Context-independent essential regulatory interactions for apoptosis and hypertrophy in the cardiac signaling network

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Supplementary Information

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I. Supplementary Figures

**Supplementary Figure S1.** Therapeutic targets for treatment of apoptosis (*) and hypertrophy (#).
Supplementray Figure S2. Effect of inhibition of epac or CaMKII on the cellular responses of cardiomyocytes under catecholamine stimulation. (A) Graphs of the CaMKII activity in HL-1 and H9C2 cells treated with isoproterenol (ISO, a synthetic catecholamine that stimulates beta-adrenergic receptor signaling, 10 µM) for indicated time in the presence or absence of ESI-09 (an epac inhibitor, 10 µM) or KN93 (a CaMKII inhibitor, 5 µM) determined using a CaMKII assay. Red asterisks, significant differences between ISO-treated and ISO-ESI-09 co-treated cells; blue asterisks, significant differences between ISO-treated and ISO-KN93 co-treated cells. (B) Graphs of the percent of viable cells treated with ISO (10 µM) for 24 hours after the one-hour pre-treatment with ESI-09 (10 µM) or KN93 (5 µM) determined using a CCK-8 assay. (C) Graphs of the percent of apoptotic cells treated with ISO (10 µM) for 24 hours after the one-hour pre-treatment with ESI-09 (10 µM) or KN93 (5 µM) determined using a cell death ELISA assay. All data represent the mean ± S.E.M. of three biological replicates. *, p < 0.05; **, p < 0.01; ***, p < 0.001; ****, p < 0.0001; Student’s t test.
**Supplementary Figure S3.** Analyses of 16 network motifs. (A) Network structure of 16 network motifs. Dynamical features to be analyzed are demonstrated in the right side. Blue bars represents the duration of the given input signal. (B) Dynamical features of the 16 network motifs. The numbers marked on x-axis is the motif number. The value of the y-axis means relative portion of parameters that generate the dynamics of interest. For a detailed explanation, see Supplementary Texts.
Supplementary Figure S4. Marginal distributions of parameters and the results of the distribution perturbation analysis. (A) Shape of marginal distribution for four associations of the network structure and dynamics (B) The results of distribution perturbation analysis. The label (A-B) on the x-axis means type A with function B used. B is one among L(Lin), H(Hill), S(Sat), A(Acc). For a detailed explanation, see Supplementary Texts.
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Supplementary Tables

Supplementray Table S1. Differential equations of the cardiac signaling network model.

| Eq. no. | Differential equation |
|---------|-----------------------|
| (1)    | \[
\frac{d[BAR]}{dt} = ISO \times (1 - BARp - BARd) - BAR
\] |
| (2)    | \[
\frac{d[BARp]}{dt} = pm_1 \times f_{act}(BAR) \times f_{act}(PKA) - BARp
\] |
| (3)    | \[
\frac{d[BARd]}{dt} = pm_2 \times f_{act}(BAR + BARp) \times f_{act}(bARKnPI3K) - BARd
\] |
| (4)    | \[
\frac{d[bARK]}{dt} = f_{act}(Gb) - bARK
\] |
| (5)    | \[
\frac{d[Gs]}{dt} = f_{act}(BAR) - Gs
\] |
| (6)    | \[
\frac{d[Gi]}{dt} = f_{act}(BARp) - Gi
\] |
| (7)    | \[
\frac{d[AC]}{dt} = pm_3 \times f_{act}(Gs) - (ADD - pm_3) \times f_{inh}(Gi) + SYN \times f_{act}(Gs) \times f_{inh}(Gi) - AC
\] |
| (8)    | \[
\frac{d[cAMP]}{dt} = pm_4 \times f_{act}(AC) + (ADD - pm_4) \times f_{inh}(PDE34) + SYN \times f_{act}(AC) \times f_{inh}(PDE34) - cAMP
\] |
| (9)    | \[
\frac{d[PKA]}{dt} = f_{act}(cAMP) - PKA
\] |
| Equation | Description |
|----------|-------------|
| (10) | \[
\frac{d[epac]}{dt} = f_{act}(cAMP) - epac
\] |
| (11) | \[
\frac{d[PDE34]}{dt} = pm_5 \times f_{act}(PKA) - (ADD - pm_5) \times f_{act}(PKA) + SYN \times f_{act}(PKA) \times f_{act}(PKC) - PDE34
\] |
| (12) | \[
\frac{d[CREB]}{dt} = pm_6 \times f_{act}(PKA) - (ADD - pm_6) \times f_{act}(MSK1) + SYN \times f_{act}(PKA) \times f_{act}(MSK1) - CREB
\] |
| (13) | \[
\frac{d[aAR]}{dt} = PE - aAR
\] |
| (14) | \[
\frac{d[Gq]}{dt} = pm_7 \times f_{act}(aAR) - (ADD - pm_7) \times f_{inh}(RGS4) + SYN \times f_{act}(aAR) \times f_{inh}(RGS4) - Gq
\] |
| (15) | \[
\frac{d[Gbg]}{dt} = \frac{(f_{act}(Gi) + f_{act}(Gq))}{2} - Gbg
\] |
| (16) | \[
\frac{d[PLC]}{dt} = f_{act}(Gq) - PLC
\] |
| (17) | \[
\frac{d[IP3]}{dt} = f_{act}(PLC) - IP3
\] |
| (18) | \[
\frac{d[DAG]}{dt} = f_{act}(PLC) - DAG
\] |
| (19) | \[
\frac{d[PKC]}{dt} = pm_8 \times f_{act}(DAG) \times f_{act}(Ca) + (1 - pm_8) \times f_{act}(DAG) \times f_{act}(Ca) \times f_{act}(CaN) - PKC
\] |
| (20) | \[
\frac{d[TAK1]}{dt} = f_{act}(PKC) - TAK1
\] |
\[
\begin{align*}
\text{(21)} & \quad \text{PKAPI3K} = pm_g \times f_{\text{act}}(\text{PKA}) \times f_{\text{inh}}(\text{PI3Krc}) + (1 - pm_g) \times f_{\text{act}}(\text{PKA}) \\
& \quad \frac{d[Ca]}{dt} = pm_{10} \times f_{\text{act}}(IP3) + (ADD - pm_{10}) \times \text{PKAPI3K} + \text{SYN} \times f_{\text{act}}(IP3) \times \text{PKAPI3K} - Ca \\
\text{(22)} & \quad \frac{d[CaM]}{dt} = f_{\text{act}}(Ca) - CaM \\
\text{(23)} & \quad \text{epacPKC} = pm_{11} \times f_{\text{act}}(\text{epac}) \times f_{\text{act}}(\text{PKC}) + (1 - pm_{11}) \times f_{\text{act}}(\text{epac}) \\
& \quad \frac{d[CaMK]}{dt} = pm_{12} \times f_{\text{act}}(CaM) \times \text{epacPKC} + (1 - pm_{12}) \times f_{\text{act}}(CaM) - CaMK \\
\text{(24)} & \quad \frac{d[CaN]}{dt} = f_{\text{act}}(CaM) - CaN \\
\text{(25)} & \quad \frac{d[HDAC]}{dt} = pm_{13} \times f_{\text{inh}}(\text{CaMK}) + pm_{14} \times f_{\text{inh}}(\text{PKC}) + (ADD - pm_{13} - pm_{14}) \times f_{\text{act}}(\text{PKA}) + \\
& \quad pm_{hdac12} \times f_{\text{inh}}(\text{CaMK}) \times f_{\text{inh}}(\text{PKC}) + pm_{hdac23} \times f_{\text{inh}}(\text{PKC}) \times f_{\text{act}}(\text{PKA}) + \\
& \quad pm_{hdac31} \times f_{\text{act}}(\text{PKA}) \times f_{\text{inh}}(\text{CaMK}) + \text{SYN} \times f_{\text{inh}}(\text{CaMK}) \times f_{\text{inh}}(\text{PKC}) \times f_{\text{act}}(\text{PKA}) - HDAC
\end{align*}
\]
\[(26)\]
\[
\frac{d[NFATnuc]}{dt} = pm_{15} \times f_{act}(CaN) + pm_{16} \times f_{inh}(JNK) + pm_{17} \times f_{inh}(p38)
\]
\[+ (ADD - pm_{15} - pm_{16} - pm_{17}) \times f_{inh}(GSK3B) + pm_{nfatnuc12} \times f_{act}(CaN) \times f_{inh}(JNK) +
\]
\[pm_{nfatnuc13} \times f_{act}(CaN) \times f_{inh}(p38) + pm_{nfatnuc14} \times f_{act}(CaN) \times f_{inh}(GSK3B) +
\]
\[pm_{nfatnuc23} \times f_{inh}(JNK) \times f_{inh}(p38) + pm_{nfatnuc24} \times f_{inh}(JNK) \times f_{inh}(GSK3B) +
\]
\[pm_{nfatnuc34} \times f_{inh}(p38) \times f_{inh}(GSK3B) + pm_{nfatnuc123} \times f_{act}(CaN) \times f_{inh}(JNK) \times f_{inh}(p38)
\]
\[+ pm_{nfatnuc124} \times f_{act}(CaN) \times f_{inh}(JNK) \times f_{inh}(GSK3B) +
\]
\[pm_{nfatnuc134} \times f_{act}(CaN) \times f_{inh}(p38) \times f_{inh}(GSK3B) +
\]
\[pm_{nfatnuc234} \times f_{inh}(JNK) \times f_{inh}(p38) \times f_{inh}(GSK3B)
\]
\[+ SYN_4 \times f_{act}(CaN) \times f_{inh}(JNK) \times f_{inh}(p38) \times f_{inh}(GSK3B) - NFATnuc
\]

\[(27)\]
\[
API = 0.5 \times cFos \times cJun + 0.5 \times cJun \times cJun
\]
\[cFos \times cJun \times GSK3B = pm_{18} \times f_{act}(API) + (ADD - pm_{18}) \times f_{inh}(GSK3B) + SYN \times f_{act}(API) \times f_{inh}(GSK3B)
\]
\[
\frac{d[NFATact]}{dt} = pm_{19} \times f_{act}(NFATnuc) \times cFos \times cJun \times GSK3B + (1 - pm_{19}) \times f_{act}(NFATnuc) - NFATact
\]

\[(28)\]
\[
\frac{d[Src]}{dt} = pm_{20} \times f_{act}(Gbg) \times f_{act}(CaN) + (1 - pm_{20}) \times f_{act}(Gbg) - Src
\]

\[(29)\]
\[
\frac{d[Shc]}{dt} = f_{act}(Src) - Shc
\]

\[(30)\]
\[
\frac{d[Grb2Sos]}{dt} = pm_{21} \times f_{inh}(ERK12) - (ADD - pm_{21}) \times f_{act}(Shc) + SYN \times f_{inh}(ERK12) \times f_{act}(Shc) - Grb2Sos
\]

\[(31)\]
\[
\frac{d[Ras]}{dt} = f_{act}(Grb2Sos) - Ras
\]
\[ \frac{d[Rac]}{dt} = f_{act}(Ras) - Rac \]

\[ \frac{d[Raf]}{dt} = \pm m_{22} \times f_{act}(Ras) + \pm m_{23} \times f_{act}(PKC) + (ADD - \pm m_{22} - \pm m_{23}) \times f_{inh}(PKA) + \pm m_{raf12} \times f_{act}(Ras) \times f_{act}(PKC) + \pm m_{raf23} \times f_{act}(PKC) \times f_{inh}(PKA) + \pm m_{raf31} \times f_{inh}(PKA) \times f_{act}(Ras) + SYN_3 \times f_{act}(Ras) \times f_{act}(PKC) \times f_{inh}(PKA) - Raf1 \]

\[ \frac{d[MEKK1]}{dt} = f_{act}(Rac) - MEKK1 \]

\[ \frac{d[MEKK234]}{dt} = f_{act}(Rac) - MEKK234 \]

\[ \frac{d[MEKK11]}{dt} = f_{act}(Rac) - MEKK11 \]

\[ \frac{d[MEK12]}{dt} = \pm m_{24} \times f_{act}(Raf1) - (ADD - \pm m_{24}) \times f_{act}(MEKK1) + SYN \times f_{act}(Raf1) \times f_{act}(MEKK1) - MEK12 \]

\[ \frac{d[MEK4]}{dt} = \pm m_{25} \times f_{act}(MEKK1) - (ADD - \pm m_{25}) \times f_{act}(MEKK234) + SYN \times f_{act}(MEKK1) \times f_{act}(MEKK234) - MEK4 \]

\[ \frac{d[MEK7]}{dt} = \pm m_{26} \times f_{act}(MEKK234) - (ADD - \pm m_{26}) \times f_{act}(MEKK11) + SYN \times f_{act}(MEKK234) \times f_{act}(MEKK11) - MEK7 \]
\[
\begin{align*}
\frac{d[MEK36]}{dt} &= pm_{27} \times f_{\text{act}}(TAK1) - (ADD - pm_{27}) \times f_{\text{act}}(MEKK11) \\
&+ \ SYN \times f_{\text{act}}(TAK1) \times f_{\text{act}}(MEKK11) - MEK36 \\
\frac{d[ERK12]}{dt} &= pm_{28} \times f_{\text{act}}(GbG) - (ADD - pm_{28}) \times f_{\text{act}}(MEK12) + SYN \times f_{\text{act}}(GbG) \times f_{\text{act}}(MEK12) - ERK12 \\
\frac{d[JNK]}{dt} &= pm_{29} \times f_{\text{act}}(CaN) + pm_{30} \times f_{\text{act}}(MEK4) + (ADD - pm_{29} - pm_{30}) \times f_{\text{act}}(MEK7) + \\
&pm_{jnk12} \times f_{\text{act}}(CaN) \times f_{\text{act}}(MEK4) + pm_{jnk23} \times f_{\text{act}}(MEK4) \times f_{\text{act}}(MEK7) + \\
&pm_{jnk31} \times f_{\text{act}}(MEK7) \times f_{\text{act}}(CaN) + SYN \times f_{\text{act}}(CaN) \times f_{\text{act}}(MEK4) \times f_{\text{act}}(MEK7) - JNK \\
\frac{d[p38]}{dt} &= pm_{31} \times f_{\text{act}}(MEK36) - (ADD - pm_{31}) \times f_{\text{act}}(MEK4) + SYN \times f_{\text{act}}(MEK36) \times f_{\text{act}}(MEK4) - p38 \\
\frac{d[PI3Krc]}{dt} &= bARKnPI3K + Grb2nPI3K - PI3Krc \\
P13Kncnt &= 1 - PI3Krc \\
\frac{d[Grb2nPI3K]}{dt} &= f_{\text{act}}(Grb2Sos) \times PI3Krcnt - Grb2nPI3K \\
\frac{d[bARKnPI3K]}{dt} &= f_{\text{act}}(bARK) \times PI3Krcnt - bARKnPI3K \\
\frac{d[Akt]}{dt} &= f_{\text{act}}(PI3Krcnt) - Akt \\
\frac{d[GSK3B]}{dt} &= f_{\text{inh}}(Akt) - GSK3B
\end{align*}
\]
| Equation | Differential Equation |
|----------|----------------------|
| (49)    | \[
\frac{dc\text{GMP}}{dt} = pm_{32} \times f_{\text{inh}}(PDE5) - (ADD - pm_{32}) \times f_{\text{act}}(s\text{GC}) + SYN \times f_{\text{inh}}(PDE5) \times f_{\text{act}}(s\text{GC}) - c\text{GMP}
\] |
| (50)    | \[
\frac{d[MEF2]}{dt} = pm_{33} \times f_{\text{act}}(p38) - (ADD - pm_{33}) \times f_{\text{inh}}(HD\text{AC}) + SYN \times f_{\text{act}}(p38) \times f_{\text{inh}}(HD\text{AC}) - MEF2
\] |
| (51)    | \[
\frac{d[G\text{ATA}]4}{dt} = pm_{34} \times f_{\text{act}}(ERK12) + pm_{35} \times f_{\text{act}}(p38) + (ADD - pm_{34} - pm_{35}) \times f_{\text{inh}}(GSK3B) +
\]
\[pm_{g\text{ata}12} \times f_{\text{act}}(ERK12) \times f_{\text{act}}(p38) + pm_{g\text{ata}23} \times f_{\text{act}}(p38) \times f_{\text{inh}}(GSK3B) +
\]
\[pm_{g\text{ata}31} \times f_{\text{inh}}(GSK3B) \times f_{\text{act}}(ERK12) + SYN_{3} \times f_{\text{act}}(ERK12) \times f_{\text{act}}(p38) \times f_{\text{inh}}(GSK3B) - G\text{ATA}4
\]
| (52)    | \[
\frac{dc\text{Fox}}{dt} = f_{\text{act}}(ERK12) - c\text{Fox}
\] |
| (53)    | \[
\frac{dc\text{Jun}}{dt} = pm_{36} \times f_{\text{act}}(J\text{NK}) - (ADD - pm_{36}) \times f_{\text{act}}(p38) + SYN \times f_{\text{act}}(J\text{NK}) \times f_{\text{act}}(p38) - c\text{Jun}
\] |
| (54)    | \[
\frac{d[M\text{SK}1]}{dt} = pm_{37} \times f_{\text{act}}(ERK12) - (ADD - pm_{37}) \times f_{\text{act}}(p38) + SYN \times f_{\text{act}}(ERK12) \times f_{\text{act}}(p38) - MSK1
\] |
| (55)    | \[
\frac{d[N\text{OS}]}{dt} = f_{\text{act}}(Akt) - N\text{OS}
\] |
| (56)    | \[
\frac{ds\text{GC}}{dt} = f_{\text{act}}(N\text{OS}) - s\text{GC}
\] |
| (57)    | \[
\frac{d[P\text{KG}]}{dt} = f_{\text{act}}(c\text{GMP}) - P\text{KG}
\] |
| (58)    | \[
\frac{d[PDE5]}{dt} = f_{\text{act}}(PKG) - PDE5
\] |
\[
\frac{d[RGS4]}{dt} = f_{act}(PKG) - RGS4
\]

\[
Apoptosis = \frac{[CaMK] + [JNK] + [p38] - [CREB] - [ERK12]}{5}
\]

\[
Hypertrophy = \frac{[NFATact] + [MEF2] + [GATA4]}{5}
\]

ADD is set to be 0.8 and SYN is 0.2. SYN\(_3\) = SYN×SYN, SYN\(_4\) = SYN×SYN×SYN×SYN
**Supplementary Table S2.** Represented regulatory process by parameters in the cardiac signaling network.

| Parameter no. | Represented link or biological process by the parameter |
|---------------|--------------------------------------------------------|
| pm₁           | maximal degree of BAR phosphorylation                  |
| pm₂           | maximal degree of BAR desensitization                  |
| pm₃           | Gs/Gi → AC                                             |
| pm₄           | AC/PDE34 → cAMP                                         |
| pm₅           | PKA/PKC → PDE34                                         |
| pm₆           | PKA/MSK1 → CREB                                         |
| pm₇           | αAR/RGS4 → Gq                                           |
| pm₈           | (DAG & Ca)/(DAG & Ca & CaN) → PKC                       |
| pm₉           | (PKA & PI3K)/PKA → activated PKA for Ca                |
| pm₁₀          | IP3/activated PKA → Ca                                  |
| pm₁₁          | (epac & PKC)/epac → activated epac for CaMK            |
| pm₁₂          | (CaM & activated epac)/CaM → CaMK                      |
| pm₁₃          | CaMK/(PKC, PKA) → HDAC                                 |
| pm₁₄          | PKC/(CaMK, PKA) → HDAC                                 |
| pm₁₅          | CaN/(JNK, p38) → NFATnucl                               |
| pm₁₆          | JNK/(CaN, p38) → NFATnucl                               |
| pm₁₇          | p38/(CaN, JNK) → NFATnucl                               |
| pm₁₈          | AP1/GSK3B → activated AP1                               |
| pm₁₉          | (NFATnucl & activated AP1)/NFATnucl → NFATact           |
| pm₂₀          | (Gbg & CaN)/Gbg → Sre                                  |
| pm₂₁          | ERK12/Shc → Grb2Sos                                    |
| pm₂₂          | Ras/(PKC, PKA) → Raf1                                   |
| pm₂₃          | PKC/(Ras, PKA) → Raf1                                   |
| pm₂₄          | Raf1/MEKK1 → MEK12                                      |
| pm₂₅          | MEKK1/MEKK234 → MEK4                                    |
| pm₂₆          | MEKK234/MEKK1 → cJun                                    |
| pm₂₇          | TAK1/MEKK11 → MEK36                                     |
| pm₂₈          | Gbg/MEK12 → ERK12                                       |
| pm₂₉          | CaN/(MEK4, MEK7) → JNK                                  |
| pm₃₀          | MEK4/(CaN, MEK7) → JNK                                  |
| pm₃₁          | MEK36/MEK4 → p38                                       |
| pm32  | PDE5/GC → cGMP  |
|-------|-----------------|
| pm33  | p38/HDAC → MEF2 |
| pm34  | ERK12/(p38, GSK3B) → GATA4 |
| pm35  | p38/(ERK12, GSK3B) → GATA4 |
| pm36  | JNK/p38 → cJun |
| pm37  | ERK12/p38 → MSK1 |

Note that the mark '→' represents influence that is either activation or inhibition.
**Supplementray Table S3.** Type of equation and constraint of parameters in the cardiac signaling network model.

| Eq no. | Dependent variable | Related parameter | Equation type[^a] | Constraints of parameter |
|--------|--------------------|-------------------|-------------------|--------------------------|
| (2)    | BARp[^b]           | pm₁              | sub               | 0≤pm₁ ≤1 |
| (3)    | BARd[^b]           | pm₂              | sub               | 0≤pm₂ ≤1 |
| (7)    | AC                 | pm₃              | add               | 0≤pm₃ ≤1-SYN |
| (8)    | cAMP               | pm₄              | add               | 0≤pm₄ ≤1-SYN |
| (11)   | PDE34              | pm₅              | add               | 0≤pm₅ ≤1-SYN |
| (12)   | CREB               | pm₆              | add               | 0≤pm₆ ≤1-SYN |
| (14)   | Gq                 | pm₇              | add               | 0≤pm₇ ≤1-SYN |
| (19)   | PKC[^c]            | pm₈              | sub               | 0≤pm₈ ≤1 |
| (21)   | Ca[^d]             | pm₉              | sub               | 0≤pm₉ ≤1 |
| (21)   | Ca[^d]             | pm₁₀             | add               | 0≤pm₁₀ ≤1-SYN |
| (23)   | CaMK               | pm₁₁             | sub               | 0≤pm₁₁ ≤1 |
| (23)   | CaMK               | pm₁₂             | sub               | 0≤pm₁₂ ≤1 |
| (25)   | HDAC               | pm₁₃, pm₁₄       | add               | 0≤ pm₁₃, pm₁₄ ≤1-SYN  |
|        |                    |                   |                   | pm₁₃+ pm₁₄ ≤1-SYN  |
|        |                    |                   |                   | pm_em=1-SYN-pm₁₃-pm₁₄  |
|        |                    |                   |                   | sum_hdac=pm₁₃ × pm₁₄+ pm₁₄ × pm_em + pm_em × pm₁₃  |
|        |                    |                   |                   | pm Hdac1=(pm₁₃ × pm₁₄/ sum_hdac)×(SYN-SYN3)  |
|        |                    |                   |                   | pm Hdac2=(pm₁₄ × pm_em/ sum_hdac)×(SYN-SYN3)  |
|        |                    |                   |                   | pm Hdac3=( pm_em × pm₁₃/ sum_hdac)×(SYN-SYN3)  |
| (26) | NFATnuc | pm$_{15}$, pm$_{16}$, pm$_{17}$ | add | $0 \leq pm_{15}, pm_{16}, pm_{17} \leq 1$-SYN |
|------|--------|-----------------|-----|--------------------------------------------------|
|      |        |                 |     | $pm_{15} + pm_{16} + pm_{17} \leq 1$-SYN          |
|      |        |                 |     | $pm_{rem} = 1 - pm_{15} - pm_{16} - pm_{17}$     |
|      |        |                 |     | $SYN_{4.2} = SYN \times (1 - SYN)$               |
|      |        |                 |     | $SYN_{4.3} = SYN \times SYN \times (1 - SYN)$   |
|      |        |                 |     | $sum_{2} = pm_{15} \times pm_{16} + pm_{15} \times pm_{17} + pm_{17} \times pm_{rem} + pm_{16} \times pm_{rem}$ |
|      |        |                 |     | $sum_{3} = pm_{15} \times pm_{16} \times pm_{17} + pm_{15} \times pm_{16} \times pm_{rem} + pm_{15} \times pm_{17} \times pm_{rem}$ |
|      |        |                 |     | $pm_{nFATnuc12} = (pm_{15} \times pm_{16}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc13} = (pm_{15} \times pm_{17}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc14} = (pm_{15} \times pm_{rem}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc23} = (pm_{16} \times pm_{17}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc24} = (pm_{16} \times pm_{rem}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc34} = (pm_{17} \times pm_{rem}) / sum_{2} \times SYN_{4.2}$ |
|      |        |                 |     | $pm_{nFATnuc123} = (pm_{15} \times pm_{16} \times pm_{17}) / sum_{3} \times SYN_{4.3}$ |
|      |        |                 |     | $pm_{nFATnuc124} = (pm_{15} \times pm_{16} \times pm_{rem}) / sum_{3} \times SYN_{4.3}$ |
|      |        |                 |     | $pm_{nFATnuc134} = (pm_{15} \times pm_{17} \times pm_{rem}) / sum_{3} \times SYN_{4.3}$ |
|      |        |                 |     | $pm_{nFATnuc234} = (pm_{16} \times pm_{17} \times pm_{rem}) / sum_{3} \times SYN_{4.3}$ |
| (27) | NFATact| pm$_{18}$       | add | $0 \leq pm_{18} \leq 1$-SYN                      |
| (27) | NFATact| pm$_{19}$       | sub | $0 \leq pm_{19} \leq 1$                          |
| (28) | Src    | pm$_{20}$       | sub | $0 \leq pm_{20} \leq 1$                          |
| (29) | Grb2Sos| pm$_{21}$       | add | $0 \leq pm_{21} \leq 1$-SYN                      |
|   | Reaction | Variables | Conditions |
|---|----------|-----------|------------|
| (33) | Raf1 | \(pm_{22}, pm_{23}\) | \(0 \leq pm_{22}, pm_{23} \leq 1-SYN\) |
|   |   |   | \(pm_{22} + pm_{23} \leq 1-SYN\) |
|   |   |   | \(pm_{rem} = 1-SYN - pm_{22} - pm_{23}\) |
|   |   |   | \(sum_{raf} = pm_{22} \times pm_{23} + pm_{23} \times pm_{rem} + pm_{rem} \times pm_{22}\) |
|   |   |   | \(pm_{raf_{12}} = \left(pm_{22} \times pm_{23}/ sum_{raf}\right) \times (SYN-SYN3)\) |
|   |   |   | \(pm_{raf_{23}} = \left(pm_{23} \times pm_{rem}/ sum_{raf}\right) \times (SYN-SYN3)\) |
|   |   |   | \(pm_{raf_{31}} = \left(pm_{rem} \times pm_{22}/ sum_{raf}\right) \times (SYN-SYN3)\) |
| (37) | MEK12 | \(pm_{24}\) | \(0 \leq pm_{24} \leq 1-SYN\) |
| (38) | MEK4 | \(pm_{25}\) | \(0 \leq pm_{25} \leq 1-SYN\) |
| (39) | MEK7 | \(pm_{26}\) | \(0 \leq pm_{26} \leq 1-SYN\) |
| (40) | MEK36 | \(pm_{27}\) | \(0 \leq pm_{27} \leq 1-SYN\) |
| (41) | ERK12 | \(pm_{28}\) | \(0 \leq pm_{28} \leq 1-SYN\) |
| (42) | JNK | \(pm_{29}, pm_{30}\) | \(0 \leq pm_{29}, pm_{30} \leq 1-SYN\) |
|   |   |   | \(pm_{29} + pm_{30} \leq 1-SYN\) |
|   |   |   | \(pm_{rem} = 1-SYN - pm_{29} - pm_{30}\) |
|   |   |   | \(sum_{jnk} = pm_{29} \times pm_{30} + pm_{30} \times pm_{rem} + pm_{rem} \times pm_{29}\) |
|   |   |   | \(pm_{jnk_{12}} = \left(pm_{29} \times pm_{30}/ sum_{jnk}\right) \times (SYN-SYN3)\) |
|   |   |   | \(pm_{jnk_{23}} = \left(pm_{30} \times pm_{rem}/ sum_{jnk}\right) \times (SYN-SYN3)\) |
|   |   |   | \(pm_{jnk_{31}} = \left(pm_{rem} \times pm_{29}/ sum_{jnk}\right) \times (SYN-SYN3)\) |
| (43) | p38 | \(pm_{31}\) | \(0 \leq pm_{31} \leq 1-SYN\) |
| (49) | cGMP | \(pm_{32}\) | \(0 \leq pm_{32} \leq 1-SYN\) |
| (50) | MEF2 | \(pm_{33}\) | \(0 \leq pm_{33} \leq 1-SYN\) |
| (51) | GATA4 | \(pm_{34}, pm_{35}\) | \(0 \leq pm_{34}, pm_{35} \leq 1-SYN\) |
Constitution of differential equation is classified to two classes: type add and type sub. Type add is used when different links converging to one node can take independent roles in regulating the node. In contrast, type sub is used when one link takes a subsidiary role in regulating the node in the same situation.

Because these equations represent process of transformation, equation type should be 'sub'

Both Ca and DAG is required to activate PKC and CaN takes subsidiary role in such activation.

Since PI3K only inhibits PKA-induced calcium activation, the equation takes the form of the stepwise activation rather than direct convergence of three different links
Supplementary Table S4. Verification data in the cardiac signaling network.

| Reference (PMID) | Experimental setting | Input       | Output               | Effect | Time  |
|------------------|----------------------|-------------|----------------------|--------|-------|
| 11585926         | cardiomyocytes + Ad GATA4 TF | PE(10μM)    | p-GATA4/GATA4        | 3.5    | 0hr   |
| 11585926         | cardiomyocytes + Ad GATA4 TF | PE(10μM)    | p-GATA4/GATA4        | 5      | 1hr   |
| 11585926         | cardiomyocytes + Ad GATA4 TF | PE(10μM)    | p-GATA4/GATA4        | 8      | 3hr   |
| 11585926         | cardiomyocytes + Ad GATA4 TF | PE(10μM)    | p-GATA4/GATA4        | 10     | 24hr  |
| 11585926         | NRVM                 | Saline      | p-GATA4/GATA4        | 1      | 3hr   |
| 11585926         | NRVM                 | PE          | p-GATA4/GATA4        | 3      | 3hr   |
| 10737771         | NRCM                 | none        | MEF2                 | 1      | NA    |
| 10737771         | NRCM                 | PE          | MEF2                 | 4.5    | NA    |
| 15522277         | NRVM                 | PE          | CREB                 | 0.2    | 0min  |
| 15522277         | NRVM                 | PE          | CREB                 | 0.3    | 1min  |
| 15522277         | NRVM                 | PE          | CREB                 | 0.5    | 2min  |
| 15522277         | NRVM                 | PE          | CREB                 | 1.5    | 5min  |
| 15522277         | NRVM                 | PE          | CREB                 | 1.4    | 10min |
| 15522277         | NRVM                 | PE          | CREB                 | 1.5    | 15min |
| 15522277         | NRVM                 | PE          | CREB                 | 0.6    | 30min |
| 15522277         | NRVM                 | none        | MSK1                 | 50     | 10min |
| 15522277         | NRVM                 | PE          | MSK1                 | 200    | 10min |
| 11356841         | NRVM+AdGATA4         | none        | GATA4                | 1      | 3hr   |
| 11356841         | NRVM+AdGATA4         | PE          | GATA4                | 2.1    | 3hr   |
| 24152730         | NRCM                 | none        | HDAC4 mRNA expression | 5     | 24hr  |
| 24152730         | NRCM                 | Ang II     | HDAC4 mRNA expression | 1.5   | 24hr  |
| 24152730         | NRCM                 | none        | HDAC5 mRNA expression | 7     | 24hr  |
| 24152730         | NRCM                 | Ang II     | HDAC5 mRNA expression | 2     | 24hr  |
| 24152730         | NRCM                 | none        | HDAC4 protein expression | 12 | 24hr  |
| 24152730         | NRCM                 | Ang II     | HDAC4 protein expression | 4     | 24hr  |
| 24152730         | NRCM                 | none        | HDAC5 protein expression | 13 | 24hr  |
| Experiment | Cell Type | Treatment | Assay | Value | Duration |
|------------|-----------|-----------|-------|-------|----------|
| 24152730   | NRCM      | Ang II    | HDAC5 protein expression | 3 | 24hr |
| 24152730   | NRCM      | none      | GATA4 protein expression | 100 | 24hr |
| 24152730   | NRCM      | Ang II    | GATA4 protein expression | 330* | 24hr |
| 24152730   | NRCM      | none      | GATA4 mRNA expression | 1 | 24hr |
| 24152730   | NRCM      | Ang II    | GATA4 mRNA expression | 3.3* | 24hr |
| 24152730   | NRCM      | none      | GATA4 transcriptional activity | 1 | 24hr |
| 24152730   | NRCM      | Ang II    | GATA4 transcriptional activity | 2.8* | 24hr |
| 12177418   | Ventricular cardiomyocyte | none | nuclear localization of NFAT | 23 | 48hr |
| 12177418   | Ventricular cardiomyocyte | PE | nuclear localization of NFAT | 50 | 48hr |
| 12494267   | Neonatal rat cardiomyocytes | 100nM Ang2 | ERK12 | 100 | 5min |
| 12494267   | Neonatal rat cardiomyocytes | 100nM Ang2 | ERK12 | 45 | 30min |
| 12494267   | Neonatal rat cardiomyocytes | 100nM Ang2 | ERK12 | 27.5 | 60min |
| 12494267   | Neonatal rat cardiomyocytes | 100nM Ang2 | ERK12 | 7.5 | 120min |
| 9751683    | ARVM(adult rat ventricular myocytes) | control | Apoptosis | 10 | 24h |
| 9751683    | ARVM      | NE(10microM/L) | Apoptosis | 36 | 24h |
| 9751683    | ARVM      | control | Apoptosis | 7 | 24h |
| 9751683    | ARVM      | ISO(10microM/L) | Apoptosis | 14.6 | 24h |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 1 | 0min |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 5 | 2min |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 11.4 | 5min |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 8 | 15min |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 5.75 | 30min |
| 8921810    | Cardiomyocytes | NE (1*10^-5 mol/L) | MAPK | 4.8 | 60min |
| 9363896    | HEK293     | none      | pMAPK | 1 | 5min |
| 9363896    | HEK293     | Isoprenaline(10^-10) | pMAPK | 1.2 | 5min |
| 9363896    | HEK293     | Isoprenaline(10^-9) | pMAPK | 2 | 5min |
| ID          | Cell Type       | Treatment                | Control/Condition                           | Result          | Time  |
|-------------|-----------------|--------------------------|---------------------------------------------|-----------------|-------|
| 9363896     | HEK293          | Isoprenaline(10^-8)      | pMAPK                                        | 4               | 5min  |
| 9363896     | HEK293          | Isoprenaline(10^-7)      | pMAPK                                        | 5.5             | 5min  |
| 9363896     | HEK293          | Isoprenaline(10^-6)      | pMAPK                                        | 6               | 5min  |
| 9363896     | HEK293          | Isoprenaline(10^-5)      | pMAPK                                        | 5.8             | 5min  |
| 15964981    | Adult cardiomyocyte(Rat) | control | CaMKII activation | 100             | 15min |
| 15964981    | Adult cardiomyocyte(Rat) | phe(0.1uM) | CaMKII activation | 130             | 15min |
| 15964981    | Adult cardiomyocyte(Rat) | phe(1uM) | CaMKII activation | 170             | 15min |
| 15964981    | Adult cardiomyocyte(Rat) | phe(10uM) | CaMKII activation | 190             | 15min |
| 15964981    | Adult cardiomyocyte(Rat) | phe(100uM) | CaMKII activation | 185             | 15min |
| 15572667    | control mouse   | none                     | p38 kinase activity                          | 1               | 0min  |
| 15572667    | control mouse   | phenylephrine            | p38 kinase activity                          | 1.6             | 30min |
| 15572667    | p38aCKO(10wk)   | none                     | p38 kinase activity                          | 0.25            | 0min  |
| 15572667    | p38aCKO(10wk)   | phenylephrine            | p38 kinase activity                          | 0.4             | 30min |
| 15572667    | control         | saline                   | TUNEL(+) myocytes                            | 23              | NA    |
| 15572667    | control         | isoproterenol(7.5mg/kg/day for 2days) | TUNEL(+) myocytes | 26              | NA    |
| 15572667    | p38aCKO(10wk)   | saline                   | TUNEL(+) myocytes                            | 25              | NA    |
| 15572667    | p38aCKO(10wk)   | isoproterenol(7.5mg/kg/day for 2days) | TUNEL(+) myocytes | 50              | NA    |
| 12177418    | Ventricular cardiomyocyte | none       | cell size                                    | 800             | 48hr  |
| 12177418    | Ventricular cardiomyocyte | PE         | cell size                                    | 1200            | 48hr  |
| 11435346    | NRVM            | none                     | ERK1/2                                       | 0.1             | NA    |
| 11435346    | NRVM+thapsigargin/nifedipine/EGTA pretx | none       | ERK1/2                                       | 0.1/0.1/0.1     | NA    |
| 11435346    | NRVM            | Iso                      | ERK1/2                                       | 1               | NA    |
| 11435346    | NRVM+thapsigargin/nifedipine/EGTA pretx | Iso          | ERK1/2                                       | 0.5/0.2/0.2     | NA    |
| 11435346    | NRVM            | none                     | ERK1/2                                       | 0.1             | 8min  |
| 11435346    | NRVM            | AngII                    | ERK1/2                                       | 0.4             | 8min  |
| 11435346    | NRVM            | PHE                      | ERK1/2                                       | 2               | 8min  |
| 11435346    | NRVM            | Iso(10uM)                 | calcineurin                                  | 100             | 0min  |
| ID          | Cell Type | Condition     | Parameter | Unit  | Value | Time  |
|-------------|-----------|---------------|-----------|-------|-------|-------|
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 120   | 1min  |
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 180   | 2min  |
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 260   | 5min  |
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 150   | 15min |
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 130   | 30min |
| 11435346    | NRVM      | Iso(0uM)      | calcineurin |       | 100   | 5min  |
| 11435346    | NRVM      | Iso(0.01uM)   | calcineurin |       | 180   | 5min  |
| 11435346    | NRVM      | Iso(0.1uM)    | calcineurin |       | 190   | 5min  |
| 11435346    | NRVM      | Iso(1uM)      | calcineurin |       | 200   | 5min  |
| 11435346    | NRVM      | Iso(10uM)     | calcineurin |       | 310   | 5min  |
| 11435346    | NRVM      | Iso(100uM)    | calcineurin |       | 300   | 5min  |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 0.1   | 0min  |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 0.5   | 1min  |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 1     | 2min  |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 1     | 5min  |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 1     | 10min |
| 11435346    | NRVM      | Iso           | Raf-1     |       | 0.5   | 15min |
| 24248367    | NRVM      | control       | PDE3A1    |       | 0.1   | NA    |
| 24248367    | NRVM      | Iso           | PDE3A1    |       | 1     | NA    |
| 23933582    | ARVM      | control       | calcium(Fura2 ratio) |       | 20   | NA    |
| 23933582    | ARVM      | Iso           | calcium(Fura2 ratio) |       | 100  | NA    |
| 11799083    | NRVM      | PE            | AP-1 DNA binding activity |       | 10   | 0hr   |
| 11799083    | NRVM      | PE            | AP-1 DNA binding activity |       | 4.8  | 3hr   |
| 11799083    | NRVM      | PE            | AP-1 DNA binding activity |       | 4    | 6hr   |
| 11799083    | NRVM      | PE            | AP-1 DNA binding activity |       | 3.8  | 12hr  |
| 11799083    | NRVM      | PE            | AP-1 DNA binding activity |       | 2.1  | 24hr  |
| 9584192     | myocyte+GST-ATF2 | none  | p38 activity |       | 0    | 0min  |
| 9584192     | myocyte+GST-ATF2 | PE    | p38 activity |       | 7    | 15min |
| 9584192     | myocyte+GST-ATF2 | PE    | p38 activity |       | 10   | 30min |
| 9584192     | myocyte+GST-ATF2 | PE    | p38 activity |       | 3    | 60min |
| Experiment ID | Treatment | Reagent | Activity | Time (min) |
|---------------|-----------|---------|----------|------------|
| 9584192       | myocyte+GST-ATF2 | PE      | p38 activity | 2          |
| 9584192       | myocyte+GST-c-Jun | none    | JNK activity | 0          | 0min       |
| 9584192       | myocyte+GST-c-Jun | PE      | JNK activity | 10         | 15min      |
| 9584192       | myocyte+GST-c-Jun | PE      | JNK activity | 13         | 30min      |
| 9584192       | myocyte+GST-c-Jun | PE      | JNK activity | 5          | 60min      |
| 9584192       | myocyte+GST-c-Jun | PE      | JNK activity | 3          | 120min     |
| 9584192       | myocyte+MBP     | none    | ERK activity | 0          | 0min       |
| 9584192       | myocyte+MBP     | PE      | ERK activity | 4          | 15min      |
| 9584192       | myocyte+MBP     | PE      | ERK activity | 2          | 30min      |
| 9584192       | myocyte+MBP     | PE      | ERK activity | 1          | 60min      |
| 9584192       | myocyte+MBP     | PE      | ERK activity | 1          | 120min     |
| 15367659      | NRVM+Ad GFP-HDAC5 | none    | HDAC5 nuclear localization | 750 | 2hr       |
| 15367659      | NRVM+Ad GFP-HDAC5 | PE      | HDAC5 nuclear localization | 150 | 2hr       |
| 20362664      | NRVM serum-starved (24h) | ISO | RGS expression/18s rRNA | 4.5 | 0.5h      |
| 20362664      | NRVM serum-starved (24h) | ISO | RGS expression/18s rRNA | 8 | 1h         |
| 20362664      | NRVM serum-starved (24h) | ISO | RGS expression/18s rRNA | 4 | 2h         |
| 20362664      | NRVM serum-starved (24h) | ISO | RGS expression/18s rRNA | 2.5 | 6h        |
| 20362664      | NRVM serum-starved (24h) | ISO | RGS expression/18s rRNA | 1 | 24h       |
**Supplementary Table S5.** Verification results in the cardiac signaling network.

| | Lin | Hill | Sat | Acc | Combination* |
|---|---|---|---|---|---|
| Increase of RGS4 | 0.999999 | 0.618143 | 0.999986 | 0.999995 | 0.849005 |
| Increase of Ca | 0.975967 | 0.60222 | 0.944983 | 0.994678 | 0.841005 |
| Increase of PDE34 | 0.992181 | 0.622474 | 0.984437 | 0.997869 | 0.811249 |
| Increase of Raf1 | 0.798534 | 0.511632 | 0.85876 | 0.700121 | 0.691984 |
| Increase of CaN | 0.975967 | 0.602289 | 0.944971 | 0.994657 | 0.842722 |
| Increase of JNK | 0.903222 | 0.521664 | 0.881672 | 0.921375 | 0.801478 |
| Increase of p38 | 0.891231 | 0.504119 | 0.912041 | 0.862816 | 0.816612 |
| Increase of CaMK | 0.978696 | 0.606074 | 0.95267 | 0.995022 | 0.835570 |
| Increase of ERK12 | 0.994433 | 0.616307 | 0.997128 | 0.990608 | 0.833709 |
| Increase of NFATnuc | 0.746256 | 0.525368 | 0.595141 | 0.9129 | 0.676622 |
| Decrease of HDAC | 0.872288 | 0.945868 | 0.915132 | 0.793033 | 0.864994 |
| Increase of MSK1 | 0.988983 | 0.588751 | 0.996149 | 0.984066 | 0.831351 |
| Increase of CREB | 0.926242 | 0.48057 | 0.921248 | 0.929137 | 0.810174 |
| Increase of MEF2 | 0.921411 | 0.559428 | 0.956791 | 0.840387 | 0.829389 |
| Increase of GATA4 | 0.99415 | 0.606909 | 0.997398 | 0.993794 | 0.868812 |
| Increase of cJun | 0.911455 | 0.520087 | 0.914718 | 0.911178 | 0.827229 |

Effect of catecholamine on the distribution of the 16 network components evaluated using each function type separately or using different types of response functions in a combined manner.

* Results of the mathematical simulation analysis performed using the combination of the four different response functions
**Supplementary Table S6.** Results of the one-distribution perturbation analyses in the cardiac signaling network.

1) Result of one-distribution perturbation analysis for apoptosis or hypertrophy when each response function was separately applied

| Response Function | Apoptosis | Hypertrophy |
|-------------------|-----------|-------------|
| **Lin**           | **Hill**  | **Sat**     | **Acc** |
| pm7               | 2.069     | 1.646       | 2.483   | 1.871   |
|                   | <0.001    | <0.001      | <0.001  | <0.001  |
| pm10              | 2.140     | 1.905       | 1.933   | 2.221   |
|                   | <0.001    | <0.001      | <0.001  | <0.001  |
| pm12              | 1.154     | 1.236       | 1.169   | 1.254   |
|                   | 0.024     | <0.001      | 0.021   | <0.001  |
| pm21              | 1.163     | 1.273       | 1.484   | 1.167   |
|                   | 0.023     | <0.001      | <0.001  | 0.021   |
| pm28              | 1.335     | 1.162       | 1.162   | 1.450   |
|                   | <0.001    | 0.027       | 0.021   | <0.001  |

Threshold: top 5%

| Response Function | Apoptosis | Hypertrophy |
|-------------------|-----------|-------------|
| **Lin**           | **Hill**  | **Sat**     | **Acc** |
| pm7               | 3.115     | 2.285       | 3.306   | 2.322   |
|                   | <0.001    | <0.001      | <0.001  | <0.001  |
| pm10              | 1.557     | 1.542       | 1.367   | 1.692   |
|                   | <0.001    | <0.001      | <0.001  | <0.001  |
| pm15              | 1.151     | 1.267       | 1.162   | 1.169   |
|                   | 0.021     | <0.001      | 0.024   | 0.021   |
| pm16              | 1.148     | 1.193       | 1.218   | 1.178   |
|                   | 0.022     | 0.008       | <0.001  | 0.010   |
| pm17              | 1.148     | 1.170       | 1.196   | 1.154   |
|                   | 0.022     | 0.009       | 0.007   | 0.020   |
| pm21              | 1.626     | 1.143       | 1.873   | 1.207   |
|                   | <0.001    | 0.033       | <0.001  | <0.001  |

Threshold: top 20%
Results of one-distribution perturbation analysis for apoptosis and hypertrophy when the threshold for determining the marginal distributions was set to top 5% or 20%. The effect is represented as the ratio between the degree of appearance of phenotypes in the one-distribution perturbation analysis and that in the control distributions. Parameters of which the marginal distributions significantly (p<0.05) increased apoptosis or hypertrophy in all response function types are shown. The mathematical analysis was all repeated for 10 times using different random seeds of 1 million parameter sets for each case. P-values were determined by comparison with the control distributions using Student’s *t* test. See Supplementary Data Sets for full data.
2) Result of reverse one-distribution perturbation analysis for apoptosis or hypertrophy when each response function was separately applied

| Threshold: top 5% | Apoptosis | Hypertrophy | Apoptosis |
|------------------|-----------|-------------|-----------|
|                   | Lin       | Hill        | Sat       | Acc       |
| pm7               | 0.012     | <0.001      | 0.214     | <0.001    | 0.024     | <0.001      | 0.130     | <0.001    |
| pm10              | 0.158     | <0.001      | 0.376     | <0.001    | 0.180     | <0.001      | 0.050     | <0.001    |
| pm12              | 0.816     | 0.009       | 0.743     | <0.001    | 0.761     | <0.001      | 0.694     | <0.001    |
| pm23              | 0.816     | 0.009       | 0.614     | <0.001    | 0.714     | <0.001      | 0.784     | <0.001    |
| pm28              | 0.671     | <0.001      | 0.728     | <0.001    | 0.789     | <0.001      | 0.529     | <0.001    |
| pm30              | 0.714     | <0.001      | 0.470     | <0.001    | 0.826     | 0.017       | 0.633     | <0.001    |

| Threshold: top 20% | Apoptosis | Hypertrophy | Apoptosis |
|--------------------|-----------|-------------|-----------|
|                   | Lin       | Hill        | Sat       | Acc       |
| pm7                | 0.302     | <0.001      | 0.536     | <0.001    | 0.255     | <0.001      | 0.387     | <0.001    |
| pm10               | 0.274     | <0.001      | 0.431     | <0.001    | 0.394     | <0.001      | 0.290     | <0.001    |
| pm12               | 0.888     | 0.032       | 0.829     | 0.011     | 0.897     | 0.038       | 0.754     | <0.001    |
| pm23               | 0.890     | 0.039       | 0.729     | <0.001    | 0.863     | 0.011       | 0.897     | 0.042     |
| Hypertrophy | Lin Effect p-value | Hill Effect p-value | Sat Effect p-value | Acc Effect p-value |
|-------------|--------------------|--------------------|-------------------|-------------------|
| pm28        | 0.788 <0.001       | 0.895 0.040        | 0.847 0.011       | 0.700 <0.001      |
| pm30        | 0.790 <0.001       | 0.680 <0.001       | 0.887 0.041       | 0.715 <0.001      |

Results of reverse one-distribution perturbation analysis for apoptosis and hypertrophy when the threshold for determining the marginal distributions was set to top 5% or 20%. The effect is represented as the ratio between the degree of appearance of phenotypes in the one-distribution perturbation analysis and that in the control distributions. Parameters of which the marginal distributions significantly (p<0.05) decreased apoptosis or hypertrophy in all response function types are shown. The mathematical analysis was all repeated for 10 times using different random seeds of 1 million parameter sets for each case. P-values were determined by comparison with the control distributions using Student’s $t$ test. See Supplementary Data Sets for full data.
3) Result of one-distribution perturbation analysis when four different response function types were applied in a combined manner

|                      | Effect | p-value | Effect | p-value | Effect | p-value |
|----------------------|--------|---------|--------|---------|--------|---------|
| **Apoptosis**        |        |         |        |         |        |         |
| One-distribution     |        |         |        |         |        |         |
| perturbation analysis|        |         |        |         |        |         |
| Top 5%               |        |         |        |         |        |         |
| pm7                  | 1.888  | <0.001  | 1.700  | <0.001  | 1.385  | <0.001  |
| pm10                 | 1.876  | <0.001  | 1.667  | <0.001  | 1.597  | <0.001  |
| pm12                 | 1.349  | <0.001  | 1.182  | 0.012   | 1.176  | 0.012   |
| pm21                 | 1.397  | <0.001  | 1.214  | <0.001  | 1.174  | 0.013   |
| pm28                 | 1.332  | <0.001  | 1.188  | 0.012   | 1.166  | 0.028   |
| **Hypertrophy**      |        |         |        |         |        |         |
| One-distribution     |        |         |        |         |        |         |
| perturbation analysis|        |         |        |         |        |         |
| Top 5%               |        |         |        |         |        |         |
| pm7                  | 2.412  | <0.001  | 2.350  | <0.001  | 1.955  | <0.001  |
| pm10                 | 1.397  | <0.001  | 1.334  | <0.001  | 1.247  | <0.001  |
| pm15                 | 1.291  | <0.001  | 1.175  | 0.010   | 1.165  | 0.012   |
| pm16                 | 1.259  | <0.001  | 1.220  | <0.001  | 1.146  | 0.022   |
| pm17                 | 1.191  | 0.006   | 1.153  | 0.018   | 1.142  | 0.025   |
| pm21                 | 1.438  | <0.001  | 1.396  | <0.001  | 1.292  | <0.001  |
| **Apoptosis**        |        |         |        |         |        |         |
| Reverse one-distribution perturbation analysis | | | | | | |
| Top 5%               |        |         |        |         |        |         |
| pm7                  | 0.192  | <0.001  | 0.413  | <0.001  | 0.497  | <0.001  |
| pm10                 | 0.338  | <0.001  | 0.391  | <0.001  | 0.518  | <0.001  |
| pm12                 | 0.775  | <0.001  | 0.853  | 0.028   | 0.891  | 0.040   |
| pm23                 | 0.797  | <0.001  | 0.823  | 0.016   | 0.880  | 0.018   |
| pm28                 | 0.778  | <0.001  | 0.812  | 0.010   | 0.849  | 0.023   |
| pm30                 | 0.782  | <0.001  | 0.822  | 0.011   | 0.848  | 0.022   |
### Hypertrophy

|     | Top 5% Effect | p-value | Top 10% Effect | p-value | Top 20% Effect | p-value |
|-----|--------------|---------|---------------|---------|---------------|---------|
| pm7 | 0.177        | <0.001  | 0.269         | <0.001  | 0.503         | <0.001  |
| pm10| 0.685        | <0.001  | 0.759         | <0.001  | 0.795         | <0.001  |
| pm16| 0.634        | <0.001  | 0.693         | <0.001  | 0.747         | <0.001  |
| pm17| 0.699        | <0.001  | 0.733         | <0.001  | 0.778         | <0.001  |
| pm35| 0.718        | <0.001  | 0.827         | 0.007   | 0.896         | 0.034   |

Results of one-distribution perturbation analysis for apoptosis and hypertrophy when four different response function types were applied in a combined manner. The effect is represented as the ratio between the degree of appearance of phenotypes in one-distribution perturbation analysis and that in the control distributions. Threshold for determining the marginal distributions was set to top 5%, 10%, or 20%. Parameters of which the marginal distributions significantly (p<0.05) increased apoptosis or hypertrophy are shown. The mathematical analysis was all repeated for 10 times using different random seeds of 1 million parameter sets for each case. P-values were determined by comparison with the control distributions using Student’s 𝑡 test. See Supplementary Data Sets for full data.
Supplementray Table S7. Results of two-distribution perturbation analysis when four different response function types were applied in a combined manner.

| Pair of perturbed parameter distributions | 1 million parameter sets | 10 million parameter sets | 100 million parameter sets |
|-------------------------------------------|--------------------------|---------------------------|-----------------------------|
|                                           | Synergistic effect | p-value  | Synergistic effect | p-value  | Synergistic effect | p-value  |
| pm1-pm10                                  | 0.11  | 0.006  | 0.125  | 0.008  | 0.108  | 0.007  |
| pm2-pm10                                  | 0.113 | 0.009  | 0.096  | 0.017  | 0.117  | 0.010  |
| pm3-pm10                                  | 0.101 | 0.006  | 0.103  | 0.008  | 0.111  | 0.009  |
| pm6-pm10                                  | 0.196 | 0.004  | 0.211  | <0.001 | 0.185  | 0.002  |
| pm7-pm10                                  | 0.482 | <0.001 | 0.463  | <0.001 | 0.454  | <0.001 |
| pm7-pm30                                  | 0.09  | 0.019  | 0.078  | 0.015  | 0.079  | 0.011  |
| pm8-pm10                                  | 0.097 | 0.015  | 0.108  | 0.010  | 0.12   | 0.009  |
| pm9-pm10                                  | 0.113 | 0.009  | 0.098  | 0.018  | 0.115  | 0.007  |
| pm10-pm11                                 | 0.149 | 0.005  | 0.163  | 0.002  | 0.169  | 0.004  |
| pm10-pm13                                 | 0.119 | 0.007  | 0.107  | 0.005  | 0.128  | 0.009  |
| pm10-pm14                                 | 0.091 | 0.013  | 0.093  | 0.011  | 0.108  | 0.009  |
| pm10-pm15                                 | 0.065 | 0.026  | 0.071  | 0.013  | 0.07   | 0.032  |
| pm10-pm17                                 | 0.091 | 0.014  | 0.084  | 0.010  | 0.082  | 0.018  |
| pm10-pm19                                 | 0.09  | 0.019  | 0.086  | 0.014  | 0.104  | 0.010  |
| pm10-pm20                                 | 0.092 | 0.012  | 0.091  | 0.014  | 0.105  | 0.006  |
| pm10-pm26                                 | 0.066 | 0.031  | 0.068  | 0.031  | 0.073  | 0.011  |
| pm10-pm30                                 | 0.118 | 0.008  | 0.112  | 0.006  | 0.138  | 0.008  |
| pm10-pm32                                 | 0.08  | 0.014  | 0.09   | 0.015  | 0.081  | 0.017  |
| pm10-pm33                                 | 0.057 | 0.029  | 0.066  | 0.026  | 0.058  | 0.029  |
Results of two-distribution perturbation analysis for apoptosis and hypertrophy when four different response function types were applied in a combined manner. The synergistic effect was calculated as the difference between the effect of simultaneous perturbation of marginal distributions of two parameters on the phenotype and the sum of that obtained from perturbing either individual marginal distribution. Higher values indicate stronger synergistic effect. Parameter pairs exhibiting synergistic effect for apoptosis or hypertrophy with significance (p<0.05) are shown. The mathematical analysis was all repeated for 10 times using different random seeds of 1, 10, or 100 million parameter sets for each case. P-values were determined using Student’s t test. See Supplementary Data Sets for full data.
Table S8. Differential equations of the mathematical model of 16 network motifs.

| Network motif | Differential equations |
|---------------|------------------------|
| Type 1 negative feedback (motif 1) | \[
\frac{dX}{dt} = p_z \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_1 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} = f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} = f_{\text{act}}(Y) - Z 
\] |
| Type 2 negative feedback (motif 2) | \[
\frac{dX}{dt} = p_z \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_1 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} = f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} = f_{\text{act}}(Y) - Z 
\] |
| Type 3 negative feedback (motif 3) | \[
\frac{dX}{dt} = p_z \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_1 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} = f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} = f_{\text{act}}(Y) - Z 
\] |
| Type 4 negative feedback (motif 4) | \[
\begin{align*}
\frac{dX}{dt} &= p_2 \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_3 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} &= f_{\text{inh}}(X) - Y \\
\frac{dZ}{dt} &= f_{\text{inh}}(Y) - Z
\end{align*}
\] |
| Type 1 positive feedback (motif 5) | \[
\begin{align*}
\frac{dX}{dt} &= p_2 \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_3 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} &= f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} &= f_{\text{inh}}(Y) - Z
\end{align*}
\] |
| Type 2 positive feedback (motif 6) | \[
\begin{align*}
\frac{dX}{dt} &= p_2 \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_3 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} &= f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} &= f_{\text{act}}(Y) - Z
\end{align*}
\] |
| Type 3 positive feedback (motif 7) | \[
\begin{align*}
\frac{dX}{dt} &= p_2 \times f_{\text{act}}(Z) + (1 - p_1 - p_2) \times f_{\text{act}}(\text{Input}) + p_3 \times f_{\text{act}}(Z) \times f_{\text{act}}(\text{Input}) - X \\
\frac{dY}{dt} &= f_{\text{act}}(X) - Y \\
\frac{dZ}{dt} &= f_{\text{act}}(Y) - Z
\end{align*}
\] |
| Type | Motif | Equations |
|------|-------|-----------|
| 4 positive feedback (motif 8) | $\frac{dX}{dt} = p_Z \times f_{act}(Z) + (1 - p_1 - p_2) \times f_{act}(\text{Input}) + p_1 \times f_{act}(Z) \times f_{act}(\text{Input}) - X$ | $\frac{dY}{dt} = f_{act}(X) - Y$ |
|  |  | $\frac{dZ}{dt} = f_{act}(Y) - Z$ |
| 1 coherent feedforward (motif 9) | $\frac{dX}{dt} = f_{act}(\text{Input}) - X$ | $\frac{dY}{dt} = f_{act}(X) - Y$ |
|  |  | $\frac{dZ}{dt} = p_2 \times f_{act}(Y) + (1 - p_1 - p_2) \times f_{act}(X) + p_1 \times f_{act}(Y) \times f_{act}(X) - Z$ |
| 2 coherent feedforward (motif 10) | $\frac{dX}{dt} = f_{act}(\text{Input}) - X$ | $\frac{dY}{dt} = f_{act}(X) - Y$ |
|  |  | $\frac{dZ}{dt} = p_2 \times f_{act}(Y) + (1 - p_1 - p_2) \times f_{act}(X) + p_1 \times f_{act}(Y) \times f_{act}(X) - Z$ |
| 3 coherent feedforward (motif 11) | $\frac{dX}{dt} = f_{act}(\text{Input}) - X$ | $\frac{dY}{dt} = f_{act}(X) - Y$ |
|  |  | $\frac{dZ}{dt} = p_2 \times f_{act}(Y) + (1 - p_1 - p_2) \times f_{act}(X) + p_1 \times f_{act}(Y) \times f_{act}(X) - Z$ |
| Type 4 coherent feedforward (motif 12) | \[
\begin{align*}
\frac{dX}{dt} &= f_{act}(Input) - X \\
\frac{dY}{dt} &= f_{act}(X) - Y \\
\frac{dZ}{dt} &= p_2 \times f_{act}(Y) + (1 - p_1 - p_2) \times f_{act}(X) + p_1 \times f_{inh}(Y) \times f_{act}(X) - Z
\end{align*}
|
**Type 4 incoherent feedforward (motif 16)**

\[
\begin{align*}
\frac{dX}{dt} &= f_{\text{in}}(\text{Input}) - X \\
\frac{dY}{dt} &= f_{\text{as}}(X) - Y \\
\frac{dZ}{dt} &= p_2 \times f_{\text{as}}(Y) + (1 - p_1 - p_2) \times f_{\text{as}}(X) + p_1 \times f_{\text{as}}(Y) \times f_{\text{as}}(X) - Z
\end{align*}
\]

**Supplementary Table S9.** Association of the network motifs and the dynamical features.

|                | Negative feedback | Positive feedback | Coherent feedforward | Incoherent feedforward |
|----------------|-------------------|-------------------|----------------------|------------------------|
| Adaptation     | +++               | +                 | -                    | +++                    |
| Memory         | -                 | ++                | -                    | -                      |
| Consistency    | -                 | -                 | +++                  | -                      |
| Pulsation      | -                 | -                 | -                    | +++                    |

+++: dynamics are observed significantly in all types of motifs regardless of the form of response function, ++: dynamics are observed significantly in some types of motifs, +: dynamics are observed weakly in all types of motifs, -: no such dynamics observed
**Supplementary Table S10.** Dynamical features of the 16 network motifs.

1) Dynamical features of network motif: adaptation

|       | Lin         | Hill         | Sat         | Acc         |
|-------|-------------|--------------|-------------|-------------|
| Motif1| 0.211±0.061 | 0.224±0.079  | 0.205±0.062 | 0.218±0.059 |
| Motif2| 0.211±0.061 | 0.228±0.076  | 0.206±0.062 | 0.211±0.061 |
| Motif3| 0.210±0.062 | 0.230±0.080  | 0.212±0.061 | 0.208±0.062 |
| Motif4| 0.210±0.062 | 0.228±0.083  | 0.208±0.062 | 0.212±0.061 |
| Motif5| 0.062±0.073 | 0.015±0.030  | 0.053±0.061 | 0.082±0.088 |
| Motif6| 0.075±0.079 | 0.043±0.153  | 0.087±0.087 | 0.073±0.077 |
| Motif7| 0.059±0.073 | 0.161±0.359  | 0.059±0.069 | 0.079±0.093 |
| Motif8| 0.042±0.068 | 0.009±0.021  | 0.057±0.068 | 0.118±0.094 |
| Motif9| 0.001±0.000 | 0.001±0.000  | 0.001±0.000 | 0.001±0.000 |
| Motif10| 0.001±0.000 | 0.001±0.000  | 0.001±0.000 | 0.001±0.000 |
| Motif11| 0.001±0.000 | 0.001±0.000  | 0.001±0.000 | 0.001±0.000 |
| Motif12| 0.001±0.000 | 0.001±0.001  | 0.001±0.000 | 0.001±0.000 |
| Motif13| 0.206±0.074 | 0.208±0.076  | 0.201±0.071 | 0.212±0.079 |
| Motif14| 0.172±0.069 | 0.172±0.069  | 0.174±0.069 | 0.171±0.070 |
| Motif15| 0.172±0.069 | 0.173±0.069  | 0.171±0.070 | 0.173±0.069 |
| Motif16| 0.206±0.074 | 0.206±0.074  | 0.213±0.080 | 0.199±0.070 |

2) Dynamical features of network motif: pulsation

|       | Lin         | Hill         | Sat         | Acc         |
|-------|-------------|--------------|-------------|-------------|
| Motif1| 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 |
| Motif2| 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 |
| Motif3| 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 |
| Motif4| 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 | 0.0000±0.0000 |
| Motif | Lin         | Hill         | Sat          | Acc          |
|-------|-------------|--------------|--------------|--------------|
| Motif 1 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 2 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 3 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 4 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 5 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 6 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 7 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 8 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 9 | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  | 0.000±0.000  |
| Motif 10 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 11 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 12 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 13 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 14 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 15 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |
| Motif 16 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 | 0.000±0.000 |

3) Dynamical features of network motif: memory
| Motif  | Lin    | Hill   | Sat    | Acc    |
|-------|--------|--------|--------|--------|
| Motif1| 0.036  | 0.026  | 0.033  | 0.041  |
| Motif2| 0.037  | 0.027  | 0.031  | 0.044  |
| Motif3| 0.037  | 0.027  | 0.036  | 0.038  |
| Motif4| 0.037  | 0.026  | 0.038  | 0.035  |
| Motif5| 0.022  | 0.005  | 0.038  | 0.012  |
| Motif6| 0.023  | 0.005  | 0.012  | 0.038  |
| Motif7| 0.022  | 0.005  | 0.034  | 0.011  |
| Motif8| 0.020  | 0.005  | 0.019  | 0.010  |
| Motif9| 3.429  | 3.767  | 3.341  | 3.339  |
| Motif10| 2.436 | 2.619  | 2.577  | 2.226  |
| Motif11| 3.424 | 3.789  | 3.291  | 3.384  |
| Motif12| 2.474 | 2.669  | 2.588  | 2.285  |
| Motif13| 0.009 | 0.009  | 0.009  | 0.009  |
| Motif14| 0.009 | 0.009  | 0.009  | 0.009  |
| Motif15| 0.009 | 0.009  | 0.009  | 0.009  |
| Motif16| 0.009 | 0.009  | 0.009  | 0.009  |

4) Dynamical features of network motif: consistency
Supplementary Table S11. Results of the distribution perturbation analysis of the 16 network motifs.

1) Result of distribution perturbation analysis: association 1 (adaptation-negative feedback)

|                | Uniform | 1 marginal (pm1) | 1 marginal (pm2) | 2 marginal (pm1, pm2) |
|----------------|---------|------------------|------------------|-----------------------|
| Type 1 - Lin   | 0.1     | 0.392            | 0.353            | 0.772                 |
| Type 1 - Hill  | 0.1     | 0.415            | 0.362            | 0.765                 |
| Type 1 - Sat   | 0.1     | 0.401            | 0.335            | 0.748                 |
| Type 1 - Acc   | 0.1     | 0.388            | 0.329            | 0.76                  |
| Type 2 - Lin   | 0.1     | 0.498            | 0.18             | 0.567                 |
| Type 2 - Hill  | 0.1     | 0.483            | 0.16             | 0.554                 |
| Type 2 - Sat   | 0.1     | 0.52             | 0.207            | 0.647                 |
| Type 2 - Acc   | 0.1     | 0.516            | 0.205            | 0.623                 |
| Type 3 - Lin   | 0.1     | 0.392            | 0.332            | 0.721                 |
| Type 3 - Hill  | 0.1     | 0.385            | 0.3              | 0.703                 |
| Type 3 - Sat   | 0.1     | 0.444            | 0.3              | 0.715                 |
| Type 3 - Acc   | 0.1     | 0.361            | 0.337            | 0.778                 |
| Type 4 - Lin   | 0.1     | 0.364            | 0.349            | 0.761                 |
| Type 4 - Hill  | 0.1     | 0.323            | 0.401            | 0.824                 |
| Type 4 - Sat   | 0.1     | 0.38             | 0.352            | 0.793                 |
| Type 4 - Acc   | 0.1     | 0.425            | 0.287            | 0.704                 |

2) Result of distribution perturbation analysis: association 1 (memory-positive feedback)

|                | Uniform | 1 marginal (pm1) | 1 marginal (pm2) | 2 marginal (pm1, pm2) |
|----------------|---------|------------------|------------------|-----------------------|
| Type 1 - Lin   | 0.1     | 0.228            | 0.808            | 0.851                 |
| Type 1 - Hill  | 0.1     | 0.227            | 0.816            | 0.85                  |
| Type 1 - Sat   | 0.1     | 0.232            | 0.821            | 0.862                 |
| Type 1 - Acc   | 0.1     | 0.209            | 0.788            | 0.841                 |
| Type            | Lin | Hill  | Sat | Acc |
|-----------------|-----|-------|-----|-----|
| Type 2          | NA* | 0.208 | NA* | NA* |
| Type 2          | 0.1 | 0.208 | 0.863 | 0.906 |
| Type 2          | NA* | NA*  | NA* | NA* |
| Type 2          | NA* | NA*  | NA* | NA* |
| Type 2          | 0.1 | 0.175 | 0.878 | 0.879 |
| Type 2          | 0.1 | 0.203 | 0.817 | 0.848 |
| Type 3          | 0.1 | 0.171 | 0.912 | 0.917 |
| Type 3          | NA* | NA*  | NA* | NA* |
| Type 3          | 0.1 | 0.218 | 0.829 | 0.862 |
| Type 4          | 0.1 | 0.212 | 0.818 | 0.871 |
| Type 3          | 0.1 | 0.211 | 0.81  | 0.861 |
| Type 4          | NA* | NA*  | NA* | NA* |
| Type 4          | 0.1 | 0.209 | 0.771 | 0.826 |

*NA denotes 'not available'

3) Result of distribution perturbation analysis: association 1 (adaptation-incoherent feedforward)

| Type            | Uniform | 1 marginal (pm1) | 1 marginal (pm2) | 2 marginal (pm1, pm2) |
|-----------------|---------|------------------|------------------|-----------------------|
| Type 1          | 0.1     | 0.357            | 0.391            | 0.853                 |
| Type 1          | 0.1     | 0.124            | 0.114            | 0.151                 |
| Type 1          | 0.1     | 0.121            | 0.105            | 0.144                 |
| Type 1          | 0.1     | 0.354            | 0.386            | 0.85                  |
| Type 2          | 0.1     | 0.42             | 0.322            | 0.818                 |
| Type 2          | 0.1     | 0.123            | 0.144            | 0.166                 |
| Type 2          | 0.1     | 0.108            | 0.115            | 0.139                 |
| Type 2          | 0.1     | 0.384            | 0.33             | 0.796                 |
| Type 3          | 0.1     | 0.318            | 0.447            | 0.874                 |
| Type 3          | 0.1     | 0.124            | 0.121            | 0.142                 |
| Type 3          | 0.1     | 0.109            | 0.11             | 0.158                 |
4) Result of distribution perturbation analysis: association 1 (adaptation-negative feedback)

|                | Uniform | 1 marginal (pm1) | 1 marginal (pm2) | 2 marginal (pm1, pm2) |
|----------------|---------|-----------------|-----------------|----------------------|
| Type 1 - Lin   | 0.1     | 0.158           | 0.263           | 0.302                |
| Type 1 - Hill  | 0.1     | 0.132           | 0.287           | 0.29                 |
| Type 1 - Sat   | 0.1     | 0.132           | 0.288           | 0.323                |
| Type 1 - Acc   | 0.1     | 0.13            | 0.267           | 0.322                |
| Type 2 - Lin   | 0.1     | 0.145           | 0.256           | 0.31                 |
| Type 2 - Hill  | 0.1     | 0.148           | 0.273           | 0.318                |
| Type 2 - Sat   | 0.1     | 0.119           | 0.27            | 0.281                |
| Type 2 - Acc   | 0.1     | 0.125           | 0.234           | 0.275                |
| Type 3 - Lin   | 0.1     | 0.134           | 0.255           | 0.311                |
| Type 3 - Hill  | 0.1     | 0.131           | 0.271           | 0.28                 |
| Type 3 - Sat   | 0.1     | 0.153           | 0.295           | 0.343                |
| Type 3 - Acc   | 0.1     | 0.161           | 0.295           | 0.345                |
| Type 4 - Lin   | 0.1     | 0.146           | 0.258           | 0.35                 |
| Type 4 - Hill  | 0.1     | 0.151           | 0.294           | 0.362                |
| Type 4 - Sat   | 0.1     | 0.133           | 0.281           | 0.333                |
| Type 4 - Acc   | 0.1     | 0.138           | 0.259           | 0.277                |
**Supplementray Table S12.** Differential equations of the EGFR model.

| Eq. no. | Differential equation |
|---------|-----------------------|
| (1) | \[
\frac{d[EGFR]}{dt} = \text{Inputs} - \text{EGFR}
\] |
| (2) | \[
\frac{d[Grb2Sos]}{dt} = pm_{p1} \times f_{act}(GAB1) + pm_{p2} \times f_{inh}(ERK) + (add_{p2} - pm_{p1} - pm_{p2}) \times f_{act}(ERK) + \]
\[
\times pm_{p12} \times f_{act}(GAB1) \times f_{act}(ERK) + pm_{p23} \times f_{act}(ERK) \times f_{act}(ERK) + pm_{p31} \times f_{act}(ERK) \times f_{act}(GAB1) + \]
\[
\times pm_{synp123} \times f_{act}(GAB1) \times f_{act}(ERK) \times f_{act}(EGFR) - Grb2Sos
\] |
| (3) | \[
\frac{d[Src]}{dt} = f_{act}(EGFR) - Src
\] |
| (4) | \[
\frac{d[P13K]}{dt} = pm_{p1} \times f_{act}(GAB1) + pm_{p2} \times f_{act}(Ras) + (add_{p2} - pm_{p1} - pm_{p2}) \times f_{act}(ERK) + \]
\[
\times pm_{p12} \times f_{act}(GAB1) \times f_{act}(Ras) + pm_{p23} \times f_{act}(Ras) \times f_{act}(ERK) + pm_{p31} \times f_{act}(ERK) \times f_{act}(GAB1) + \]
\[
\times pm_{synp123} \times f_{act}(GAB1) \times f_{act}(Ras) \times f_{act}(EGFR) - P13K
\] |
| (5) | \[
\frac{d[Ras]}{dt} = pm_{ras} \times f_{inhib}(RasGAP) + (add_{ras} - pm_{ras}) \times f_{act}(Grb2Sos) + pm_{synras} \times f_{inhib}(RasGAP) \times f_{act}(Grb2Sos) \]
\[
- Ras
\] |
| (6) | \[
\frac{d[GAB1]}{dt} = pm_{gab1} \times f_{act}(Src) + pm_{gab2} \times f_{act}(PIP3) + (add_{gab} - pm_{gab1} - pm_{gab2}) \times f_{inh}(ERK) + \]
\[
\times pm_{gab12} \times f_{act}(Src) \times f_{act}(PIP3) + pm_{gab23} \times f_{act}(PIP3) \times f_{inh}(ERK) + pm_{gab31} \times f_{inh}(ERK) \times f_{act}(Src) + \]
\[
\times pm_{synpgab123} \times f_{act}(Src) \times f_{act}(PIP3) \times f_{inh}(ERK) - GAB1
\] |
| (7) | \[
\frac{d[MEK]}{dt} = f_{act}(Ras) - k_{i} \times MEK *
\] |
\begin{align*}
(8) \quad \frac{d[\text{ERK}]}{dt} &= f_{\text{act}}(\text{MEK}) - \text{ERK} \\
(9) \quad \frac{d[\text{RasGAP}]}{dt} &= \text{pm}_{\text{rasgap1}} \times f_{\text{act}}(\text{GABI}) + \text{pm}_{\text{rasgap2}} \times f_{\text{inh}}(\text{SHP2}) + (\text{add}_{\text{rasgap}} - \text{pm}_{\text{rasgap1}} - \text{pm}_{\text{rasgap2}}) \times f_{\text{act}}(\text{EGFR}) + \text{pm}_{\text{rasgap12}} \times f_{\text{act}}(\text{GABI}) \times f_{\text{inh}}(\text{SHP2}) + \text{pm}_{\text{rasgap23}} \times f_{\text{inh}}(\text{SHP2}) \times f_{\text{act}}(\text{EGFR}) + \text{pm}_{\text{rasgap31}} \times f_{\text{act}}(\text{EGFR}) \times f_{\text{act}}(\text{GABI}) + \text{pm}_{\text{syntasgap123}} \times f_{\text{act}}(\text{GABI}) \times f_{\text{inh}}(\text{SHP2}) \times f_{\text{act}}(\text{EGFR}) - \text{RasGAP} \\
(10) \quad \frac{d[\text{PIP3}]}{dt} &= f_{\text{act}}(\text{PI3K}) - \text{PIP3} \\
(11) \quad \frac{d[\text{SHP2}]}{dt} &= f_{\text{act}}(\text{GABI}) - \text{SHP2} \\
(12) \quad \frac{d[\text{PDK1}]}{dt} &= f_{\text{act}}(\text{PIP3}) - \text{PDK1} \\
(13) \quad \frac{d[\text{AKT}]}{dt} &= f_{\text{act}}(\text{PDK1}) - \text{AKT}
\end{align*}

* The effect of the MEK inhibitor is represented by the parameter $k_i$
**Supplementary Table S13.** Relationship between interactions and parameters in the EGFR model.

| Link                                              | Related parameter | Constraints of parameter                                                                 |
|---------------------------------------------------|-------------------|------------------------------------------------------------------------------------------|
| Effect of GAB1 on Grb2SoS                         | $p_{mgs1}$        | $p_{m\text{syn}}^* + p_{mgs1}^* + p_{mgs2}^* \leq 1$                                    |
| Effect of ERK on Grb2SoS                          | $p_{mgs2}$        | $0 \leq p_{m\text{syn}}, p_{mgs1}, p_{mgs2} \leq 1$                                     |
| Effect of EGFR on Grb2SoS                         | $p_{mgs3}$        | $add_{\text{syn}} = 1 - p_{m\text{syn}}$                                                |
| Synergistic effect of GAB1 and ERK on Grb2SoS     | $p_{mgs12}$       | $add_{\text{syn}} = 1 - p_{m\text{syn}}$                                                |
| Synergistic effect of ERK and EGFR on Grb2SoS     | $p_{mgs12}$       | $add_{\text{syn}} = 1 - p_{m\text{syn}}$                                                |
| Synergistic effect of EGFR and GAB1 on Grb2SoS    | $p_{mgs31}$       | $pm_{\text{syn}} = (pm_{gs1} \times pm_{gs2}) / (pm_{gs1} + pm_{gs2})$                   |
| Synergistic effect of GAB1, ERK, EGFR on Grb2SoS  | $p_{m\text{syn}gs123}$ | $pm_{\text{syn}} = (pm_{gs1} \times pm_{gs2}) / (pm_{gs1} + pm_{gs2})$                   |
| Effect of GAB1 on PI3K                            | $p_{mpitk1}$      | $pm_{\text{syn}}^* + p_{mpitk1}^* + p_{mpitk2}^* \leq 1$                                |
| Effect of Ras on PI3K                             | $p_{mpitk2}$      | $0 \leq p_{mpitk1}, p_{mpitk2} \leq 1$                                                  |
| Effect of EGFR on PI3K                            | $p_{mpitk3}$      | $add_{\text{syn}} = 1 - p_{m\text{syn}}$                                                |
| Synergistic effect of GAB1 and Ras on PI3K        | $p_{mpitk12}$     | $pm_{\text{syn}} = (pm_{pitk1} \times pm_{pitk2}) / (pm_{pitk1} + pm_{pitk2})$             |
| Synergistic effect of Ras and EGFR on PI3K        | $p_{mpitk23}$     | $pm_{\text{syn}} = (pm_{pitk1} \times pm_{pitk2}) / (pm_{pitk1} + pm_{pitk2})$             |
| Synergistic effect of EGFR and GAB1 on PI3K       | $p_{mpitk31}$     | $pm_{\text{syn}} = (pm_{pitk1} \times pm_{pitk2}) / (pm_{pitk1} + pm_{pitk2})$             |
| Synergistic effect of GAB1, Ras, EGFR on PI3K     | $p_{mpitk123}$    | $pm_{\text{syn}} = (pm_{pitk1} \times pm_{pitk2}) / (pm_{pitk1} + pm_{pitk2})$             |
| Effect of RasGAP on Ras                           | $p_{mr}$          | $p_{mr}^* + p_{m\text{syn}}^* \leq 1$                                                   |
| Effect of Grb2SoS on Ras                          | $1 - p_{mr} - p_{m\text{syn}}$ | $0 \leq p_{mr}, p_{m\text{syn}} \leq 1$                                                |
| Synergistic effect of RasGAP and Grb2SoS on Ras   | $p_{m\text{syn}}$ | $p_{mr}^* + p_{m\text{syn}}^* \leq 1$                                                   |
| Effect of Src on GAB1 | pm\_gab1 | pm\_syngab*+ pm\_gab1*+ pm\_gab2*≤1 |
|----------------------|----------|----------------------------------|
| Effect of PIP3 on GAB1 | pm\_gab2 | 0≤pm\_syngab, pm\_gab1, pm\_gab2≤1 |
| Effect of ERK on GAB1 | pm\_gab3 | add\_syngab=1-pm\_syngab |

\[
pm\_gab3=\text{add\_syngab}\times pm\_gab1-pm\_gab2
\]

| Synergistic effect of Src and PIP3 | pm\_gab12 | sum\_gab=pm\_gab1 \times pm\_gab2+ pm\_gab2 \times pm\_gab3 + pm\_gab3 \times pm\_gab1 |
|-----------------------------------|----------|----------------------------------|
| Synergistic effect of PIP3 and ERK | pm\_gab23 | pm\_syngab123= pm\_syngab×pm\_syngab |
| Synergistic effect of ERK and Src | pm\_gab31 | pm\_gab12=( pm\_gab1 \times pm\_gab2/ sum\_gab)\times(pm\_syngab-pm\_syngab123) |
| Synergistic effect of Src, PIP3, ERK | pm\_syngab123 | pm\_gab23=( pm\_gab2 \times pm\_gab3/ sum\_gab)\times(pm\_syngab-pm\_syngab123) |
| pm\_gab31=( pm\_gab3 \times pm\_gab1/ sum\_gab)\times(pm\_syngab-pm\_syngab123) |

| Effect of GAB1 on RasGAP | pm\_rasgap1 | pm\_syng\_rasgap*+ pm\_rasgap1*+ pm\_rasgap2*≤1 |
|--------------------------|------------|----------------------------------|
| Effect of SHP2 on RasGAP | pm\_rasgap2 | 0≤pm\_syng\_rasgap, pm\_rasgap1, pm\_rasgap2≤1 |
| Effect of EGFR on RasGAP | pm\_rasgap3 | add\_syng\_rasgap=1-pm\_syng\_rasgap |

\[
\text{add\_syng\_rasgap}=\text{add\_syng\_rasgap}\times pm\_rasgap1-pm\_rasgap2
\]

| Synergistic effect of GAB1 and SHP2 | pm\_rasgap12 | sum\_rasgap=pm\_rasgap1 \times pm\_rasgap1+ pm\_rasgap2 \times pm\_rasgap1 + pm\_rasgap3 \times pm\_rasgap1 |
|------------------------------------|------------|----------------------------------|
| Synergistic effect of SHP2 and EGFR | pm\_rasgap23 | pm\_syng\_rasgap123= pm\_syng\_rasgap×pm\_syng\_rasgap |
| Synergistic effect of EGFR and GAB1 | pm\_rasgap31 | pm\_rasgap12=( pm\_rasgap1 \times pm\_rasgap2/ sum\_rasgap)\times(pm\_syng\_rasgap-pm\_syng\_rasgap123) |
| pm\_rasgap23=( pm\_rasgap2 \times pm\_rasgap3/ sum\_rasgap)\times(pm\_syng\_rasgap-pm\_syng\_rasgap123) |
| pm\_rasgap31=( pm\_rasgap3 \times pm\_rasgap1/ sum\_rasgap)\times(pm\_syng\_rasgap-pm\_syng\_rasgap123) |

*The fourteen parameters (i.e. pm\_syngs, pm\_gs1, pm\_gs2, pm\_syng\_pitk, pm\_pitk1, pm\_pitk2, pm\_ras, pm\_syng\_ras, pm\_syngab, pm\_gab1, pm\_gab2, pm\_syng\_rasgap, pm\_rasgap1, pm\_rasgap2) are sampled from uniform distribution ranging from 0 to 1.
**Supplementary Table S14.** Results of the distribution perturbation analysis of the EGFR network.

| A perturbed parameter distribution | Lin   | Hill  | Sat   | Acc  |
|------------------------------------|-------|-------|-------|------|
| pm SynG1                           | 0.511 | 0.561 | 0.343 | 0.369|
| pm GSK1                           | 0.435 | 0.547 | 0.311 | 0.323|
| pm GSK2                           | 0.458 | 0.519 | 0.302 | 0.305|
| pm SynP1k                         | 0.060 | 0.325 | 0.169 | 0.000|
| pm P1k1                           | 0.416 | 0.042 | 0.129 | 0.321|
| pm P1k2                           | 0.000 | 0.000 | 0.000 | 0.037|
| pm Ras                            | 0.888 | 0.655 | 0.478 | 0.710|
| pm SynRas                         | 0.622 | 0.655 | 0.435 | 0.415|
| pm SynGab                         | 0.619 | 0.531 | 0.472 | 0.576|
| pm Gab1                           | 1.000 | 1.000 | 1.000 | 0.510|
| pm Gab2                           | 0.813 | 0.473 | 0.595 | 1.000|
| pm SynRasGap                      | 0.226 | 0.218 | 0.181 | 0.073|
| pm Gab1p1                        | 0.129 | 0.246 | 0.170 | 0.052|
| pm Gab2p1                        | 0.219 | 0.305 | 0.203 | 0.064|
Supplementary Texts

Supplementray Text S1. Analysis of network motifs

I. Construction of the 16 network motifs

We constructed 16 network motifs (i.e. 4 negative feedbacks (motif 1, 2, 3, and 4), 4 positive feedbacks (motif 5, 6, 7, and 8), 4 coherent feedforward loops (motif 9, 10, 11, and 12), 4 incoherent feedforward loops (motif 13, 14, 15, and 16)) (Fig. S3A). Input signal was given to X and the time course of Z was observed. From the simulation data of Z in each network motif, we evaluated the presence of the dynamical features (i.e., adaptation, memory, pulsation, and consistency) (Fig. S3A). Adaptation means how the variables return to original value after the response to the input signal. It is calculated as the product of sensitivity and 1-precision. Memory means if the variable remember the input signal after it vanishes. Pulsation is the ability to generate pulse at the moment of input signal is given or is removed. Consistency measures similarity between the values of Z at each time point between those evaluated at different parameter sets.

II. Normalized equation modeling of the 16 network motifs

Differential equations of each model are made according to the principles described in METHODS (differential equations for all models are provided in Table S8). Each model has two parameters: p1 represents synergistic effect of two links while p2 represents dominant effect of one link over that of the other. p2 means dominant effect from Z to X over Input to X in negative feedback and positive feedback motifs while p2 means dominant effect from Y to Z over X to Z in coherent feedforward and incoherent feedforward motifs. Parameter p1 and p2 were sampled from uniform distribution between 0 and 1 with constraint that the sum of p1 and p2 should be less than or equal to 1. Total 1,000 parameter sets were generated. For each model and for each form of the response function, for each parameter set, numerical simulation was performed using ode15s function in the MATLAB R2009a (i.e. total 64,000 (16×4×1,000) simulations were conducted). Input signal is given from t=10 to t=100. Dynamical features are evaluated for every simulation.
III. Observed dynamical characteristics in the 16 network motifs

Adaptation was mainly observed in negative feedback (motif 1, 2, 3, and 4) and incoherent feedforward motifs (motif 13, 14, 15, and 16). The result was consistent regardless of the form of the response function. Memory was only observed in positive feedback motifs (motif 5, 6, 7, and 8) except for motif 5 with Hill, motif 7 with Hill, and motif 8 with Hill. Consistency was observed in all coherent feedforward motifs (motif 9, 10, 11, and 12) regardless of the form of the response function. Pulsation was observed in incoherent feedforward motifs (mainly with the function 'Hill'). From the results, we can conclude that the specific dynamical features are associated with the specific network motifs. These features may be determined by network structure of the motifs rather than the detailed arrangement of the links inside the motifs or form of the response functions. Therefore, dynamics of the network was successfully represented by normalized equation modeling. In Table S9, we summarized the association of network motifs and dynamical features. These results were consistent with previous studies (Table S10) (1, 2).

IV. Calculation of marginal distributions of the parameters

Then, which link is associated with the dynamical features? For example, which link is related with the property of adaption in type 1 negative feedback motif? To investigate the question, we observed the shape of the marginal distributions for the parameters in four such associations: association 1 - adaptation with negative feedback motifs, association 2 - adaptation with incoherent feedforward motifs, association 3 - memory with positive feedback motifs, association 4 - pulsation with incoherent feedforward motifs. Marginal distribution was calculated for the parameters that show upper 10% of the dynamics of interest for each association (Fig. S3A).

IV-1. Association 1: adaptation in negative feedback motifs

High p1 and low p2 were associated with adaptation in all types of negative feedback motifs. That is, the higher the synergistic effect of Input and Z, the lower the lower the dominant effect of Z to X in inhibition of X, adaptation can be observed more frequently. Therefore, coordination of two links in regulation of X may be important to generate the
dynamical feature, "adaptation". The distributions were similar regardless of the form of the response functions.

IV-2. Association 2: adaptation in incoherent feedforward motifs

For adaptation, different distributions of parameters were observed depending on the type of incoherent feedforward motifs (in motif 13 and 16, high p1 and low p2 was associated with adaptation while low p1 and high p2 was associated with adaptation in motif 14 and motif 15). However, the marginal distributions were not different according to the form of response functions.

IV-3. Association 3: memory in positive feedback motifs

Calculation of marginal distributions for type 1 positive feedback with Hill, type 3 positive feedback with Hill, and type 4 positive feedback with Hill was impossible because of zero or small number of cases. Except for these, low p1 and high p2 are associated with memory. That is, the lower the synergistic effect of Input and Z, the higher the dominant effect of Z to X in activation of X, adaptation can be observed more frequently. Therefore, positive feedback link may take a role to generate the dynamical feature, "memory".

IV-4. Association 4: pulsation in incoherent feedforward motifs

Low p1 and medium p2 were associated with pulsation in all types of incoherent feedforward motifs. That is, pulsation was observed more frequently when the synergistic effect of Input and Z was low and the effect of Y on Z (indirect effect for the activation of Z) was neither high nor low. The latter is an interesting point. Therefore, coordination of direct effect (i.e. X on Z) and indirect effect (i.e. Y on Z) may be required to generate the dynamical feature, "pulsation". The distributions were similar regardless of the form of the response functions.
V. Distribution perturbation analysis

Although distinct distributions of parameters were observed for specific dynamics in all previously investigated network-dynamics associations, it does not always imply that these distributions generate the dynamics. To further investigate this issue, we performed "distribution perturbation analysis". After the one or two parameters were sampled from marginal distribution while the others were sampled from uniform distribution, numerical simulation was performed and change of phenotypes (or dynamics) was evaluated. If the results showed certain dynamics more frequently, it will suggest that the distribution generates the dynamics. For one distribution perturbation analysis, we sampled the value of one parameter (p1 or p2) from marginal distribution whereas the other (p2 or p1) was sampled from uniform distribution. For two distribution perturbation analysis, we sampled both parameters (p1 and p2) from marginal distribution. One constraint required to be satisfied during the process of random sampling is that the sum of p1 and p2 is less 1. The results of distribution perturbation analyses were demonstrated Fig. S4 and Table S11.

V-1. Association 1: adaptation in negative feedback motifs

For all types of negative feedback motifs and all forms of response functions, perturbation of any one distribution and two distributions generated more degree of adaptation. The perturbation effect of the two distributions was always larger than that of one marginal distribution. This results implies that high p1 and low p2 (i.e., strong synergistic effect with dominant role of input) actively generates the dynamical feature, adaptation.

V-2. Association 2: adaptation in incoherent feedforward motifs

Distribution perturbation has more impacts in type 1 and type 4 than in type 2 and type 3. That is, marginal distributions of p1 and p2 in motif 14 and motif 15 do not have significant causal relationship with adaptation.

V-3. Association 3: memory in positive feedback motifs

For all types of positive feedback motifs and all forms of response functions, distribution
perturbation of p2 generates memory more effectively. In addition, differences are very slight between the results of distribution perturbation of p2 and those of distribution perturbation of both p1 and p2. These results imply that high p2 have more significant causal relationship with memory than low p1.

V-4. Association 4: pulsation in incoherent feedforward motifs

For all types and all forms of response functions, perturbation of any one distribution and two distribution generated more degree of adaptation. The perturbation effect of two distributions was always larger than that of one distribution. This results implies that low p1 and medium p2 (i.e., strong synergistic effect with dominant role of input) actively generates the dynamical feature, pulsation.

VI. Summary

Normalized equation modeling revealed well-known dynamical features of network motifs: negative feedback and incoherent feedforward motifs showed adaptation; positive feedback motifs showed memory; coherent feedforward motif showed consistency. Furthermore, the conditions for the dynamic features can be identified through distribution perturbation analysis. Most of the results were consistent regardless of the form of the response function which strengthen the reliability of the developed method.
Supplementray Text S2. Analysis of the EGFR network

I. Construction of the EGFR network

Network structure is the simplified form of the previously constructed EGFR network (Fig. S5A).

II. Normalized equation modeling of the EGFR network.

Differential equations of each model are made according to the principles described in METHODS (differential equations for all models are provided in Table S12). The model requires 14 parameters (i.e. pmgs, pmgs1, pmgs2, pmgsynpitk, pmgs1, pmgs2, pmgsynpitk, pmgs1, pmgs2, pmpitk, pmpitk1, pmpitk2, pmpitk1, pmpitk2, pmras, pmssynras, pmssynras, pmsgab, pmgab1, pmgab2, pmssynrasgap, pmssynrasgap, pmssynrasgap1, pmssynrasgap2) which are sampled from standard uniform distribution. The remaining parameter can be calculated from the sampled parameters. In this manner, 100,000 parameter sets were randomly generated. The detailed information of the parameters is provided in Table S13.

III. Measurement of the MEK inhibitor resistance

Numerical simulation was performed using ode15s function in the MATLAB R2009a. MEK inhibitor is treated at t=100 (Fig. S5B). The resistance of the MEK inhibitor was calculated as the increased amount of AKT after MEK inhibitor is given.

IV. Marginal distribution of parameters

To find out which parameter is associated with MEK inhibitor resistance, we investigated the marginal distributions of all 14 parameters. Marginal distribution was calculated for the parameter sets that showed top 10% of the MEK inhibitor resistance. Among 14 parameters, six parameters (pmgs1, pmgs2, pmgsynpitk, pmgsynras, pmras, pmssynrasgap, pmssynrasgap) represented non-uniform, coherent marginal distributions (Fig. S5C).

V. One-distribution perturbation analyses

The presence of the association between MEK inhibitor resistance and marginal
distribution of parameters do not always imply the inducing relationship between them. To evaluate the inducing relationship, we performed one-distribution perturbation analyses. As a result, the marginal distributions of eight parameters (i.e., $p_{\text{msyngs}}$, $p_{\text{mgs1}}$, $p_{\text{mgs2}}$, $p_{\text{msynras}}$, $p_{\text{mras}}$, $p_{\text{msyngab}}$, $p_{\text{mgab1}}$, $p_{\text{mgab2}}$) were shown to have the inducing relationship with the MEK inhibitor resistance (Table S14). These parameters represent the regulation of Grb2Sos (i.e., $p_{\text{msyngs}}$, $p_{\text{mgs1}}$, $p_{\text{mgs2}}$), Ras (i.e., $p_{\text{msynras}}$, $p_{\text{mras}}$), and GAB1 (i.e., $p_{\text{msyngab}}$, $p_{\text{mgab1}}$, $p_{\text{mgab2}}$). Among them, the importance of GAB1 regulation was supported by published experimental results (3).

VI. Summary

We investigated the underlying mechanism of MEK inhibitor resistance in the EGFR network using normalized equation modeling and one-distribution perturbation analysis. The regulation of Grb2Sos, Ras, and GAB1 were identified as essential regulatory processes to generate MEK inhibitor resistance, among which GAB1 regulation had been also identified as a key process in previously published results.
**Supplementary Text S3.** Normalized equation modeling when one node is regulated by more than two nodes

Let us suppose that Y is regulated by A, B, and C (Fig. S6). Then the instantaneous rate of change in Y (dY/dt) is determined in consideration of these 7 influences: individual influence of A on Y (shortly, A on Y), individual influence of B on Y (B on Y), individual influence of C and Y (C on Y), combined influence of A and B on Y (AB on Y), combined influence of B and C on Y (BC on Y), combined influence of C and A on Y (CA on Y), combined influence of A, B, and C on Y (ABC on Y).

The seven influences can be divided by individual influences (i.e., A on Y, B on Y, C on Y) and combined influences (i.e., AB on Y, BC on Y, CA on Y, ABC on Y). The sum of combined influences (i.e., AB on Y + BC on Y + CA on Y + ABC on Y) is parameterized as p1. Then the sum of individual influences becomes 1-p1. p2 represents A on Y, and p3 represents B on Y. Then, C on Y is determined as 1-p1-p2-p3.

The four combined influences are determined using p1, p2, and p3. Since ABC on Y has double combinations, ABC on Y is determined as p1^2. Then, the sum of remaining three combined influences becomes p1-p1^2. AB on Y, BC on Y, and CA on Y are determined using A on Y, B on Y, and C on Y. Specifically, the ratio between AB on Y, BC on Y, CA on Y is determined to be equal to the ratio between A on Y x B on Y, B on Y x C on Y, C on Y x A on Y. Since the sum is already known as p1-p1^2, these three influences can be determined using a proportional expression. For example, if p1, p2, and p3 are 0.2, 0.4, and 0.25 respectively, seven influences are determined as follows: A on Y is 0.4; B on Y is 0.25; C on Y is 0.15 (i.e., 1-0.2-0.4-0.25); ABC on Y is 0.04 (i.e., 0.2 x 0.2); AB on Y is 0.081 (i.e., 0.1 x 0.2 x 0.5); BC on Y is 0.0304 (i.e., 0.1 x 0.2 x 0.5); CA on Y is 0.0486 (i.e.,

When one node is regulated by more than three nodes, the formulation of dY/dt can be constituted in the same manner.
**Supplementary Data Sets**

**Supplementary Data Set S1.** Experimental database for the cardiac signaling pathways.

| Reference (PMID) | Experimental Setting | Input                          | Output                                          | Effect | Time          |
|------------------|----------------------|--------------------------------|-------------------------------------------------|--------|---------------|
|                  |                      | The FOXO3a transcription factor regulates cardiac myocyte size downstream of AKT signaling | pFOXO1/3a/4/Akt                               | 1      | 10min         |
| 15781459         |                      | NRVM IGF-1                      | pFOXO1                                         | 2      | 10min         |
|                  |                      | NRVM IGF-1                      | pFOXO4                                         | 3      | 10min         |
|                  |                      | NRVM IGF-1                      | pFOXO3a                                        | 1.5    | 10min         |
|                  |                      | NRVM IGF-1                      | Akt                                            | 2      | 10min         |
|                  |                      | NRVM Insulin+LY294002           | pFOXO1/3a/4/Akt                               | 1      | 10min         |
|                  |                      | NRVM insulin+LY294002           | Akt                                            | 1.5    | 10min         |
|                  |                      | NRVM                            | Akt                                            | 1      | 12hr          |
|                  |                      | NRVM+TM-FOXO3a                  | Akt                                            | 2      | 12hr          |
|                  |                      | NRVM+WT-FOXO3a                  | Akt                                            | 2      | 12hr          |
|                  |                      | TAC on mouse                    | pAkt/pFOXO3a                                   | 4/2    | TAC 1wk       |
|                  |                      | NRVM IGF-1                      | cell size                                      | 1.4    | 48hr          |
|                  |                      | NRVM+WT-FOXO3a                  | cell size                                      | 1.3    | 24hr(IGF)+24 after TD |
|                  |                      | NRVM+TM-FOXO3a                  | cell size                                      | 0.85   | 24hr(IGF)+24 after TD |
|                  |                      | NRVM stretch                    | cell size                                      | 1.3    | 48hr          |
|                  |                      | NRVM+WT-FOXO3a                  | cell size                                      | 1.15   | 24hr(stretch)+24 after TD |
|                  |                      | NRVM+TM-FOXO3a                  | cell size                                      | 0.9    | 24hr(stretch)+24 after TD |
|                  |                      | Switching of the coupling of the beta2-adrenergic receptor to different G proteins by protein kinase A |                                           |       |               |
| 9363896          |                      | HEK293                         | pMAPK                                          | 1      | 5min          |
|                  |                      | HEK293 Isoprenaline(10^-10/-9/-8/-7/-6/-5) | pMAPK                                          | 1.2/2/4/5.5/6/5.8 | 5min |
|                  |                      | HEK293 Isoprenaline+Propranol ol | pMAPK                                          | 1      | 5min          |
|                  |                      | HEK293 Isoprenaline             | pMAPK                                          | 6.5    | 5min          |
alpha1-Adrenoceptor stimulation potentiates L-type Ca2+ current through Ca2+/calmodulin-dependent PK II(CaMKII) activation in rat ventricular myocytes

| Condition                              | Stimulation | MAPK   | Time  |
|----------------------------------------|-------------|--------|-------|
| HEK293+βARKct TF                       | Isoprenaline| 3      | 5min  |
| HEK293 Isoprenaline+PTX                | pMAPK       | 1.7    | 5min  |
| HEK293+Csk TF                          | Isoprenaline| 3      | 5min  |
| HEK293+Sos-Pro TF                      | Isoprenaline| 2.6    | 5min  |
| HEK293                                 | Isoprenaline| 7      | 5min  |
| HEK293                                 | Isoprenaline+H-89| 1.5  | 5min  |
| HEK293                                 | LPA         | 8      | 5min  |
| HEK293                                 | LPA+H-89    | 8      | 5min  |
| HEK293                                 | isoprenaline| 5      | 5min  |
| HEK293                                 | isoprenaline| 7      | 5min  |
| HEK293                                 | isoprenaline| 3      | 5min  |

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| Condition                              | Phenylephrine(10uM) | LTCC Current | Time  |
|----------------------------------------|---------------------|--------------|-------|
| Adult cardiomyocyte(Rat)               |                     |              | 0/1/2/3/4/5/10/15min |
| Adult cardiomyocyte(Rat)+BAPTA pretx  |                     |              |       |
| Adult cardiomyocyte(Rat)+KN-93(0.5uM) pretx|              |              |       |
| Adult cardiomyocyte(Rat)+KN-92(0.5uM) pretx|              |              |       |
| Adult cardiomyocyte(Rat)+Chelerythrine(10uM) pretx|             |              |       |

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| Group                                      | Treatment                        | CaMKII Activation | 15min |
|--------------------------------------------|----------------------------------|-------------------|-------|
| Adult cardiomyocyte(Rat)                   | control/phe(0.1uM)/1/100         | 100/130/170/190/185 | 15min |
| Adult cardiomyocyte(Rat)                   | control/prazocin/pra+phe         | 100/100/105       | 15min |
| Adult cardiomyocyte(Rat)                   | control/KN-93/KN-93+phe          | 100/70/75         | 15min |
| Adult cardiomyocyte(Rat)                   | control/che/che+phe              | 100/85/99         | 15min |

**p38alpha Mitogen-Activated Protein Kinase Plays a Critical Role in Cardiomyocytes Survival but Not in Cardiac Hypertrophic Growth in Response to Pressure Overload**

| Group                                      | Treatment                        | p38 Kinase Activity | 30min |
|--------------------------------------------|----------------------------------|---------------------|-------|
| control mouse                              | none                             | 1                   |       |
| control                                    | phenylephrine                    | 1.6                 |       |
| p38aCKO(10wk)                              | none                             | 0.25                |       |
| p38aCKO(10wk)                              | phenylephrine                    | 0.4                 |       |
| control                                    | none                             | FS                  | 37    |
| p38aCKO(10wk)                              | none                             | FS                  | 37    |
| p38aCKO(10wk)                              | TAC(1wk)                         | FS                  | 15    |
| p38aCKO(10wk)                              | sham(1wk)                        | FS                  | 37    |
| control                                    | TAC(1wk)                         | FS                  | 37    |
| control                                    | sham(1wk)                        | FS                  | 37    |
| control                                    | sham(1wk)                        | TUNEL(+) myocytes   | 37    |
| control                                    | TAC(1wk)                         | TUNEL(+) myocytes   | 37    |
| p38aCKO(10wk)                              | sham(1wk)                        | TUNEL(+) myocytes   | 37    |
| p38aCKO(10wk)                              | TAC(1wk)                         | TUNEL(+)            | 115   |
| Condition   | Treatment     | Protein/Pathway | Value |
|-------------|---------------|----------------|-------|
| control     | sham(1wk)     | cytochrome c in cytosol | 1     |
| control     | TAC(1wk)      | cytochrome c in cytosol | 1.5   |
| p38aCKO(10wk) | sham(1wk)    | cytochrome c in cytosol | 1.3   |
| p38aCKO(10wk) | TAC(1wk)     | cytochrome c in cytosol | 3.7   |
| control     | TAC(1wk)      | Bax/Bcl         | 1     |
| p38aCKO(10wk) | TAC(1wk)     | Bax/Bcl         | 1.7   |
| control     | sham(1wk)     | pJNK/totalJNK   | 1     |
| control     | TAC(1wk)      | pJNK/totalJNK   | 2.2   |
| p38aCKO(10wk) | sham(1wk)    | pJNK/totalJNK   | 0.7   |
| p38aCKO(10wk) | TAC(1wk)     | pJNK/totalJNK   | 3.5   |
| control     | sham(1wk)     | pERK/totalERK   | 1     |
| control     | TAC(1wk)      | pERK/totalERK   | 2     |
| p38aCKO(10wk) | sham(1wk)    | pERK/totalERK   | 1     |
| p38aCKO(10wk) | TAC(1wk)     | pERK/totalERK   | 2     |
| control     | sham(1wk)     | pMKK3/6 / totalMKK3/6 | 1     |
| control     | TAC(1wk)      | pMKK3/6 / totalMKK3/6 | 5     |
| p38aCKO(10wk) | sham(1wk)    | pMKK3/6 / totalMKK3/6 | 5     |
| p38aCKO(10wk) | TAC(1wk)     | pMKK3/6 / totalMKK3/6 | 40    |
| control     | saline        | LVDd            | 3.5   |
| control     | isoproterenol(7.5mg/kg /day for 2days) | LVDd | 3.5 |
| p38aCKO(10wk) | saline      | LVDd            | 3.5   |
| p38aCKO(10wk) | isoproterenol(7.5mg/kg /day for 2days) | LVDd | 4.5 |
|                | saline  | FS   | TUNEL(+) myocytes | survival |
|----------------|---------|------|-------------------|----------|
| control        | saline  | 40   |                   |          |
| p38aCKO(10wk)  | saline  | 48   |                   |          |
| control        | isoproterenol(7.5mg/kg/day for 2days) | FS | 15 |
| p38aCKO(10wk)  | isoproterenol(7.5mg/kg/day for 2days) | FS | 15 |
| control        | saline  | FS   | TUNEL(+) myocytes | 23       |
| p38aCKO(10wk)  | saline  | TUNEL(+) myocytes | 25       |
| p38aCKO(10wk)  | isoproterenol(7.5mg/kg/day for 2days) | TUNEL(+) myocytes | 25       |
| control cell   | isoproterenol(0uM) | survival | 100   |
| p38aCKO(10wk) cell | isoproterenol(0uM) | survival | 100   |
| control cell   | isoproterenol(0.31uM) | survival | 120  |
| p38aCKO(10wk) cell | isoproterenol(0.31uM) | survival | 120  |
| control cell   | isoproterenol(0.63uM) | survival | 110  |
| p38aCKO(10wk) cell | isoproterenol(0.63uM) | survival | 110  |
| control cell   | isoproterenol(1.25uM) | survival | 105  |
| p38aCKO(10wk) cell | isoproterenol(1.25uM) | survival | 105  |
| control cell   | isoproterenol(2.5uM) | survival | 120  |
| p38aCKO(10wk) cell | isoproterenol(2.5uM) | survival | 120  |
| control cell   | isoproterenol(5uM) | survival | 120  |
| p38aCKO(10wk) cell | isoproterenol(5uM) | survival | 120  |
| control cell   | isoproterenol(10uM) | survival | 30   |
| p38aCKO(10wk) cell | isoproterenol(10uM) | survival | 30   |
| control cell   | isoproterenol(20uM) | survival | 25   |
| p38aCKO(10wk) cell | isoproterenol(20uM) | survival | 28   |
| control cell   | isoproterenol(40uM) | survival | 28   |
| p38aCKO(10wk) cell | isoproterenol(40uM) | survival | 28   |
### Selective repression of MEF2 activity by PKA-dependent proteolysis of HDAC4

| Condition                        | PKA        | MEF2 Value |
|----------------------------------|------------|------------|
| H9C2 myocyte                     | none       | 1          |
| H9C2 myocyte                     | dbcAMP(1mM)| 0.1        |
| H9C2 myocyte                     | dbcAMP(1mM) + KT5720(2uM) | 0.8        |
| COS cells                        | Myc-PKA:none | 0.05       |
| COS cells + MEF2C                | Myc-PKA:none | 1          |
| COS cells + MEF2C + HDAC4        | Myc-PKA:none | 0.1        |
| COS cells + MEF2C + HDAC4 + CaMKII | Myc-PKA:none | 1.2        |
| COS cells                        | Myc-PKA:low | 0.05       |
| COS cells + MEF2C                | Myc-PKA:low | 1          |
| COS cells + MEF2C + HDAC4        | Myc-PKA:low | 0.15       |
| COS cells + MEF2C + HDAC4 + CaMKII | Myc-PKA:low | 0.5        |
| COS cells                        | Myc-PKA:high | 0.05       |
| COS cells + MEF2C                | Myc-PKA:high | 1          |
| COS cells + MEF2C + HDAC4        | Myc-PKA:high | 0.13       |
| COS cells + MEF2C + HDAC4 + CaMKII | Myc-PKA:high | 0.3        |

### Isoproterenol activates extracellular signal-regulated protein kinases in cardiomyocytes through calcineurin

| Condition                        | PKA        | ERK1/2 Value |
|----------------------------------|------------|--------------|
| NRVM                             | none       | 0.1          |
| NRVM + thapsigargin/nifedipine/EGTA pretx | none       | 0.1/0.1/0.1  |
| NRVM                             | Iso        | 1            |
| NRVM + thapsigargin/nifedipine/EGTA pretx | Iso        | 0.5/0.2/0.2  |
| NRVM                             | none       | 0.1          | 8min         |
| NRVM                             | Iso        | 1            | 8min         |
| NRVM+KN93/W7/CsA pretx | Iso | ERK1/2 | 1.3/0.4/0.4 | 8min |
|------------------------|-----|--------|------------|------|
| NRVM | none | ERK1/2 | 0.1 | 8min |
| NRVM | AngII | ERK1/2 | 0.4 | 8min |
| NRVM | PHE | ERK1/2 | 2 | 8min |
| NRVM+CsA pretx | none | ERK1/2 | 0.1 | 8min |
| NRVM+CsA pretx | AngII | ERK1/2 | 0.4 | 8min |
| NRVM+CsA pretx | PHE | ERK1/2 | 1.5 | 8min |
| NRVM | Iso(10uM) | calcineurin | 100/120/1 80/260/15 0/130 | 0/1/2/5/15/30min |
| NRVM | Iso(0/0.01/0.1/1/10/100 uM) | calcineurin | 100/180/1 90/200/31 0/300 | 5min |
| NRVM | Iso | Raf-1 | 0.1/0.5/1/1 | 0/1/2/5/10/15min |
| NRVM+CsA pretx | Iso | Raf-1 | 0.1/0.1/0.1 | 0/1/2/5/10/15min |

Epac mediates beta-adrenergic receptor-induced cardiomyocyte hypertrophy

| Rat myocardium | Sham/TAC | Epac1 expression | 1/1.6 | 5day |
|----------------|----------|------------------|------|------|
| ARVM | Sham/Sham+8-CPT/TAC/TAC+8-CPT | Cell area | 100/110/1 10/140 | 24hr(8-CPT) |
| ARVM | Ad.GFP/Ad.GFP+8-CPT/Ad.Epac/Ad.Epac+8-CPT | Cell area | 100/115/1 05/130 | 36hr(Ad.Epac or 8-CPT) |
| ARVM | Ad.GFP/Ad.GFP+8-CPT/Ad.Epac/Ad.Epac+8-CPT | Ras-GTP/total Ras | 0.1/0.7/0.3 | 36hr(Ad.Epac)+5min(8-CPT) |
| ARVM | Ad.GFP/Ad.GFP+Ad.RasS17N/Ad.Epac/Ad.Epac+8-CPT | [3H]-Leucine uptake | 100/105/1 20/85 | 1day(8-CPT) |
| ARVM | Ad.GFP/Ad.GFP+Ad.RasS17N/Ad.Epac/Ad.Epac+8-CPT | Calcineurin activity | 100/150/2 20/130 | 30min(8-CPT) |
| ARVM | pac+8-CPT | P-CaMKII/total CaMKII | 1/1.2/3/1.2 | 30min(8-CPT) |
|------|-----------|------------------------|-------------|-------------|
| ARVM | none/CsA/KN93/8-CPT/8-CPT+CsA/8-CPT+KN-93 | [3H]-Leucine uptake | 100/95/96/150/115/98 | 24hr |
| NRVM | shCT/shCT+ISO/shEpac1/shEpac1+ISO | Cell area | 100/150/104/130 | 48hr(ISO) |
| NRVM | shCT/shCT+ISO/shEpac1/shEpac1+ISO | ANF | 25/225/60/140 | 48hr(ISO) |
| ARVM | none/Ad.PKI/ISO/Ad.PKI+ISO | [3H]-Leucine uptake | 110/95/150/140 | 24hr(ISO) |
| ARVM | none/Ad.PKI/ISO/Ad.PKI+ISO | PKA activity | 80/70/180/90 | 10min(ISO) |
| ARVM | Ad.Epac1/Ad.Epac1+ISO/Ad.Epac1R279K/Ad.Epac1R279K+ISO | [3H]-Leucine uptake | 100/135/15/115 | 24hr |
| Human heart(NonFailing(NF)/Heart Failure(HF)) | none | Epac1 expression | 1.0/2.0 |

Epac enhances excitation-transcription coupling in cardiac myocytes

| ARVM | 8-CPT(10uM) | nuclear HDAC5 | 1.0/1.0/0.8 7/0.72/0.6 6/0.63 | 0/10/20/30/40/50/60min |
|------|-----------|----------------|-------------------------------|------------------------|
| ARVM | endothelin(100nM) | nuclear HDAC5 | 1.0/0.95/0.87/0.82/0.78/0.67/0.55 | 0/10/20/30/40/50/60min |
| NRVM | control/epac1WT TF | MEF-2 | 100/300 |
| NRVM | 8-CPT/KN93+8-CPT | nuclear HDAC5 | 0.7/1.0 |

beta-Adrenergic Pathway Induces Apoptosis through Calcineurin Activation in Cardiac Myocytes

| NRVM | control/Iso(10^-% of TUNEL | % of TUNEL | 4/5/10/15/ | 48hr |
|------|-----------------------------|-------------|-------------|-------------|

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| 17307839 | Cardiomyocyte-specific inactivation of transcription factor CREB in mice | NRVM | control/Iso(50uM)/CsA pretx(1hr)+Iso/FK506(1hr)+Iso/nifedipine(1hr)+Iso | % of TUNEL positive cells | 5/18/5/5/9 | 48hr |
| 17307839 | | NRVM | Iso(50uM) | pBad | 1/0.5/0.5/1 | 0/2/4/6hr |
| 17307839 | | NRVM | Iso(50uM)+FK506 | pBad | 1/1/1/1 | 0/2/4/6hr |
| 17307839 | | NRVM | Iso(50uM)+nifedipine | pBad | 1/1/1/1 | 0/2/4/6hr |
| 17307839 | | NRVM | Iso(50uM)+FK506 | Bcl-2 | 1/1/1/1 | 0/6/12/24/48hr |
| 17307839 | | NRVM | Iso(50uM) | cytosolic cyt c | 1/2/3/3 | 0/8/18/24hr |
| 17307839 | Akt phosphorylates BAD in vitro | 3T3 cells | Vector/Active AKT TF/Wt AKT TF/Inactive AKT TF | pBAD | 0/1/0/0 |
| 17307839 | Akt phosphorylates BAD in vitro | 3T3 cells | none/PDGF/Wort+PDGF/LY294002+PDGF | pBAD | 0.1/1/0.5/0.5 |
| 165545 | Induction of bcl-2 expression by phosphorylated CREB proteins during B-cell activation and rescue from apoptosis | DHL-9 cells | Basal Promoter/WtUREDRE/MutCRE | bcl-2 | 1.0/3.0/1.3 |
| 17296607 | Activation of CaMKIIdeltaC is a common intermediate of diverse death stimuli-induced heart muscle cell apoptosis | ARCM | none | TUNEL positive cells(%) | 2/4/5/8/9 | 0/1/2/3/4day |
| 17296607 | Activation of CaMKIIdeltaC is a common intermediate of diverse death stimuli-induced heart muscle cell apoptosis | ARCM | CA-CaMKIIIdc | TUNEL positive cells(%) | 3/9/18/20/22 | 0/1/2/3/4day |
|     | ARCM CA-CaMKIIIdc+DN-CaMKIIIdc | TUNEL positive cells(%) | 3/4/12/13/14 | 0/1/2/3/4day |
|-----|--------------------------------|------------------------|--------------|-------------|
| ARCM | CA-CaMKIIIdc+AIP              | TUNEL positive cells(%) | 3/7/8/12/13 | 0/1/2/3/4day |
| ARCM | CA-CaMKIIIdc+Bcl-XL           | TUNEL positive cells(%) | 3/5/10/12/14 | 0/1/2/3/4day |
| ARCM | CaMKII activity(1/2/3/5/7)    | TUNEL positive cells(%) | 4/6/14/16/17 | 24hr        |

Identification of Novel in Vivo Phosphorylation Sites of the Human Proapoptotic Protein BAD: PORE-FORMING ACTIVITY OF BAD IS REGULATED BY PHOSPHORYLATION

|     | HEK293+BAD TF+B-RAF           | DMSO/BAY43-9006 0.1uM/1uM/10uM | pBAD(S75) 0.35/0.45/0.25 | 16hr TF + 22hr BAY |
|-----|-------------------------------|--------------------------------|--------------------------|-------------------|
| HEK293+BAD | none                | Apoptotic cells(%) 25 | 16hr TF + 30hr culture |
| HEK293+BAD+B-RAF-KD | none             | Apoptotic cells(%) 24 | 16hr TF + 30hr culture |
| HEK293+BAD+B-RAF     | none              | Apoptotic cells(%) 10 | 16hr TF + 30hr culture |
| HEK293+B-RAF         | none              | Apoptotic cells(%) 8 | 16hr TF + 30hr culture |

Selective regulation of cyclic nucleotide phosphodiesterase PDE3A isoforms

|     | HEK293+PDE3A2 | Ctrl/ISO/PMA | PDE3A2-pS428 0.1/0.1/1.0 | ISO(1uM) 90s, PMA(10ng/ml) for 15min |
|-----|---------------|--------------|--------------------------|-----------------------------------|
| HEK293+PDE3A1 | Ctrl/ISO/PMA | PDE3A1-pS312 0.1/1.0/0.1 | ISO(1uM) 90s, PMA(10ng/ml) for 15min |
| HEK293+PDE3A2 | Ctrl/ISO/IBMX/IBMX +ISO | PDE3A1-pS312 0.2/0.2/0.2 /1.0 | ISO(1uM) 90s, PMA(10ng/ml) for 15min |
| HEK293+PDE3A2 | Ctrl/ISO/IBMX/IBMX +ISO | PDE3A1-pS312 0.1/0.2/0.2 /1.0 | ISO(1uM) 90s, PMA(10ng/ml) for 15min |
| HEK293+PDE3A2 | PKA 0nM/10nM/100nM | PDE3A2-pS312 0.1/0.5/1.0 | 20min |
| HEK293+PDE3A1 | PKA           | PDE3A1-pS312 0.1/0.2/1.0 | 20min |
|          | Condition  | PDE3 activity | Note                  |
|----------|------------|---------------|-----------------------|
| HEK293+PDE3A2 | Ctrl/PMA/dBcAMP | 100/120/125 | PMA 15min, dBcAMP 1h |
| HEK293+PDE3A1 | Ctrl/ISO/PMA/dBcAMP | 100/100/100/145 | ISO 90s, PMA 15min, dBcAMP 1h |

### 23933582

**Differential regulation of cardiac excitation-contraction coupling by cAMP phosphodiesterase subtypes**

|          | Condition  | Parameter                          | Value                  |
|----------|------------|------------------------------------|------------------------|
| ARVM     | Ctrl/Bay/Iso/Iso+Bay | Fura2 ratio(% of diastolic ratio) | 20/40/100/130          |
| ARVM     | Ctrl/Bay/Iso/Iso+Bay | t\textsubscript{1/2 off} relaxation(s) of calcium transient | 0.45/0.4/0.25          |
| ARVM     | Ctrl/Bay/Iso/Iso+Bay | Sarcomere shortening               | 0.00333333             |
| ARVM     | Ctrl/Bay/Iso/Iso+Bay | t\textsubscript{1/2 off} relaxation(s) of sarcomere shortening | 0.5/0.35/0.15          |
| ARVM     | Ctrl/Cil/Iso/Iso+Cil | Fura2 ratio(% of diastolic ratio) | 20/45/100/140          |
| ARVM     | Ctrl/Cil/Iso/Iso+Cil | t\textsubscript{1/2 off} relaxation(s) of calcium transient | 0.4/0.3/0.25/0.2       |
| ARVM     | Ctrl/Cil/Iso/Iso+Cil | Sarcomere shortening               | 0.001960784            |
| ARVM     | Ctrl/Cil/Iso/Iso+Cil | t\textsubscript{1/2 off} relaxation(s) of sarcomere shortening | 0.5/0.25/0.15/0.1     |
| ARVM     | Ctrl/Ro/Iso/Iso+Ro  | Fura2 ratio(% of diastolic ratio) | 20/20/80/140           |
| ARVM     | Ctrl/Ro/Iso/Iso+Ro  | t\textsubscript{1/2 off} relaxation(s) of calcium transient | 0.4/0.35/0.25/0.25     |
| ARVM     | Ctrl/Ro/Iso/Iso+Ro  | Sarcomere                           | 0.0046296              |
| ARVM          | Ctrl/Ro/Iso/Iso+Ro | Shortening t1/2/off relaxation(s) of sarcomere shortening | 0.5/0.45/0.15/0.1 |
|--------------|--------------------|-----------------------------------------------------------|-------------------|
| NRVM+Ad GFP-HDAC5 | none               | HDAC5 nuclear localization                               | 750               |
| NRVM+Ad GFP-HDAC5 | PE                 | HDAC5 nuclear localization                               | 150               |
| NRVM+Ad GFP-HDAC5 | PE+KN93           | HDAC5 nuclear localization                               | 100               |
| NRVM+Ad GFP-HDAC5 | PE+U1026          | HDAC5 nuclear localization                               | 150               |
| NRVM+Ad GFP-HDAC5 | PE+HA1077         | HDAC5 nuclear localization                               | 300               |
| NRVM+Ad GFP-HDAC5 | PE+Y27632         | HDAC5 nuclear localization                               | 200               |
| NRVM+Ad GFP-HDAC5 | PE+DAGK Inhibitor | HDAC5 nuclear localization                               | 250               |
| NRVM+Ad GFP-HDAC5 | PE+Wortmannin     | HDAC5 nuclear localization                               | 20                |
| NRVM+Ad GFP-HDAC5 | PE+Rapamycin      | HDAC5 nuclear localization                               | 200               |
| NRVM+Ad GFP-HDAC5 | PE+SB216763       | HDAC5 nuclear localization                               | 10                |
| NRVM+Ad GFP-HDAC5 | PE+Bis1           | HDAC5 nuclear localization                               | 600               |
| NRVM+Ad GFP-HDAC5 | PE+Staurosporine  | HDAC5 nuclear localization                               | 1000              |
| NRVM+Ad GFP-HDAC5 | none               | HDAC5 nuclear localization                               | 330               |
| NRVM+Ad GFP-HDAC5 | PE                 | HDAC5 nuclear localization                               | 100               |

Protein Kinases C and D Mediate Agonist-Dependent Cardiac Hypertrophy through Nuclear Export of Histone Deacetylase 5
Akt/mTOR pathway is a crucial regulator of skeletal muscle hypertrophy and can prevent muscle atrophy in vivo

| Condition                                      | Treatment                        | Effect                        | Value   | Duration |
|-----------------------------------------------|----------------------------------|-------------------------------|---------|----------|
| NRVM+Ad GFP-HDAC5                            | Bis1 pretx 30min+PE HDAC5 nuclear localization | 110                            | 2hr     |
| NRVM+Ad GFP-HDAC5                            | ET-1 HDAC5 nuclear localization | 115                            | 2hr     |
| NRVM+Ad GFP-HDAC5                            | Bis1 pretx 30min+ET-1 HDAC5 nuclear localization | 115                            | 2hr     |
| NRVM+Ad GFP-HDAC5                            | FBS HDAC5 nuclear localization | 130                            | 2hr     |
| NRVM+Ad GFP-HDAC5                            | Bis1 pretx 30min+FBS HDAC5 nuclear localization | 80                             | 2hr     |

| Condition                                      | Treatment                        | Effect                        | Value   | Duration |
|-----------------------------------------------|----------------------------------|-------------------------------|---------|----------|
| Rat heart                                     | clenbuterol Heart weight         | 21                            | 14days  |
| Rat heart                                     | clenbuterol+CsA Heart weight     | 1                             | 14days  |
| plantaris muscle lysates from control rats    | none calcineurin activity        | 47                            | 14days  |
| plantaris muscle lysates from control rats    | CsA calcineurin activity         | 33                            | 14days  |
| CH                                            | none calcineurin activity        | 36                            | 14days  |
| CH                                            | CsA calcineurin activity         | 33                            | 14days  |
| CH                                            | none Muscle weight               | 37                            | 14days  |
| CH                                            | CsA Muscle weight                | 36                            | 14days  |
| CH                                            | none Muscle weight               | 58                            | 30days  |
| CH                                            | CsA Muscle weight                | 89                            | 30days  |
| Rat plantaris muscle of control               | none Fibre cross-sectional area  | 2100                          | 14days  |
| CH                                            | none Fibre cross-sectional area  | 3300                          | 14days  |
| CH                                            | CsA Fibre cross-sectional area   | 3200                          | 14days  |
| Rat plantaris muscle of control               | none Fibre cross-sectional area  | 1400                          | 14days  |
|                                | CH   | None | Fibre cross-sectional area | 2800 | 14days |
|--------------------------------|------|------|----------------------------|------|--------|
| muscle fibres expressing slow MyHC in plantaris muscle of control | CH   | CsA  | Fibre cross-sectional area | 2600 | 14days |
| % of total fibre               | CH   | None | % of total fibre            | 12   | 14days |
| GSK-3β activity                | CH   | CSa  | GSK-3β activity             | 75   | 14days |
| p70S6K activity                | CH   | Rap  | p70S6K activity             | 100  | 14days |
| muscle fibres in rat plantaris muscle of control | CH   | None | Fibre cross-sectional area | 2100 | 14days |
| % of total fibre               | CH   | None | % of total fibre            | 3300 | 14days |
| muscle fibres in rat plantaris muscle of control | CH   | Rap  | Fibre cross-sectional area | 2400 | 14days |
| % of total fibre               | CH   | None | % of total fibre            | 1300 | 14days |
| muscle fibres in rat plantaris muscle of control | CH   | None | Fibre cross-sectional area | 2800 | 14days |
| % of total fibre               | CH   | Rap  | Fibre cross-sectional area | 1800 | 14days |
| Serum Response Factor Mediates AP-1-dependent Induction of the Skeletal α-Actin Promoter in Ventricular Myocytes |
|--------------------------------------------------------------------------------------------------|
| cardiac myocyte+Δ56Fos | none | Skeletal α-Actin activity | 1 | 24hr |
| cardiac myocyte+Δ56Fos+Fos 1ug | none | Skeletal α-Actin activity | 1.3 | 24hr |
| cardiac myocyte+Δ56Fos+Fos 5ug | none | Skeletal α-Actin activity | 1.2 | 24hr |
| cardiac myocyte+Δ56Fos+Fos 10ug | none | Skeletal α-Actin activity | 0.5 | 24hr |
| cardiac myocyte+Δ56Fos+Jun 1ug | none | Skeletal α-Actin activity | 1 | 24hr |
| cardiac myocyte+Δ56Fos+Jun 5ug | none | Skeletal α-Actin activity | 1.1 | 24hr |
| cardiac myocyte+Δ56Fos+Jun 10ug | none | Skeletal α-Actin activity | 1.3 | 24hr |
| cardiac myocyte+Δ56Fos+JunB 1ug | none | Skeletal α-Actin activity | 0.4 | 24hr |
| cardiac myocyte+Δ56Fos+JunB 5ug | none | Skeletal α-Actin activity | 0.3 | 24hr |
| cardiac myocyte+Δ56Fos+JunB 10ug | none | Skeletal α-Actin activity | 0.2 | 24hr |
| cardiac myocyte+Jun | none | Gal4 activity | 0.8 | 24hr |
| cardiac myocyte+Gal4-SRF(256-508) | none | Gal4 activity | 8 | 24hr |
| cardiac myocyte+Gal4-SRF(256-508)+Jun | none | Gal4 activity | 9 | 24hr |

| Estrogen regulates histone deacetylases to prevent cardiac hypertrophy |
|--------------------------------------------------------------|
| NRCM | none | HDAC4 mRNA expression | 5 | 24hr |
| NRCM | Ang II | HDAC4 mRNA expression | 1.5 | 24hr |
| NRCM | ET-1 | HDAC4 mRNA expression | 2.5 | 24hr |
| NRCM | none | HDAC5 mRNA | 7 | 24hr |
|          | Treatment | mRNA/Protein | Expression | Time (hr) |
|----------|-----------|--------------|------------|-----------|
| NRCM     | Ang II    | HDAC5 mRNA   | 2          | 24hr      |
|          | ET-1      | HDAC5 mRNA   | 3          | 24hr      |
|          | none      | HDAC4 protein| 12         | 24hr      |
|          | Ang II    | HDAC4 protein| 4          | 24hr      |
|          | ET-1      | HDAC4 protein| 3.8        | 24hr      |
|          | none      | HDAC5 protein| 13         | 24hr      |
|          | Ang II    | HDAC5 protein| 3          | 24hr      |
|          | ET-1      | HDAC5 protein| 3          | 24hr      |
|          | none      | HDAC4 mRNA   | 12         | 24hr      |
|          | Ang II    | HDAC4 mRNA   | 4          | 24hr      |
|          | none      | HDAC5 mRNA   | 8          | 24hr      |
|          | Ang II    | HDAC5 mRNA   | 3          | 24hr      |
|          | none      | pHDAC4 S632  | 1000       | 24hr      |
|          | Ang II    | pHDAC4 S632  | 3700       | 24hr      |
|          | Ang II+BAPTA| pHDAC4 S632  | 1200       | 24hr      |
|          | BAPTA 5mM | pHDAC4 S632  | 1400       | 24hr      |
|          | Ang II+EGTA| pHDAC4 S632  | 1300       | 24hr      |
|          | EGTA 3mM  | pHDAC4 S632  | 1500       | 24hr      |
|          | none      | GAPDH        | 2.3        | 24hr      |
|          | Ang II    | GAPDH        | 2.3        | 24hr      |
|                  | Treatment                          | Gene     | Expression | Time  |
|------------------|------------------------------------|----------|------------|-------|
| NRCM             | Ang II+E2                          | GAPDH    | 2.4        | 24hr  |
| NRCM             | Ang II+DPN                         | GAPDH    | 2          | 24hr  |
| NRCM             | E2                                 | GAPDH    | 2.3        | 24hr  |
| NRCM             | DPN                                | GAPDH    | 2.3        | 24hr  |
| NRCM             | none                               | HDAC2 mRNA expression | 1 | 24hr  |
| NRCM             | Ang II                             | GATA4 transcriptional activity | 2.8* | 24hr  |

|                  | Treatment                          | pFAK     | SHP2       | pSHP2  | Time  |
|------------------|------------------------------------|----------|------------|--------|-------|
| NRVM             | no stretch                         | 100      | 100        | 100    | 0min  |
| NRVM             | stretch 10min                       | 150*     | 35*        | 15*    | 10min |
| NRVM             | stretch 30min                       | 180*     | 50*        | 50*    | 30min |
| NRVM             | stretch 60min                       | 190*     | 35*        | 35*    | 60min |
| NRVM             | no stretch                         | 100      | 25*        | 100    | 0min  |
| NRVM             | stretch 10min                       | 15*      | 25*        | 15*    | 60min |
| NRVM             | stretch 30min                       | 50*      | 60*        | 60min |
| NRVM             | stretch 60min                       | 15*      | 60*        | 60min |
| NRVM             | no stretch                         | 100      | 100        | 100    | 60min |
| NRVM             | stretch                            | 160*     | 160*       | 100    | 60min |
| NRVM             | no stretch                         | 100      | 100        | 100    | 0min  |
| NRVM             | stretch 10min                       | 100      | 100        | 100    | 10min |
| NRVM             | stretch 30min                       | 30*      | 60*        | 60min |
| NRVM             | stretch 60min                       | 50*      | 60*        | 60min |
| NRVM             | no stretch                         | 100      | 100        | 100    | 0min  |
| NRVM             | stretch 10min                       | 45*      | 45*        | 45*    | 10min |

**Shp2 Negatively Regulates Growth in Cardiomyocytes by Controlling Focal Adhesion Kinase/Src and mTOR Pathways**

18757826
|                        | Treatment                  | pFAK  | SHP2   | pSHP2 Tyr542 | Anti-SHP2 |
|------------------------|----------------------------|-------|--------|--------------|-----------|
| NRVM                   | stretch 30min              |       |        | 65*          | 100       |
| NRVM                   | stretch 60min              |       |        | 62*          | 100       |
| NRVM                   | no stretch                 |       | pSHP2  | 100          | 100       |
| NRVM                   | stretch 10min              |       | pSHP2  | 130*         | 100       |
| NRVM                   | stretch 60min              |       | pSHP2  | 180          | 100       |
| NRVM                   | none                       |       | SHP2   | 100          |          |
| NRVM                   | Lipofectamine              |       | SHP2   | 120          |          |
| NRVM+si-GFP            | none                       |       | SHP2   | 100          | 100       |
| NRVM+si-SHP2           | none                       |       | SHP2   | 100          | 10*       |
| NRVM                   | none                       |       | p Anti-SHP2 | 100      |          |
| NRVM                   | Lipofectamine              |       | p Anti-SHP2 | 85        |          |

Stress-induced activation of protein kinase CK2 by direct interaction with p38 mitogen-activated protein kinase

|                          | Treatment                  | p38α-stimulated casein phosphotransferase activity of CK2 | HeLa cell+ CK2 | 10747897 |
|--------------------------|----------------------------|----------------------------------------------------------|----------------|----------|
|                          | none                       | p38α-stimulated casein phosphotransferase activity of CK2 | 480            | 30min    |
| HeLa cell+ CK2+GST-p38   | none                       | p38α-stimulated casein phosphotransferase activity of CK2 | 1600           | 30min    |
| HeLa cell+ CK2+GST-p38   | SB203580                   | p38α-stimulated casein phosphotransferase activity of CK2 | 490            | 30min    |
| HeLa cell+ CK2+GST-p38   | DRB                        | p38α-stimulated casein phosphotransferase activity of CK2 | 500            | 30min    |
|    | HeLa cell+ CK2+GST-p38 | Heparin | p38α-stimulated casein phosphotransferase activity of CK2 | 220 | 30min |
|----|------------------------|---------|----------------------------------------------------------|-----|-------|
|    | HeLa cell+GST-p38      | none    | p38α-stimulated casein phosphotransferase activity of CK2 | 10  | 30min |

|    | Regulation of angiotensin II-induced JAK2 tyrosine phosphorylation: roles of SHP-1 and SHP-2 |
|----|------------------------------------------------------------------------------------------------|
|    | VSMC+Rabbit IgG | Ang II 0/5/10/30/60min | pJAK2 | 0.4/2.6/3.1/2.0/0.4 | 0/5/10/30/60min |
|    | VSMC+Anti SHP2 Ab | Ang II 0/5/10/30/60min | pJAK2 | 0.4/0.4/0.5/0.4/0.4 | 0/5/10/30/60min |
|    | VSMC | none | Cell proliferation | 0.24/0.29/0.28 | 0.28 | 0/7/12/24/48hr |
|    | VSMC | Ang II | Cell proliferation | 0.23/0.28/0.50/0.60/0.63 | 0/7/12/24/48hr |
|    | VSMC+anti SHP2 Ab | Ang II | Cell proliferation | 0.20/0.25/0.30/0.31/0.29 | 0/7/12/24/48hr |

|    | Requirement of Ca(2+) and PKCdelta for Janus kinase 2 activation by angiotensin II: involvement of PYK2 |
|----|-----------------------------------------------------------------------------------------------------------|
|    | VSMC | none | pJAK2 | 1 | 3min |
|    | VSMC | Ang II | pJAK2 | 4 | 3min |
|    | VSMC | none | pJAK2 | 0.2 | 3min |
|    | VSMC | Ang II+GF109203X pretx 30min | pJAK2 | 0.7 | 3min |
|    | VSMC | none | pJAK2 | 1 | 3min |
|    | VSMC | Ang II | pJAK2 | 5 | 3min |
|    | VSMC | none | pJAK2 | 0.8 | 3min |
| VSMC         | Ang II+Rottle pretx 30min | pJAK2 | 1.2 | 3min |
|--------------|---------------------------|-------|-----|------|
| VSMC         | none                      | pJAK2 | 1   | 3min |
| VSMC         | Ang II                    | pJAK2 | 5   | 3min |
| VSMC         | none                      | pJAK2 | 2   | 3min |
| VSMC         | Ang II+Go6976 pretx 30min | pJAK2 | 4   | 3min |

Scaffolding Protein Grb2-associated Binder 1 Sustains Epidermal Growth Factor-induced Mitogenic and Survival Signaling by Multiple Positive Feedback Loops

| HEK293       | none                      | pAkt  | 1   | 0min |
|---------------|---------------------------|-------|-----|------|
| HEK293        | EGF                       | pAkt  | 3   | 1min |
| HEK293        | EGF                       | pAkt  | 2   | 5min |
| HEK293        | EGF                       | pAkt  | 1.5 | 10min|
| HEK293        | wortmannin                | pAkt  | 0   | 0min |
| HEK293        | EGF+wortmannin            | pAkt  | 0   | 1min |
| HEK293        | EGF+wortmannin            | pAkt  | 0   | 5min |
| HEK293        | EGF+wortmannin            | pAkt  | 0   | 10min|
| HEK293        | EGF                       | ppERK | 0/1.5/7/0.6/0/4/5/2.0 | 0/1/3/5/10/30min |
| HEK293        | EGF+wortmannin            | ppERK | 0/0/0.8/1.5/1.2/0.3 | 0/1/3/5/10/30min |
| HEK293        | none                      | pEGFR | 1   | 0min |
| HEK293        | EGF                       | pEGFR | 3   | 1min |
| HEK293        | EGF                       | pEGFR | 2   | 5min |
| HEK293        | EGF                       | pEGFR | 1.5 | 10min|
| HEK293        | wortmannin                | pEGFR | 1   | 0min |
| HEK293        | EGF+wortmannin            | pEGFR | 3.5 | 1min |
| HEK293        | EGF+wortmannin            | pEGFR | 2   | 5min |
| HEK293        | EGF+wortmannin            | pEGFR | 1.5 | 10min|
| HEK293        | EGF                       | ppERK | 0/0/0.45/0.6/0.75/1.2/0.9/0.28 | 0/1/3/4/5/7/10/15/30min |
|                | Condition                    | Protein | Value    | Time (min)          |
|----------------|------------------------------|---------|----------|--------------------|
| HEK293         | EGF+wortmannin               | ppERK   | 0/0/0/0/0 | 0/1/3/4/5/7/10/15/30 |
|                |                              | pAkt    | 1/0/0     | 0min               |
|                |                              |         | 2/0.05/0  | 5min               |
|                |                              |         | 3/0.05/0  | 0min               |
|                |                              |         | 4/0.05/0  | 5min               |
|                |                              |         | 2/0.05/0  | 0min               |
|                |                              |         | 3.5/0.05/0 | 5min              |
|                | EGF                          | pAkt    | 1.0/1.3/2.5 | 0/1/3/5/10/30     |
|                |                              |         | 2.0/3.0/5.0 | 0/1/3/5/10/30     |
|                |                              |         | 1.0/1.3/2.5 | 0/1/3/5/10/30     |
|                |                              |         | 2.0/3.0/5.0 | 0/1/3/5/10/30     |
|                |                              |         | 1.0/1.3/2.5 | 0/1/3/5/10/30     |
|                |                              |         | 2.0/3.0/5.0 | 0/1/3/5/10/30     |
|                |                              |         | 1.0/1.3/2.5 | 0/1/3/5/10/30     |
|                |                              |         | 2.0/3.0/5.0 | 0/1/3/5/10/30     |
|                | Gab-SHP2 complex             |         | 0/280/170/120/90/70/50/25 | 0/2/5/10/15/20/25/30 |
|                |                              |         | 0/150/30/25/25/25/25/25 | 0/2/5/10/15/20/25/30 |
|                |                              |         | 0/43/23/10/8/5/3/1 | 0/2/5/10/15/20/25/30 |
|                |                              |         | 0/18/2/1/1/1/1/1 | 0/2/5/10/15/20/25/30 |
| Experiment | Condition | Protein | Time (min) | Description |
|------------|-----------|---------|------------|-------------|
| HEK293    | none      | ppERK   | 0/70/75/50 | 0/2/5/10/15/20/25/30 |
| HEK293+Gab1ΔSHP2 | none      | ppERK   | 0/60/45/20 | 0/2/5/10/15/20/25/30 |

**Angiotensin II induces cardiomyocyte hypertrophy probably through histone deacetylases**

| Experiment | Condition | Gene | Time (hr) | Description |
|------------|-----------|------|-----------|-------------|
| NRCM       | none      | HDAC2 mRNA | 0.12     | 12hr        |
| NRCM       | Ang II    | HDAC2 mRNA | 0.35     | 12hr        |
| NRCM       | Ang II+VPA | HDAC2 mRNA | 0.23     | 12hr        |
| NRCM       | none      | β-MHC mRNA | 0.16     | 12hr        |
| NRCM       | Ang II    | β-MHC mRNA | 0.36     | 12hr        |
| NRCM       | Ang II+VPA | β-MHC mRNA | 0.24     | 12hr        |
| NRCM       | none      | % of HDAC2 positive CM | 1.25     | 12hr        |
| NRCM       | Ang II    | % of HDAC2 positive CM | 2.2      | 12hr        |
| NRCM       | Ang II+VPA | % of HDAC2 positive CM | 1.6     | 12hr        |
| NRCM       | none      | % of c-fos positive CM | 1.2      | 12hr        |
| NRCM       | Ang II    | % of c-fos positive CM | 2.4      | 12hr        |
| NRCM       | Ang II+VPA | % of c-fos positive CM | 1.6     | 12hr        |
| NRCM       | none      | Surface area of CM | 40       | 12hr        |
| NRCM       | Ang II    | Surface area of CM | 110      | 12hr        |
| NRCM       | Ang II+VPA | Surface area of CM | 85       | 12hr        |

**Protein tyrosine phosphorylation induced by epidermal growth factor and insulin-like growth factor-1 in a rat clonal dental pulp-cell line**

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### Table 1: Proliferation Assay Results

| Cell Line     | Treatment          | Proliferation | Time (h) |
|---------------|--------------------|---------------|----------|
| RDP 4-1cells  | None               | 0.45          | 48h      |
| RDP 4-1cells  | EGF 0.1 ng/ml      | 0.485         | 48h      |
| RDP 4-1cells  | EGF 1 ng/ml        | 0.53          | 48h      |
| RDP 4-1cells  | EGF 10 ng/ml       | 0.565         | 48h      |
| RDP 4-1cells  | EGF 100 ng/ml      | 0.575         | 48h      |
| RDP 4-1cells  | None               | 0.45          | 48h      |
| RDP 4-1cells  | IGF-1 0.1 ng/ml    | 0.452         | 48h      |
| RDP 4-1cells  | IGF-1 1 ng/ml      | 0.465         | 48h      |
| RDP 4-1cells  | IGF-1 10 ng/ml     | 0.515         | 48h      |
| RDP 4-1cells  | IGF-1 100 ng/ml    | 0.527         | 48h      |

### Table 2: PLC-gamma Activity Assay Results

| Cell Line     | Treatment          | Activity | Time (min) |
|---------------|--------------------|----------|------------|
| NIH 3T3 cells | None               | pPLBbeta1 | 1          | 5min      |
| NIH 3T3 cells | PDGF (2 nM)        | pPLBbeta1 | 1.1        | 5min      |
| NIH 3T3 cells | None               | pPLCgamma| 1          | 5min      |
| NIH 3T3 cells | PDGF (2 nM)        | pPLCgamma| 9          | 5min      |
| NIH 3T3 cells | None               | pPLCdelt a| 1          | 5min      |
| NIH 3T3 cells | PDGF (2 nM)        | pPLCdelt a| 1          | 5min      |
| NIH 3T3 cells | EGF (rp-saturating amount) | pPLCgamma | 1.45       | 15min     |
| NIH 3T3 cells | PDGF (2 nM)        | pPLCgamma| 10/20/30/4 2/58/100/8 0/50 | 0/2/4/6/8/10/30/60 |
| T84 cells+CCh | PDGFR              | pPLCgamma| positive   |           |
| A431 cells    | EGFR               | pPLCgamma| positive   |           |

### Additional Information

**PLC-gamma is a substrate for the PDGF and EGF receptor protein-tyrosine kinases in vivo and in vitro**

**ErbB2 and ErbB3 receptors mediate inhibitor of calcium-dependent chloride secretion in colonic epithelial cells**

| Cell Line     | Treatment          | Activity | Time (min) |
|---------------|--------------------|----------|------------|
| T84 cells+CCh | None               | Isc (µA/cm²) | 33         | 20min      |
| T84 cells+CCh | EGF                | Isc (µA/cm²) | 15         | 20min      |
| T84 cells    | EGF                | p-EGFR   | 12.5       | control    |
| T84 cells    | EGF                | p-EGFR   | 190        | 1min       |
| T84 cells    | EGF                | p-EGFR   | 195        | 5min       |
| T84 cells | EGF | p-EGFR | 208 | 15min |
|----------|-----|--------|-----|-------|
| T84 cells | EGF | p-ErbB2 | 10 | control |
| T84 cells | EGF | p-ErbB2 | 108 | 1min |
| T84 cells | EGF | p-ErbB2 | 106 | 5min |
| T84 cells | EGF | p-ErbB2 | 114 | 15min |
| T84 cells | EGF | p-ErbB3 | 3 | control |
| T84 cells | EGF | p-ErbB3 | 9 | 1min |
| T84 cells | EGF | p-ErbB3 | 3 | 5min |
| T84 cells | EGF | p-ErbB3 | 7 | 15min |
| T84 cells | EGF(100ng/ml) | ErbB2+EGFR | 0/1/0.7/0.7 | 0/1/5/15min |
| T84 cells | EGF | PI3K+EGFR | 0.1/1/0.8/0.6 | 0/1/5/15min |
| T84 cells | EGF | PI3K+ErbB2 | 0/0/0/0 | 0/1/5/15min |

A JNK-independent signaling pathway regulates TNF alpha-stimulated, c-Jun-Driven FRA-1 protooncogene transcription in pulmonary epithelial cells

| pulmonary epithelial cells | TNFa | p-JNK1(activation) | 0 | 0min |
|--------------------------|------|--------------------|---|------|
| pulmonary epithelial cells | TNFa | p-JNK1(activation) | 1 | 15min |
| pulmonary epithelial cells | TNFa | p-JNK1(activation) | 1.5 | 30min |
| pulmonary epithelial cells | TNFa | p-JNK1(activation) | 1.7 | 60min |
| pulmonary epithelial cells | TNFa | p-c-JUN/c-JUN | 0 | 0min |
| pulmonary epithelial cells | TNFa | p-c-JUN/c-JUN | 0.3 | 15min |
| pulmonary epithelial cells | TNFa | p-c-JUN/c-JUN | 0.4 | 30min |
| pulmonary epithelial cells | TNFa | p-c-JUN/c-JUN | 0.5 | 60min |
| pulmonary epithelial cells | TNFa | p-c-JUN/c-JUN | 1.2 | 120min |
| pulmonary epithelial cells | TNFa | p-CREB | 1.5 | 15min |
| pulmonary epithelial cells | TNFa | p-CREB | 2.7 | 30min |
| pulmonary epithelial cells | TNFa | p-ATF1 | 1 | 0min |
| pulmonary epithelial cells | TNFa | p-ATF1 | 2.7* | 15min |
| Condition                                      | Stimulation | Phospho-Protein   | Ratio | Time (min) |
|-----------------------------------------------|-------------|-------------------|-------|------------|
| Pulmonary epithelial cells                    | TNFα        | p-ATF1            | 1.2   | 30min      |
| Pulmonary epithelial cells + DMSO             | TNFα        | p-Elk-1/Elk-1     | 1     | 30min      |
| Pulmonary epithelial cells + PD98059          | TNFα        | p-Elk-1/Elk-1     | 0.5   | 30min      |
| Pulmonary epithelial cells + DMSO             | TNFα        | p-CREB            | 1.7   | 30min      |
| Pulmonary epithelial cells + PD98059          | TNFα        | p-CREB            | 0.9   | 30min      |
| Pulmonary epithelial cells + DMSO             | TNFα        | p-ATF1            | 1.1   | 30min      |
| Pulmonary epithelial cells + PD98059          | TNFα        | p-ATF1            | 0.5   | 30min      |

The transcription factor GATA-4 is activated by extracellular signal-regulated kinase1- and 2-Mediated phosphorylation of serine 105 in cardiomyocytes.

| Condition                                      | Stimulation | Phospho-Protein   | Ratio | Time (min) |
|-----------------------------------------------|-------------|-------------------|-------|------------|
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 1     | 0hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 2     | 1hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 2.5   | 3hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 3.5   | 3hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 5     | 0hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 8     | 1hr        |
| Cardiomyocytes + Ad beta gal TF               | PE(10uM)    | p- GATA4/GATA4    | 10    | 24hr       |
| NRVM                                          | Saline      | p- GATA4/GATA4    | 1     | 3hr        |
| NRVM                                          | PE          | p-                | 3     | 3hr        |
| Treatment                                      | Condition     | p-GATA4 fold increase | Time  |
|-----------------------------------------------|---------------|-----------------------|-------|
| NRVM + Ad beta-gal TF                         | none          | p-GATA4/GATA4         | 1     | 24h   |
| NRVM + Ad MEK1 TF                            | none          | p-GATA4/GATA4         | 5     | 24h   |
| NRVM + Ad MKK7 TF                            | none          | p-GATA4/GATA4         | 2     | 24h   |
| NRVM + Ad MKK6 TF                            | none          | p-GATA4/GATA4         | 3     | 24h   |
| NRVM                                         | beta-gal      | p-GATA4 fold increase | 1     | 0hr   |
| NRVM                                         | beta-gal +PE  | p-GATA4 fold increase | 3.3   | 3hr   |
| NRVM                                         | dnMEK1+PE     | p-GATA4 fold increase | 0.75  | 3hr   |
| NRVM                                         | dnMKK4+PE     | p-GATA4 fold increase | 2.78  | 3hr   |
| NRVM                                         | dnMKK3+PE     | p-GATA4 fold increase | 3.5   | 3hr   |
| NRVM+MBP                                      | none          | p-GATA4               | 0     | 20min |
| NRVM                                         | beta-gal      | ANF                   | 17    | 2h TF + 24h medium |
| NRVM                                         | MEK1          | ANF                   | 64    | 2h TF + 24h medium |
| NRVM                                         | MEK1+Engr     | ANF                   | 62    | 2h TF + 24h medium |
| NRVM                                         | MEK1+G4-Engr  | ANF                   | 30.5  | 2h TF + 24h medium |
| NRVM                                         | MKK7          | ANF                   | 67    | 2h TF + 24h medium |
| NRVM                                         | MKK7+Engr     | ANF                   | 62.5  | 2h TF + 24h medium |
| NRVM                                         | MKK7+G4-Engr  | ANF                   | 64    | 2h TF + 24h medium |
| 10788473 Ad CnA : A replication-deficient adenovirus |              |                       |       |       |
| None TG mice                                  | none          | p-JNK(p54)            | 1     | 14 day mice |
| Calcineurin TG mice                           | none          | p-JNK(p54)            | 1.7   | 14 day mice |
| None TG mice                                  | none          | p-JNK(p54)            | 1     | 25 day mice |
| Calcineurin TG mice                           | none          | p-JNK(p54)            | 1.7   | 25 day mice |
|                              | None TG mice |    | p-p38    |    | 14 day mice |
|------------------------------|--------------|----|----------|----|-------------|
| Calcineurin TG mice          | none         |    | p-p38    | 0.8| 14 day mice |
| None TG mice                 | none         |    | p-p38    | 1  | 25 day mice |
| Calcineurin TG mice          | none         |    | p-p38    | 0.9| 25 day mice |
| None TG mice                 | none         |    | p-ERK1/2 | 1  | 14 day mice |
| Calcineurin TG mice          | none         |    | p-ERK1/2 | 2  | 14 day mice |
| None TG mice                 | none         |    | p-ERK1/2 | 1  | 25 day mice |
| Calcineurin TG mice          | none         |    | JNK activity | 1.7| 24hr        |
| None TG mice                 | none         |    | ERK 1/2 activity | 1| 24hr        |
| Calcineurin TG mice          | none         |    | PKC activity | 1.4| 4 day       |
| None TG mice                 | none         |    | PKC activity | 2 | 8 day       |
| Calcineurin TG mice / None   | none         |    | PKC activity | 2.4| 14 day      |
| Calcineurin TG mice / None   | none         |    | PKC activity | 1.4| 25 day      |
| None TG mice                 | none         |    | PKC alpha particulate | 0.4516129\ 03 | 24hr |
| Calcineurin TG mice          | none         |    | PKC beta-1 particulate | 0.6944444\ 44 | 24hr |
| None TG mice                 | none         |    | PKC beta-1 particulate | 0.7518796\ 99 | 24hr |
| Calcineurin TG mice          | none         |    | PKC epsilon cytosol | 0.8620689\ 66 | 24hr |
| None TG mice                 | none         |    | PKC epsilon cytosol | 1.1739130\ 43 | 24hr |
| Calcineurin TG mice          | none         |    | PKC epsilon cytosol | 0.8111111\ 11 | 24hr |
| None TG mice                 | none         |    | PKC theta | 0.75 | 24hr       |
|                          | Assay                                        | Protein     | Concentration | Cell Area (μm²) | Time (24hr) |
|--------------------------|----------------------------------------------|-------------|---------------|-----------------|-------------|
| Calcineurin TG mice      | none                                         | PKC theta cytosol | 1.6           |                 |             |
| None TG mice             | PKC beta-2 cytosol                          | 0.8666666 67 |               |                 |             |
| Calcineurin TG mice      | PKC beta-2 cytosol                          | 2           |               |                 |             |
| None TG mice             | PKC lambda cytosol                          | 4           |               |                 |             |
| Calcineurin TG mice      | PKC lambda cytosol                          | 0.9230769 23 |               |                 |             |
| Cardiomyocyte + Ad beta gal TF | none                                        | CellArea(μm²) | 1250          |                 |             |
| Cardiomyocyte + Ad CnA TF | none                                         | CellArea(μm²) | 2200          |                 |             |
| Cardiomyocyte + Ad CnA TF | Chelerythrine 2.5uM                          | CellArea(μm²) | 1300          |                 |             |
| Cardiomyocyte + Ad CnA TF | PMA 1uM                                      | CellArea(μm²) | 1400          |                 |             |
| Cardiomyocyte + Ad CnA TF | PD098059 25uM                                | CellArea(μm²) | 2000          |                 |             |
| Cardiomyocyte + Ad CnA TF | SB202190 20uM                                | CellArea(μm²) | 2100          |                 |             |
| Cardiomyocyte + Ad CnA TF | BDM 7mM                                      | CellArea(μm²) | 2000          |                 |             |
| Cardiomyocyte + Ad CnA TF | BAPTA 2.5uM                                  | CellArea(μm²) | 1080          |                 |             |

**Big mitogen-activated kinase regulates multiple members of the mef2 protein family**

| Assay | Protein     | Concentration | Time (24hr) |
|-------|-------------|---------------|-------------|
| in vitro protein kinase assay | BMK1 | pMEF2A | positive | 1hr |
| in vitro protein kinase assay | BMK1 | pMEF2B | neutral | 1hr |
| in vitro protein kinase assay | BMK1 | pMEF2C | positive | 1hr |
| in vitro protein kinase assay | BMK1 | pMEF2D | positive | 1hr |
| in vitro protein kinase assay | BMK1 | MBP    | neutral  | 1hr |
| in vitro protein kinase assay | BMK1 | c-jun  | neutral  | 1hr |
| HeLa | None | control | 1         | 48hr |
| HeLa | MEK5D+BMK1 | control | 0.8       | 48hr |
| HeLa | None | MEF2A | 1.5       | 48hr |
| HeLa | MEK5D+BMK1 | MEF2A | 21.5      | 48hr |
| HeLa | None | MEF2B | 0.5       | 48hr |
| Cell Line       | Treatment                          | MEF2 Gene | Value | Time (48hr) |
|----------------|------------------------------------|-----------|-------|-------------|
| HeLa           | MEK5D+BMK1                         | MEF2B     | 0.3   |             |
| HeLa           | None                               | MEF2C     | 1     |             |
| HeLa           | MEK5D+BMK1                         | MEF2C     | 19    |             |
| HeLa           | None                               | MEF2D     | 1.5   |             |
| HeLa           | MEK5D+BMK1                         | MEF2D     | 26.5  |             |
| Chinese hamster ovary | None                             | control  | 1     |             |
| Chinese hamster ovary | MEK5D+BMK1                      | control  | 0.8   |             |
| Chinese hamster ovary | None                             | MEF2A     | 1.5   |             |
| Chinese hamster ovary | MEK5D+BMK1                      | MEF2A     | 25    |             |
| Chinese hamster ovary | None                             | MEF2B     | 0.7   |             |
| Chinese hamster ovary | MEK5D+BMK1                      | MEF2B     | 0.8   |             |
| Chinese hamster ovary | None                             | MEF2C     | 1.5   |             |
| Chinese hamster ovary | MEK5D+BMK1                      | MEF2C     | 32    |             |
| Chinese hamster ovary | None                             | MEF2D     | 0.9   |             |
| Chinese hamster ovary | MEK5D+BMK1                      | MEF2D     | 38    |             |
| 293            | None                               | control  | 1     |             |
| 293            | MEK5D+BMK1                         | control  | 1     |             |
| 293            | None                               | MEF2A     | 1     |             |
| 293            | MEK5D+BMK1                         | MEF2A     | 190   |             |
| 293            | None                               | MEF2B     | 1     |             |
| 293            | MEK5D+BMK1                         | MEF2B     | 5     |             |
| 293            | None                               | MEF2C     | 1     |             |
| 293            | MEK5D+BMK1                         | MEF2C     | 175   |             |
| 293            | None                               | MEF2D     | 1     |             |
| 293            | MEK5D+BMK1                         | MEF2D     | 120   |             |
| PC12           | None                               | control  | 1     |             |
| PC12           | MEK5D+BMK1                         | control  | 0.8   |             |
| PC12           | None                               | MEF2A     | 1.2   |             |
| PC12           | MEK5D+BMK1                         | MEF2A     | 4.4   |             |
| PC12           | None                               | MEF2B     | 1.2   |             |
|                | PC12 | MEK5D+BMK1 | MEF2B | 0.6 | 48hr |
|----------------|------|------------|-------|-----|------|
|                | PC12 | None       | MEF2C | 1.3 | 48hr |
|                | PC12 | MEK5D+BMK1 | MEF2C | 6   | 48hr |
|                | PC12 | None       | MEF2D | 1.5 | 48hr |
|                | PC12 | MEK5D+BMK1 | MEF2D | 4.8 | 48hr |
| HeLa cells     | none | control    | 1     |     | 6hr  |
| HeLa cells     | EGF  | control    | 1.15  |     | 6hr  |
| HeLa cells     | none | MEF2A      | 1.2   |     | 6hr  |
| HeLa cells     | EGF  | MEF2A      | 3.7   |     | 6hr  |
| HeLa cells     | none | MEF2D      | 100   | 20min |
| HeLa cells     | none | MEF2D      | 80    | 20min |
| HeLa cells     | none | MEF2D      | 100   | 20min |
| HeLa cells     | none | MEF2D      | 115   | 20min |
| HeLa cells     | none | MEF2D      | 110   | 20min |
| HeLa cells     | none | MEF2D      | 97    | 20min |
| BMK1 phosphorylates MEF2A at amino acids Ser-355, Thr-312, Thr-319 |
| HeLa+pG5ElbLuc+pcDNA3 | None | MEF2A | 1 | 24h |
| HeLa+pG5ElbLuc+pcDNA3 | MEK5D+BMK1 | MEF2A | 0.8 | 24h |
| HeLa+pG5ElbLuc+wt   | None  | MEF2A | 1.2 | 24h |
| HeLa+pG5ElbLuc+wt   | MEK5D+BMK1 | MEF2A | 21 | 24h |
| HeLa+pG5ElbLuc+MEF2A(S355A) | None | MEF2A | 0.5 | 24h |
| HeLa+pG5ElbLuc+MEF2A(S355A) | MEK5D+BMK1 | MEF2A | 11 | 24h |
| HeLa+pG5ElbLuc+MEF2A(T312A,T319A) | None | MEF2A | 0.8 | 24h |
| HeLa+pG5ElbLuc+MEF2A(T312A,T319A) | MEK5D+BMK1 | MEF2A | 8.5 | 24h |
| Condition                                      | Treatment                  | MEF2A 1 | MEF2A 20min |
|------------------------------------------------|----------------------------|---------|-------------|
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | None                       | MEF2A   | 1           |
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | MEK5D+BMK1                 | MEF2A   | 1.8         |
| HeLa+pG5ElbLuc+pcDNA3                          | None                       | MEF2A   | 1           |
| HeLa+pG5ElbLuc+pcDNA3                          | EGF                        | MEF2A   | 0.8         |
| HeLa+pG5ElbLuc+wt                              | None                       | MEF2A   | 0.9         |
| HeLa+pG5ElbLuc+wt                              | EGF                        | MEF2A   | 1.3         |
| HeLa+pG5ElbLuc+MEF2A( S355A)                   | None                       | MEF2A   | 0.75        |
| HeLa+pG5ElbLuc+MEF2A( S355A)                   | EGF                        | MEF2A   | 1.3         |
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | None                       | MEF2A   | 0.9         |
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | EGF                        | MEF2A   | 1.4         |
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | None                       | MEF2A   | 0.6         |
| HeLa+pG5ElbLuc+MEF2A( S355A/T312A,T319A)       | EGF                        | MEF2A   | 0.5         |
| HeLa+pG5ElbLuc+pcDNA3                          | None                       | MEF2D   | 1           |
| HeLa+pG5ElbLuc+pcDNA3                          | MEK5D+BMK1                 | MEF2D   | 1.2         |
| HeLa+pG5ElbLuc+wt                              | None                       | MEF2D   | 1.1         |
| HeLa+pG5ElbLuc+wt                              | MEK5D+BMK1                 | MEF2D   | 26.5        |
| HeLa+pG5ElbLuc+MEF2D( S179A)                   | None                       | MEF2D   | 0.9         |
| HeLa+pG5ElbLuc+MEF2D( S179A)                   | MEK5D+BMK1                 | MEF2D   | 0.5         |
| HeLa+pG5ElbLuc+MEF2D( S430A)                   | None                       | MEF2D   | 1.5         |
| HeLa+pG5ElbLuc+MEF2D( S430A)                   | MEK5D+BMK1                 | MEF2D   | 28.5        |
| HeLa+pG5ElbLuc+pcDNA3 | None | MEF2D | 1 | 20min |
|------------------------|------|-------|---|-------|
| HeLa+pG5ElbLuc+pcDNA3 | EGF  | MEF2D | 0.8 | 20min |
| Endothelin-1 is a potent regulator of human bone cell metabolism |
| osteoblastic cells+ETRAnt(10ng/ml) | None | Cell number(%) | 75 | 24h |
| osteoblastic cells+ETRAnt(10ng/ml) | Endothelin-1 1pg/ml | Cell number(%) | 87.5 | 24h |
| osteoblastic cells+ETRAnt(10ng/ml) | Endothelin-1 10pg/ml | Cell number(%) | 120 | 24h |
| osteoblastic cells+ETRAnt(10ng/ml) | Endothelin-1 100pg/ml | Cell number(%) | 100 | 24h |
| osteoblastic cells+ETRAnt(10ng/ml) | Endothelin-1 1000pg/ml | Cell number(%) | 130 | 24h |
| osteoblastic cells+ETRAnt(10ng/ml) | Endothelin-1 10000pg/ml | Cell number(%) | 165 | 24h |
| osteoblastic cells | Endothelin-1 1pg/ml | Cell number(%) | 125 | 24h |
| osteoblastic cells | Endothelin-1 10pg/ml | Cell number(%) | 167 | 24h |
| osteoblastic cells | Endothelin-1 100pg/ml | Cell number(%) | 243 | 24h |
| osteoblastic cells | Endothelin-1 1000pg/ml | Cell number(%) | 267 | 24h |
| osteoblastic cells | Endothelin-1 10000pg/ml | Cell number(%) | 320 | 24h |
| A paracrine Role for myoepithelial cell-derived FGF2 in the normal human breast |
| Breast epithelial cells(BCM) | none | prolif of Breast ep cell | 0.08 | 6 day |
| Breast epithelial cells(BCM)+1%FCS | none | prolif of Breast ep cell | 0.06 | 6 day |
| Breast epithelial cells(BCM)+2%FCS | none | prolif of Breast ep cell | 0.07 | 6 day |
| Breast epithelial cells(BCM)+5%FCS | none | prolif of Breast ep cell | 0.09 | 6 day |
| Breast epithelial cells(BCM)+10%FCS | none | prolif of Breast myoep cell | 0.45 | 6 day |
| Condition                          | Treatment   | Proliferation of BREAST MYOEDEMIC CELL | 6 day |
|-----------------------------------|-------------|----------------------------------------|-------|
| Breast epithelial cells(BCM)      | FGF2(10ng/ml) | 1.7                                    |       |
| Breast epithelial cells(BCM)+10%FCS | FGF2(10ng/ml) | 0.47                                   |       |
| Breast epithelial cells(BCM)      | none        | 0.25                                   |       |
| Breast epithelial cells(BCM)      | none        | 1.65                                   |       |
| Breast epithelial cells(BCM)+0.5%FCS | none        | 1.55                                   |       |
| Breast epithelial cells(BCM)+10%FCS | none        | 1.5                                    |       |

**Contribution of Src and Ras pathways in FGF-2 induced endothelial cell differentiation**

| Condition                          | Treatment   | ERK12 Activity | Time |
|-----------------------------------|-------------|----------------|------|
| IBEC                              | none        | 4              | 120min|
| IBEC                              | FGF         | 6              | 180min|
| IBEC                              | FGF + PD98059 | 8             | 300min|
| IBEC                              | FGF + PD98059 | 0              | 0min |
| IBEC                              | FGF + PD98059 | 2              | 10min |
| IBEC                              | FGF + PD98059 | 2              | 60min |
| IBEC                              | FGF + PD98059 | 3              | 120min|
| IBEC                              | FGF + PD98059 | 3              | 180min|
| IBEC                              | FGF + PD98059 | 3              | 300min|
| IBEC                              | none        | 5              | 3 days|

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|                      | FGF                        | Cell Number |    |          |
|----------------------|----------------------------|-------------|----|----------|
| IBEC                 | FGF + PD98059              | 5.7         | 3  | days     |
| IBEC                 | FGF + PD98059              | 3.5         | 3  | days     |
| IBEC + FN            | FGF                        | Rafl        | 1  | 0min     |
| IBEC + FN            | FGF + PD98059              | 4.2         | 1  | min      |
| IBEC + FN            | FGF + PD98059              | 3.82        | 3  | min      |
| IBEC + FN            | FGF                        | Rafl        | 2.4| 5min     |
| IBEC + FN            | FGF + PD98059              | 1.25        | 10| min      |
| IBEC + FN            | FGF + PD98059              | 1.25        | 60| min      |
| IBEC + Coll          | FGF                        | Rafl        | 1  | 0min     |
| IBEC + Coll          | FGF + PD98059              | 2.2         | 1  | min      |
| IBEC + Coll          | FGF + PD98059              | 2.5         | 3  | min      |
| IBEC + Coll          | FGF + PD98059              | 1.27        | 5  | min      |
| IBEC + Coll          | FGF + PD98059              | 1           | 10| min      |
| IBEC + Coll          | FGF + PD98059              | 1           | 60| min      |

Gq-initiated cardiomyocyte hypertrophy is mediated by phospholipase Cbeta1b

|                      |                         | PLC         |    |          |
|----------------------|-------------------------|-------------|----|----------|
| NRVM+Ad-GFP          | none                    | 0.75        | 48| h        |
| NRVM+Ad-PLCbeta1a    | none                    | 0.7         | 48| h        |
| NRVM+Ad-PLCbeta1b    | none                    | 2           | 48| h        |
| NRVM+Ad-G alpha q wild type | none            | 1.5         | 48| h        |
| NRVM+Ad-G alpha q active(Q208L) | none            | 4.25        | 48| h        |
| NRVM                 | none                    | Cell Area(um2) | 600| 48h     |
| NRVM+Ad-PLCbeta1a    | none                    | Cell Area(um2) | 800| 48h     |
| NRVM+Ad-PLCbeta1b    | none                    | Cell Area(um2) | 1200| 48h     |
| NRVM+Ad-G alpha q    | none                    | Cell Area(um2) | 1800| 48h     |
| NRVM                 | none                    | ANP mRNA    | 0.06 | 48h   |
| NRVM+Ad-PLCbeta1a    | none                    | ANP mRNA    | 0.055 | 48h   |
| NRVM+Ad-PLCbeta1b    | none                    | ANP mRNA    | 0.105 | 48h   |
| NRVM+Ad-G alpha q    | none                    | ANP mRNA    | 0.205 | 48h   |
| Condition | Treatment | Response | Time (h) |
|-----------|-----------|----------|----------|
| NRVM      | None      | PLC      | 2.5      |
| NRVM+Ad-PLCbeta1a-CT | None      | PLC      | 2.25     |
| NRVM+Ad-PLCbeta1b-CT | None      | PLC      | 3.75     |
| NRVM      | NE        | PLC      | 7        |
| NRVM+Ad-PLCbeta1a-CT | NE        | PLC      | 6.8      |
| NRVM+Ad-PLCbeta1b-CT | NE        | PLC      | 3.75     |
| NRVM      | None      | PLC      | 5        |
| NRVM+Ad-Galpha q | None      | PLC      | 25       |
| NRVM+Ad-Galpha q + Ad-PLCbeta1a-CT | None      | PLC      | 25.5     |
| NRVM+Ad-Galpha q + Ad-PLCbeta1b-CT | None      | PLC      | 4.5      |
| NRVM      | PE + Propranolol | Cell Area | 800     |
| NRVM+Ad-PLCbeta1a-CT | None      | Cell Area | 1000    |
| NRVM+Ad-PLCbeta1a-CT | PE + Propranolol | Cell Area | 2050    |
| NRVM+Ad-PLCbeta1b-CT | None      | Cell Area | 1200    |
| NRVM+Ad-PLCbeta1b-CT | PE + Propranolol | Cell Area | 1000    |
| NRVM      | None      | Cell Area | 760     |
| NRVM+Ad-PLCbeta1b-CT | None      | Cell Area | 820     |
| NRVM+Ad-Galpha q | None      | Cell Area | 1220    |
| NRVM+Ad-Galpha q + Ad-PLCbeta1b-CT | None      | Cell Area | 830     |
| NRVM      | None      | ANP mRNA | 0.016    |
| NRVM+Ad-PLCbeta1b-CT | None      | ANP mRNA | 0.01     |
| NRVM+Ad-Galpha q | None      | ANP mRNA | 0.07     |
| NRVM+Ad-G alpha q+Ad-PLCbeta1b-CT | none | ANP mRNA | 0.01 | 24h |
|-----------------------------------|------|----------|------|-----|
| Roles of Gbetagamma in membrane recruitment and activation of p110gamma/p101 PI3Kgamma |
| p110gamma~~p101 : dimerization of p110gamma and p101 |
| HEK cells | none | Akt | 1 |
| HEK cells | FCS | Akt | 2.5 |
| HEK cells+fMLP-R TF + p110gamma | none | Akt | 1 | 1day |
| HEK cells+fMLP-R TF + p110gamma | fMLP | Akt | 1.5 | 1day |
| HEK cells+fMLP-R TF + p110gamma+p101 (PI3K) | none | Akt | 1.5 | 1day |
| HEK cells+fMLP-R TF + p110gamma+p101 (PI3K) | fMLP | Akt | 2 | 1day |
| HEK cells+p110gamma-CAAX+fMLP-R | none | ERK12 | 1 | 1day |
| HEK cells+p110gamma-CAAX+fMLP-R+dn Ras | none | ERK12 | 0.5 | 1day |
| HEK cells | none | Akt | 1 | 1day |
| HEK cells | FCS | Akt | 2.5 | 1day |
| HEK cells+p110gamma | none | Akt | 0.2 | 1day |
| HEK cells+p110gamma | fMLP | Akt | 0.3 | 1day |
| HEK cells+p110gamma+p101 | none | Akt | 0.4 | 1day |
| HEK cells+p110gamma+p101 | fMLP | Akt | 1.3 | 1day |
| HEK cells+p110gamma-CAAX | none | Akt | 0.4 | 1day |
| HEK cells+p110gamma-CAAX | fMLP | Akt | 1 | 1day |
| HEK cells+p110gamma- | none | Akt | 0.3 | 1day |
| CAAX+p101 HEK cells+p110gamma-CAAX+p101 | fMLP | Akt | 1.2 | 1day |
|------------------------------------------|------|-----|-----|-----|
| Structure, Regulation, and Function of Mammalian Membrane Guanylyl Cyclase Receptors, with a Focus on Guanylyl cyclase-A |
| cardiomyocyte(floxed GC-A mice) | none | ANP(pg/ml plasma) | 220 |
| cardiomyocyte(CM GC-A KO mice) | none | ANP(pg/ml plasma) | 510 |
| cardiomyocyte(floxed GC-A mice) | none | cGMP | 20.8 |
| cardiomyocyte(CM GC-A KO mice) | none | cGMP(pmol/ml plasma) | 45 |
| Pressure-independent cardiac hypertrophy in mice with cardiomyocyte-restricted inactivation of the atrial natriuretic peptide receptor guanylyl cyclase-A |
| cardiomyocyte(floxed GC-A mice) | none | cGMP | 65 | 10min |
| cardiomyocyte(CM GC-A KO mice) | none | cGMP | 50 | 10min |
| cardiomyocyte(floxed GC-A mice) | ANPi | cGMP | 200 | 10min |
| cardiomyocyte(CM GC-A KO mice) | ANPi | cGMP | 140 | 10min |
| cardiomyocyte(floxed GC-A mice) | ANPi | cGMP | 325 | 10min |
| cardiomyocyte(CM GC-A KO mice) | ANPi | cGMP | 240 | 10min |
| cardiomyocyte(floxed GC-A mice) | none | ANP mRNA | 1 |
| cardiomyocyte(CM GC-A KO mice) | none | ANP mRNA | 4.9 |
| cardiomyocyte(floxed GC-A mice) | none | sACT | 1 |
| cardiomyocyte(CM GC-A KO mice) | none | sACT | 1.7 |
Activation of JAK-STAT and MAP kinases by leukemia inhibitory factor through gp130 in cardiac myocytes.

| Cell Type                      | Treatment 1 | Treatment 2 | Time 1   | Time 2   |
|--------------------------------|-------------|-------------|----------|----------|
| Cardiomyocytes                 | none        | gp130LIFR   | 0        | 0min     |
| Cardiomyocytes                 | LIF         | gp130LIFR   | 1        | 2min     |
| Cardiomyocytes                 | LIF         | gp130LIFR   | 4        | 5min     |
| Cardiomyocytes                 | LIF         | gp130LIFR   | 3        | 15min    |
| Cardiomyocytes                 | none        | JAK1        | 0        | 0min     |
| Cardiomyocytes                 | LIF         | JAK1        | 1        | 5min     |
| Cardiomyocytes                 | LIF         | JAK1        | 2.5      | 15min    |
| Cardiomyocytes                 | none        | STAT3       | 0        | 0min     |
| Cardiomyocytes                 | LIF         | STAT3       | 30       | 5min     |
| Cardiomyocytes                 | LIF         | STAT3       | 20       | 15min    |
| Cardiomyocytes                 | LIF         | STAT3       | 10       | 30min    |
| Cardiomyocytes                 | LIF         | STAT3       | 1        | 60min    |
| non-myocardial cells           | none        | STAT3       | 0        | 0min     |
| non-myocardial cells           | LIF         | STAT3       | 20       | 5min     |
| non-myocardial cells           | LIF         | STAT3       | 30       | 15min    |
| non-myocardial cells           | LIF         | STAT3       | 10       | 30min    |
| non-myocardial cells           | LIF         | STAT3       | 1        | 60min    |
| Cardiomyocytes                 | none        | STAT3       | 0.01     | 15min    |
| Cardiomyocytes                 | LIF         | STAT3       | 0.01     | 15min    |
| Cardiomyocytes                 | LIF         | STAT3       | 1        | 15min    |
| Cardiomyocytes                 | LIF         | STAT3       | 10       | 15min    |
| Neonatal murine CM + LIF       | none        | JAK1        | 1        | 2hr      |
| (1&10³ U/ml) 5min              |             |             |          |          |
| Neonatal murine CM + LIF       | anti-gp130 blocking Ab | JAK1 | 0.2 | 2hr |
| Condition                                      | Treatment / Block | MAPK Target | Time (min) | Time (hr) |
|-----------------------------------------------|-------------------|-------------|------------|-----------|
| Neonatal murine CM + LIF (1x10^3 U/ml) 5min   | none              | STAT3       | 1          | 2         |
| Neonatal murine CM + LIF (1x10^3 U/ml) 5min   | anti-gp130 blocking Ab | STAT3       | 0.05       | 2         |
| Cardiomyocytes                               | LIF               | MAPK        | 1          | 0         |
| Cardiomyocytes                               | LIF               | MAPK        | 3          | 2         |
| Cardiomyocytes                               | LIF               | MAPK        | 4.8        | 5         |
| Cardiomyocytes                               | LIF               | MAPK        | 2.8        | 15        |
| Cardiomyocytes                               | LIF               | MAPK        | 1          | 30        |
| Cardiomyocytes                               | LIF               | MAPK        | 1.2        | 60        |
| Cardiomyocytes                               | NE                | MAPK        | 1          | 0         |
| Cardiomyocytes                               | NE                | MAPK        | 5          | 2         |
| Cardiomyocytes                               | NE                | MAPK        | 11.4       | 5         |
| Cardiomyocytes                               | NE                | MAPK        | 8          | 15        |
| Cardiomyocytes                               | NE                | MAPK        | 5.75       | 30        |
| Cardiomyocytes                               | NE                | MAPK        | 4.8        | 60        |
| Cardiomyocytes                               | LIF               | ERK1        | 1          | 0         |
| Cardiomyocytes                               | LIF               | ERK1        | 7          | 5         |
| Cardiomyocytes                               | LIF               | ERK1        | 2.5        | 15        |
| Cardiomyocytes                               | LIF               | ERK1        | 0.8        | 30        |
| Cardiomyocytes                               | LIF               | ERK1        | 0.7        | 60        |
| Cardiomyocytes                               | LIF               | ERK2        | 0          | 0         |
| Cardiomyocytes                               | LIF               | ERK2        | 6          | 5         |
| Cardiomyocytes                               | LIF               | ERK2        | 1          | 15        |
| Cardiomyocytes                               | LIF               | ERK2        | 0.5        | 30        |
| Cardiomyocytes                               | LIF               | ERK2        | 0.8        | 60        |
| Adult Heart                                  | LIF               | gp130LIFR   | 1          | 0         |
| Adult Heart                                  | LIF               | gp130LIFR   | 4          | 5         |
| Adult Heart                                  | LIF               | gp130LIFR   | 0.5        | 15        |
| Adult Heart                                  | LIF               | STAT3       | 1          | 0         |
| Tissue          | Protein | Gene | Time | Unit |
|-----------------|---------|------|------|------|
| Adult Heart     | LIF     | STAT3| 4    | 5min |
| Adult Heart     | LIF     | STAT3| 6    | 15min|
| Adult Heart     | LIF     | STAT3| 2    | 30min|
| Adult Heart     | LIF     | STAT3| 0.5  | 60min|
| Liver           | LIF     | STAT3| 0    | 0min |
| Liver           | LIF     | STAT3| 1    | 5min |
| Liver           | LIF     | STAT3| 1.5  | 15min|
| Liver           | LIF     | STAT3| 0.02 | 30min|
| Liver           | LIF     | STAT3| 0    | 60min|
| Adult Heart     | IL6     | STAT3| 0    | 0min |
| Adult Heart     | IL6     | STAT3| 0    | 5min |
| Adult Heart     | IL6     | STAT3| 0    | 15min|
| Adult Heart     | IL6     | STAT3| 0    | 30min|
| Adult Heart     | NE      | STAT3| 0    | 0min |
| Adult Heart     | NE      | STAT3| 0    | 5min |
| Adult Heart     | NE      | STAT3| 0    | 15min|
| Adult Heart     | NE      | STAT3| 0    | 30min|
| Adult Heart     | LIF     | MAPK | 1    | 0min |
| Adult Heart     | LIF     | MAPK | 2.7  | 5min |
| Adult Heart     | LIF     | MAPK | 1.05 | 15min|
| Adult Heart     | LIF     | MAPK | 1    | 30min|

Activation of gp130 Transduces Hypertrophic signal through interaction of scaffolding/docking protein Gab1 with tyrosine phosphatase SHP2 in cardiomyocytes

| Tissue | Condition | Gene | Value | Time | Unit |
|--------|-----------|------|-------|------|------|
| NRVM   | control   | Gab1 | 1     | 5min |
| NRVM   | LIF       | Gab1 | 8     | 5min |
| NRVM   | NE        | Gab1 | 1     | 5min |
| NRVM   | ET1       | Gab1 | 1.1   | 5min |
| NRVM   | AngII     | Gab1 | 1.5   | 5min |
| NRVM   | control   | SHP2 | 1     | 5min |
| NRVM   | LIF       | SHP2 | 9     | 5min |
|              |          |          |     |      |
|--------------|----------|----------|-----|------|
| NRVM NE      | SHP2     | 0.5      | 5min|
| NRVM ET1     | SHP2     | 0.8      | 5min|
| NRVM AngII   | SHP2     | 0.8      | 5min|
| NRVM LIF     | Gab1     | 0        | 0min|
| NRVM LIF     | Gab1     | 1        | 2min|
| NRVM LIF     | Gab1     | 10       | 5min|
| NRVM LIF     | Gab1     | 5        | 10min|
| NRVM LIF     | Gab1     | 0.2      | 30min|
| NRVM none    | Gab1     | 1        | 5min|
| NRVM LIF     | Gab1     | 2        | 5min|
| NRVM LIF     | Gab1     | 4.5      | 5min|
| NRVM LIF     | Gab1     | 6        | 5min|
| NRVM LIF     | SHP2     | 0        | 0min|
| NRVM LIF     | SHP2     | 1        | 2min|
| NRVM LIF     | SHP2     | 3        | 5min|
| NRVM LIF     | SHP2     | 5        | 10min|
| NRVM LIF     | SHP2     | 1.5      | 30min|
| NRVM LIF     | SHP2     | 0.3      | 60min|
| NRVM none    | SHP2     | 1        | 5min|
| NRVM LIF     | SHP2     | 1        | 5min|
| NRVM LIF     | SHP2     | 3        | 5min|
| NRVM LIF     | SHP2     | 5        | 5min|
| NRVM none    | Tyrosine | 1        | 5min|
| NRVM LIF     | Tyrosine | 10       | 5min|
| NRVM none    | Tyrosine | 1        | 5min|
| NRVM LIF     | Tyrosine | 50       | 5min|
| Description | Condition | Treatments | CellArea | Time |
|-------------|-----------|------------|----------|------|
| NRVM+Ad beta-gal | none | CellArea | 1 | 24h |
| NRVM+Ad beta-gal | LIF | CellArea | 1.7 | 24h |
| NRVM+Ad Gab1WT | none | CellArea | 1 | 24h |
| NRVM+Ad beta-gal | LIF | Akt | 2.25 | 10min |
| NRVM+Ad beta-gal | LIF | Akt | 1.5 | 30min |
| NRVM+Ad Gab1WT | LIF | Akt | 1 | 0min |
| NRVM+Ad Gab1WT | LIF | Akt | 1.8 | 2min |
| NRVM+Ad Gab1WT | LIF | Akt | 2.1 | 5min |
| NRVM+Ad Gab1WT | LIF | Akt | 3.8 | 10min |
| NRVM+Ad Gab1WT | LIF | Akt | 1.78 | 30min |
| NRVM+Ad Gab1F627/659 | LIF | Akt | 1 | 0min |
| NRVM+Ad Gab1F627/659 | LIF | Akt | 1.8 | 2min |
| NRVM+Ad Gab1F627/659 | LIF | Akt | 4.1 | 10min |
| NRVM+Ad Gab1F627/659 | LIF | Akt | 2.75 | 30min |
| NRVM+Ad Gab1WT+Ad beta-gal | none | CellArea | 1 | 24h |
| NRVM+Ad Gab1WT+Ad beta-gal | LIF | CellArea | 1.6 | 24h |
| NRVM+Ad Gab1WT+Ad ERK5AEF | none | CellArea | 1 | 24h |
| NRVM+Ad Gab1WT+Ad ERK5AEF | LIF | CellArea | 1.07 | 24h |

MEK1 and the extracellular signal-regulated kinases are required for the stimulation of IL-2 gene transcription in T cells.

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| Description | Condition | Treatments | MEK1 | Time |
|-------------|-----------|------------|------|------|
| Jurkat T cells | anti-CD3 mAb | MEK1 | 0.6/2.0/1.6 /1.4/1.0 | 0/5/10/15/60/90min |
| Jurkat T cells | anti-CD3 mAb | ERK2 | 0.4/1.3/2.4 /1.3/1.1/0. 45 | 0/5/10/15/60/90min |

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Activated MEK5 induces serial assembly of sarcomeres and eccentric cardiac hypertrophy

| Description | Condition | Treatments | ERK5 | Time |
|-------------|-----------|------------|------|------|
| NR cardiomyocytes | 100 microM PE | ERK5 | 1 | 0min |
|                | NR cardiomyocytes | 100 microM PE | ERK5 | 2.75 | 5min  |
|----------------|-------------------|---------------|------|------|-------|
|                | NR cardiomyocytes | 100 microM PE | ERK5 | 3.75 | 10min |
|                | NR cardiomyocytes | 100 microM PE | ERK5 | 2.5  | 20min |
|                | NR cardiomyocytes | 1000U/ml LIF  | ERK5 | 1.5  | 60min |
|                | NR cardiomyocytes | 1000U/ml LIF  | ERK5 | 2.2  | 5min  |
|                | NR cardiomyocytes | 1000U/ml LIF  | ERK5 | 3    | 10min |
|                | NR cardiomyocytes | 1000U/ml LIF  | ERK5 | 2    | 20min |
|                | NR cardiomyocytes | 1000U/ml LIF  | ERK5 | 0.85 | 60min |
| NR cardiomyocytes | Cardiomyocytes + MEK5WT TF | PE(50uM) | sACT | 8 | 24h |
| NR cardiomyocytes | Cardiomyocytes + dnMEK5 TF | PE(50uM) | sACT | 2.8 | 24h |
| NR cardiomyocytes | Cardiomyocytes + MEK5WT TF | LIF(1000U/ml) | sACT | 4.8 | 24h |
| NR cardiomyocytes | Cardiomyocytes + dnMEK5 TF | LIF(1000U/ml) | sACT | 1 | 24h |
| NR cardiomyocytes | Cardiomyocytes + beta-galactosidase TF | PE(50uM) | sACT | 5 | 24h |
| NR cardiomyocytes | Cardiomyocytes + beta-galactosidase TF | LIF(1000U/ml) | sACT | 4 | 24h |
| NR cardiomyocytes | Cardiomyocytes + MEK5WT TF | PE(50uM) | ANF | 5.75 | 24h |
| NR cardiomyocytes | Cardiomyocytes + dnMEK5 TF | PE(50uM) | ANF | 2 | 24h |

Norepinephrine stimulates apoptosis in adult rat ventricular myocytes by activation of the beta-AR pathway

|                | ARVM (adult rat ventricular myocytes) | control | Apoptosis(% of t=0) | 10 | 24h |
|----------------|--------------------------------------|---------|---------------------|----|-----|
|                | ARVM                                 | NE(10microM/L) | Apoptosis(% of t=0) | 36 | 24h |
|                | ARVM                                 | PRO(2microM/L)+NE | Apoptosis(% of t=0) | 14 | 30minPRO 24hNE |
| ARVM          | Treatment                        | Apoptosis(%) | Time     |
|--------------|----------------------------------|--------------|----------|
|              | PZ(0.1 microM/L)+NE              | 42           | 30minPZ 24hNE |
| ARVM         | control                          | 5.7          | 30min    |
| ARVM         | NE(10 microM/L)                  | 17           | 30min    |
| ARVM         | NE+PRO(2 microM/L)               | 7            | 30min    |
| ARVM         | NE+PZ(0.1 microM/L)              | 14           | 30min    |
| ARVM         | control                          | 7            | 24h      |
| ARVM         | ISO(10 microM/L)                 | 14.6         | 24h      |
| ARVM         | FSK(10 microM/L)                 | 14.375       | 24h      |
| ARVM         | control                          | 7            | Time Course |
| ARVM         | NE(10 microM/L)                  | 10.625       |          |
| ARVM         | H-89(20 microM/L)                | 4.28         |          |
| ARVM         | NE+H-89(20 microM/L)             | 5.3          |          |
| ARVM         | control                          | 8.75         |          |
| ARVM         | NE(10 microM/L)                  | 15.7         |          |
| ARVM         | DLTZ(diltiazem:1 microM/L)       | 9.4          |          |
| ARVM         | NE+DLTZ(diltiazem:1 microM/L)    | 8.8          |          |

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| Treatments          | p38 MAPK expression and activation in smooth muscle |
|---------------------|-----------------------------------------------------|
| Colonic muscle strips | Ach p38 1 0min                                      |
| Colonic muscle strips | Ach p38 3.75 1min                                   |
| Colonic muscle strips | Ach p38 4.75 5min                                   |
| Colonic muscle strips | Ach p38 7.6 10min                                   |
| Colonic muscle strips | Ach p38 6.8 20min                                   |
| Colonic muscle strips | Ach p38 3.6 30min                                   |
| colonic smooth muscle | none ATF2 0 0min                                    |
| colonic smooth muscle | none ATF2 2500 30min                                 |
| colonic smooth muscle | none ATF2 7000 180min                                |
| colonic smooth muscle | SB202190 ATF2 0 0min                                 |
| colonic smooth muscle | SB202190 | ATF2 | 0 | 30min |
|----------------------|----------|------|---|-------|
| colonic smooth muscle | SB202190 | ATF2 | 0 | 180min |

MKK3 and MKK6 regulated gene expression is mediated by the p38 MAPK signal transduction pathway.

| CHO cell+MKK3 TF | none | p38 | positive | 48hr |
|------------------|------|-----|----------|------|
| CHO cell+MKK3 TF | none | ERK | 1        | 48hr |
| CHO cell+MKK3 TF | none | JNK | 1        | 48hr |
| CHO cell+MEK1 TF | none | p38 | 1        | 48hr |
| CHO cell+MEK1 TF | none | ERK | positive | 48hr |
| CHO cell+MEK1 TF | none | JNK | 1        | 48hr |
| CHO cell         | none | cJun| 1        | 48hr |
| CHO cell+MKK3 TF + p38 TF | none | cJun | 6 | 48hr |
| CHO cell+ERK TF  | none | cJun| 28       | 48hr |
| CHO cell         | none | cFos| 1        | 48hr |
| CHO cell+MKK3 TF + p38 TF | none | cFos | 7 | 48hr |
| CHO cell+ERK TF  | none | cFos| 5        | 48hr |
| CHO cell         | none | ATF2| 1        | 48hr |
| CHO cell+MKK3 TF + p38 TF | none | ATF2 | 5 | 48hr |
| CHO cell+ERK TF  | none | ATF2| 1.5      | 48hr |
| CHO cell         | none | cJun| 1        | 48hr |
| CHO cell+MKK3 TF + p38 TF | none | cJun | 1.5 | 48hr |
| CHO cell+ERK TF  | none | cJun| 3        | 48hr |
| CHO cell         | none | ELK1| 1        | 48hr |
| CHO cell+MKK3 TF + p38 TF | none | ELK1 | 6.5 | 48hr |
| CHO cell+ERK TF  | none | ELK1| 6.5      | 48hr |

From here

Targeting of p38 MAPK to MEF2 transcriptional factors

| COS | p38 | MEF2A | 20 | 15min |
### Table 1: Phospholipase Cbeta1 Action

| Treatment | p38 | MEF2A | Time (min) |
|-----------|-----|-------|------------|
| COS       | p38 | MEF2A | 30         |
| COS       | p38 | MEF2A | 60         |
| COS       | p38 | MEF2A | 100        |
| COS       | p38 | MEF2C | 10         |
| COS       | p38 | MEF2C | 30         |
| COS       | p38 | MEF2C | 60         |
| COS       | p38 | MEF2C | 100        |
| COS       | none | MEF2A  | 2.5        |
| COS + CA MKK6/p38 | none | MEF2A  | 53        |
| COS       | none | MEF2C  | 2          |
| COS + CA MKK6/p38 | none | MEF2C  | 32.5       |

### Table 2: Cardiomyocyte Responses

| Condition | L-Type Ca2+ Channel | Relative Increase |
|-----------|---------------------|-------------------|
| NRVM+Lac Z | none | PLC | 1.3 |
| NRVM+G alpha q-WT | none | PLC | 2.8 |
| NRVM+G alpha q(Q209L) | none | PLC | 5.8 |
| NRVM+G alpha q(Q209L,D243A,N244A,E245A) | none | PLC | 2.2 |

### Table 3: Cardiac Myocytes Responses

| Condition | Stimulus | Relative Increase |
|-----------|----------|-------------------|
| Cardiac Myocytes | isoproterenol | 1.75 |
| Cardiac Myocytes | isoproterenol + PKI | 1.1 |
| Cardiac Myocytes | isoproterenol + HT31 | 1.2 |
| Cardiac Myocytes | isoproterenol + HT31P | 1.7 |

### Table 4: Mechanical Stretch

| Condition | Stimulus | JAK1 | Time (min) |
|-----------|----------|------|------------|
| Cardiomyocytes | Stretch | JAK1 | 0          |
| Cardiomyocytes | Stretch | JAK1 | 1          |

The extreme C-terminal region of phospholipase Cbeta1 determines subcellular localization and function; the "b" splice variant mediates alpha1-ar responses in cardiomyocytes.
| inhibitor) | Cardiomyocytes | Stretch | JAK1 | 4 | 5min |
|-----------|----------------|---------|------|---|------|
| BAPTA-AM(intracellular calcium chelator) | Cardiomyocytes | Stretch | JAK1 | 3 | 15min |
| gadolinium (stretch-activated ion channel inhibitor) | Cardiomyocytes | Stretch | JAK1 | 2 | 30min |
| EGTA (extracellular Ca2+ chelator) | Cardiomyocytes | Stretch | JAK2 | 1 | 0min |
| KN62(Ca2+/calmodulin kinase2 inhibitor) | Cardiomyocytes | Stretch | JAK2 | 2.5 | 2min |
| chelerythrin (PKC inhibitor) | Cardiomyocytes | Stretch | JAK2 | 3 | 5min |
| CV11974(AT1 blocker) | Cardiomyocytes | Stretch | JAK2 | 2.5 | 15min |
| TAK044(endothelin-1-type A/B-receptor blocker) | Cardiomyocytes | Stretch | JAK2 | 1 | 30min |
| RX435(anti-glycoprotein 130 antibody) | Cardiomyocytes | Stretch | STAT1 | 1 | 0min |
| Cardiomyocytes | Stretch | STAT1 | 5 | 2min |
| Cardiomyocytes | Stretch | STAT1 | 5.5 | 5min |
| Cardiomyocytes | Stretch | STAT1 | 3.5 | 15min |
| Cardiomyocytes | Stretch | STAT1 | 3.5 | 30min |
| Cardiomyocytes | Stretch | STAT3 | 1 | 0min |
| Cardiomyocytes | Stretch | STAT3 | 2 | 2min |
| Cardiomyocytes | Stretch | STAT3 | 3.5 | 5min |
| Cardiomyocytes | Stretch | STAT3 | 4 | 15min |
| Cardiomyocytes | Stretch | STAT3 | 2 | 30min |
| Cardiomyocytes | none | STAT1 | 1 | 30min Treat 6min 20% stre |
| Cardiomyocytes | Stretch | STAT1 | 2.5 | 30min Treat 6min 20% stre |
| Cardiomyocytes | AG490 + Stretch | STAT1 | 0.5 | 30min Treat 6min 20% stre |
| Cardiomyocytes | AG490 + Stretch | STAT3 | 1 | 30min Treat 6min 20% stre |
| Cardiomyocytes | Stretch | STAT3 | 2.5 | 30min Treat 6min 20% stre |
| Cardiomyocytes | AG490 + Stretch | STAT3 | 1 | 30min Treat 6min 20% stre |
| Cardiomyocytes | none | STAT3 | 1 | 30min Treat 6min 20% stre |
| Cardiomyocytes | LIF | STAT3 | 30min Treat 6min 20% stre |
| Cardiomyocytes | AG490 + LIF | STAT3 | 30min Treat 6min 20% stre |
| Cardiomyocytes | none | STAT1 | 1 | 30min Treat 6min 20% stre |
| Cardiomyocytes | AG490 + LIF | STAT1 | 5 | 30min Treat 6min 20% stre |
| Cardiomyocytes | LIF | STAT1 | 4 | 30min Treat 6min 20% stre |
| Cell Type          | Treatment                          | Kinase | Time  | Condition              |
|-------------------|------------------------------------|--------|-------|------------------------|
| Mouse cardiomyocytes | none                               | STAT3  | 1     | 30min Treat 6min 20% stre |
| Mouse cardiomyocytes | Stretch                           | STAT3  | 6     | 30min Treat 6min 20% stre |
| Mouse cardiomyocytes | Stretch + anti-gp130 blocking Ab   | STAT3  | 2     | 30min Treat 6min 20% stre |
| Mouse cardiomyocytes | LIF                               | STAT3  | 7.5   | 30min Treat 6min 20% stre |
| Mouse cardiomyocytes | LIF + anti-gp130 blocking Ab       | STAT3  | 3     | 30min Treat 6min 20% stre |
| Mouse cardiomyocytes | none                               | STAT1  | 1     |                         |
| Mouse cardiomyocytes | Stretch                           | STAT1  | 5     |                         |
| Mouse cardiomyocytes | Stretch + anti-gp130 blocking Ab   | STAT1  | 4     |                         |
| Mouse cardiomyocytes | none                               | STAT3  | 1     |                         |
| Mouse cardiomyocytes | Stretch                           | STAT3  | 5     |                         |
| Mouse cardiomyocytes | Stretch + anti-gp130 blocking Ab   | STAT3  | 2     |                         |
| Rat cardiomyocytes  | Stretch                           | gp130LIFR | 1   | 0min                   |
| Rat cardiomyocytes  | Stretch                           | gp130LIFR | 6   | 2min                   |
| Rat cardiomyocytes  | Stretch                           | gp130LIFR | 4   | 5min                   |
| Rat cardiomyocytes  | Stretch                           | gp130LIFR | 4   | 15min                  |
| Cardiomyocytes      | Stretch + BAPTA-AM                 | STAT3  | 6     | 6min 20% stretch 60min tre |
| Cardiomyocytes      | Stretch + BAPTA-AM                 | STAT3  | 6     | 6min 20% stretch 60min tre |
| Cardiomyocytes      | Stretch + BAPTA-AM                 | STAT3  | 0.5   | 6min 20% stretch 60min tre |
| Cardiomyocytes      | none                               | STAT3  | 1     | 6min                   |
| Cardiomyocytes      | Stretch                           | STAT3  | 2.5   | 6min                   |
| Cardiomyocytes      | Stretch + chelerythrine            | STAT3  | 0.7   | 6min 20% stretch 30min tre |
| Cardiomyocytes      | PMA                               | STAT3  | 5     | 6min 20% stretch 120min tre |
| Cardiomyocytes      | none                               | STAT1  | 1     | 6min                   |
| Cardiomyocytes      | chelerythrine                      | STAT1  | 1     | 6min 20% stretch 30min tre |
| Cardiomyocytes      | Stretch                           | STAT1  | 3     | 6min                   |
| Cardiomyocytes      | Stretch + chelerythrine            | STAT1  | 2     | 6min 20% stretch 30min tre |
| Cardiomyocytes      | PMA                               | STAT1  | 4     | 6min 20% stretch 120min tre |
Biphasic activation of the jak/stat pathway by angiotensin2 in rat cardiomyocytes

| Cardiomyocytes | AngII | JAK2  | 0.067 | 0min |
|----------------|-------|-------|-------|------|
| Cardiomyocytes | AngII | JAK2  | 0.067 | 2min |
| Cardiomyocytes | AngII | JAK2  | 0.067 | 5min |
| Cardiomyocytes | AngII | JAK2  | 0.5   | 15min|
| Cardiomyocytes | AngII | JAK2  | 1     | 30min|
| Cardiomyocytes | LIF   | JAK2  | 0.03  | 0min |
| Cardiomyocytes | LIF   | JAK2  | 0.6   | 2min |
| Cardiomyocytes | LIF   | JAK2  | 1     | 5min |
| Cardiomyocytes | LIF   | JAK2  | 0.475 | 15min|
| Cardiomyocytes | LIF   | JAK2  | 0.067 | 30min|
| Cardiomyocytes | AngII | STAT1 | 0.15  | 0min |
| Cardiomyocytes | AngII | STAT1 | 0.15  | 2min |
| Cardiomyocytes | AngII | STAT1 | 0.05  | 5min |
| Cardiomyocytes | AngII | STAT1 | 1     | 15min|
| Cardiomyocytes | AngII | STAT1 | 0.95  | 30min|
| Cardiomyocytes | LIF   | STAT1 | 0     | 0min |
| Cardiomyocytes | LIF   | STAT1 | 0.2   | 2min |
| Cardiomyocytes | LIF   | STAT1 | 1     | 5min |
| Cardiomyocytes | LIF   | STAT1 | 1     | 15min|
| Cardiomyocytes | LIF   | STAT1 | 0.1   | 30min|
| Cardiomyocytes | AngII | STAT2 | 0.1   | 0min |
| Cardiomyocytes | AngII | STAT2 | 0.1   | 2min |
| Cardiomyocytes | AngII | STAT2 | 0.3   | 5min |
| Cardiomyocytes | AngII | STAT2 | 0.6   | 15min|
| Cardiomyocytes | AngII | STAT2 | 1     | 30min|
| Cardiomyocytes | LIF   | STAT2 | 0     | 0min |
| Cardiomyocytes | LIF   | STAT2 | 0     | 2min |
| Cardiomyocytes | LIF   | STAT2 | 0     | 5min |
| Cardiomyocytes | LIF   | STAT2 | 0     | 15min|
| Cell Type          | Factor | Transcription Factor | Time  | Concentration |
|-------------------|--------|----------------------|-------|---------------|
| Cardiomyocytes    | LIF    | STAT2                | 30min | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 0min  | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 2min  | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 5min  | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 15min | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 30min | 0             |
| Cardiomyocytes    | LIF    | STAT3                | 0min  | 0             |
| Cardiomyocytes    | LIF    | STAT3                | 2min  | 0.9           |
| Cardiomyocytes    | LIF    | STAT3                | 5min  | 1             |
| Cardiomyocytes    | LIF    | STAT3                | 15min | 0.7           |
| Cardiomyocytes    | LIF    | STAT3                | 30min | 0.2           |
| Cardiomyocytes    | AngII  | STAT1                | 0min  | 0             |
| Cardiomyocytes    | AngII  | STAT1                | 5min  | 0             |
| Cardiomyocytes    | AngII  | STAT1                | 15min | 1             |
| Cardiomyocytes    | AngII  | STAT1                | 60min | 0             |
| Cardiomyocytes    | AngII  | STAT1                | 120min| 0.9           |
| Cardiomyocytes    | AngII  | STAT3                | 0min  | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 5min  | 1             |
| Cardiomyocytes    | AngII  | STAT3                | 15min | 0             |
| Cardiomyocytes    | AngII  | STAT3                | 30min | 0.5           |
| Cardiomyocytes    | AngII  | STAT3                | 60min | 0.5           |
| Cardiomyocytes    | AngII  | STAT3                | 120min| 2.5           |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 0min  | 0             |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 5min  | 0             |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 15min | 1             |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 30min | 0.9           |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 60min | 0             |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT1 | 120min| 0.85          |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT3 | 0.1   | 0             |
| Cardiomyocytes    | Ang2 (10^(-7)mol/L) | Tyr-STAT3 | 5min  | 0.15          |
| Condition | Treatment | Protein | Value | Time |
|-----------|-----------|---------|-------|------|
| Cardiomyocytes | Ang2 (10^-7mol/L) | Tyr-STAT3 | 0.05 | 15min |
| Cardiomyocytes | Ang2 (10^-7mol/L) | Tyr-STAT3 | 0.1  | 30min |
| Cardiomyocytes | Ang2 (10^-7mol/L) | Tyr-STAT3 | 0.13 | 60min |
| Cardiomyocytes | Ang2 (10^-7mol/L) | Tyr-STAT3 | 1   | 120min |
| Cardiomyocytes | None | STAT1 | 1 | |
| Cardiomyocytes | Ang2 | STAT1 | 5 | |
| Cardiomyocytes | Ang2 + CV11974 | STAT1 | 1.3 | |
| Cardiomyocytes | None | STAT1 | 1 | |
| Cardiomyocytes | Ang2 | STAT1 | 6 | |
| Cardiomyocytes | Ang2 + CV11974 | STAT1 | 5.7 | 30min |
| Cardiomyocytes | Ang2 + CV11974 | STAT1 | 6 | 60min |

Characterization of IGF-1-induced activation of the JAK/STAT Pathway in Rat Cardiomyocytes.

| Condition | Treatment | Protein | Value | Time |
|-----------|-----------|---------|-------|------|
| Cardiomyocytes | IGF-1 (10^-8mol/L) | JAK2 | 1 | 0min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | JAK2 | 1 | 5min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | JAK2 | 1 | 15min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | JAK2 | 1 | 30min |
| Cardiomyocytes | LIF | JAK2 | 5 | 5min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | Raf1 | 1 | 0min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | Raf1 | 2.35 | 2min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | Raf1 | 2.3 | 5min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | Raf1 | 1.18 | 15min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | Raf1 | 1 | 30min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 1 | 0min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 2 | 1min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 3 | 2min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 5 | 5min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 4 | 15min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 1.5 | 30min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | ERK12 | 1.7 | 60min |
| Cardiomyocytes | IGF-1 (10^-8mol/L) | STAT1 | 0 | 0min |
| Cardiomyocytes | Stimulant | Time | STAT1  |
|----------------|-----------|------|--------|
| IGF-1 (10^-8mol/L) | 1 | 2min |
| IGF-1 (10^-8mol/L) | 2 | 5min |
| IGF-1 (10^-8mol/L) | 4 | 15min|
| IGF-1 (10^-8mol/L) | 0 | 30min|
| IGF-1 (10^-8mol/L) | 1 | 60min|
| LIF | 1 | 0min |
| LIF | 1 | 2min |
| LIF | 2 | 5min |
| LIF | 1.3 | 15min|
| LIF | 0.5 | 15min|
| LIF | 0.05 | 30min|
| LIF | 0 | 5min |
| LIF | 4 | 5min |
| LIF | 8 | 5min |
| LIF | 90 | 5min |
| LIF | 100 | 5min|
| IGF-1 (10^-9mol/L) | 9 | 60min|
| IGF-1 (10^-8mol/L) | 14 | 60min|
| Condition                                | Treatment                  | STAT1 | STAT3 | Time  |
|------------------------------------------|----------------------------|-------|-------|-------|
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 0     |       | 0min  |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 1     |       | 5min  |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 1     |       | 15min |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 2     |       | 30min |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 1     |       | 60min |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 1     |       | 0min  |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 3.3   |       | 5min  |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 0.6   |       | 15min |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 0.7   |       | 30min |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         | 4     |       | 60min |
| Cardiomyocytes + IGF-1 (10^-8mol/L)      | none                       |       | 1     | 0min  |
| Cardiomyocytes + IGF-1 (10^-8mol/L)      | none                       |       | 1.3   | 60min |
| Cardiomyocytes + IGF-1 (10^-8mol/L)      | TAK044                     |       | 1.5   | 60min |
| Cardiomyocytes + IGF-1 (10^-8mol/L)      | CV11974                    |       | 1.3   | 60min |
| Murine Cardiomyocytes                    | none                       |       | 0     | 60min |
| Murine Cardiomyocytes                    | IGF-1 (10^-8mol/L)         |       | 1     | 60min |
| Murine Cardiomyocytes                    | IGF-1 (10^-8mol/L) + RX435 |       | 1     | 60min |
| Murine Cardiomyocytes                    | none                       |       | 0     | 5min  |
| Murine Cardiomyocytes                    | LIF (1000U/mL)             |       | 1     | 5min  |
| Murine Cardiomyocytes                    | LIF (1000U/mL) + RX435     |       | 0.25  | 5min  |
| Cardiomyocytes                           | none                       |       | 0     | 30min preincu- in inhibitor |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L)         |       | 1     | 30min preincu- in inhibitor |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L) + BAPTA-AM |   | 0.05  | 30min preincu- in inhibitor |
| Cardiomyocytes                           | IGF-1 (10^-8mol/L) + EDTA  |       | 0.96  | 30min preincu- in inhibitor |
| Cardiomyocytes | Treatment | STAT3 | 30min preinc- | in inhibitor |
|----------------|-----------|-------|---------------|--------------|
| IGF-1 (10^-8mol/L) + KN62 | STAT3 | 1.04 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + PD98059 | STAT3 | 0.98 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + wortmannin | STAT3 | 0.84 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + Chelerythrine | STAT3 | 0.02 | 30min preincu- | in inhibitor |
| none | STAT1 | 1 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) | STAT1 | 6 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + BAPTA-AM | STAT1 | 6 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + EDTA | STAT1 | 6 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + KN62 | STAT1 | 6 | 30min preincu- | in inhibitor |
| none | STAT1 | 1 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) | STAT1 | 2.5 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + wortmannin | STAT1 | 2.6 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + PD98059 | STAT1 | 2.5 | 30min preincu- | in inhibitor |
| none | STAT1 | 1 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) | STAT1 | 3 | 30min preincu- | in inhibitor |
| IGF-1 (10^-8mol/L) + Chelerythrine | STAT1 | 2.8 | 30min preincu- | in inhibitor |

**ERK 1/2 AND STAT3 IS OR LOGIC**

| Treatment | p-Ser(338)-Raf1 / total Raf1 |
|-----------|-------------------------------|
| myocardium none | 1.87 |
| myocardium ischemic PC | 1.19 |
| myocardium ischemic PC + Chelerythrine | 1.87 |

Role of the Protein Kinase C—Raf-1—MEK-1/2—p44/42 MAPK Signaling Cascade in the Activation of Signal Transducers and Activators of Transcription 1 and 3 and Induction of Cyclooxygenase-2 After Ischemic Preconditioning
| Condition                      | Treatment               | p-Ser-MEK12 / total MEK12 | p-Tyr(204)-ERK12 / total ERK12 | p-Ser(727)-STAT1 / total STAT1 | p-Tyr(705)-STAT3 / total STAT3 |
|-------------------------------|-------------------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|
| Myocardium                   | None                    | p-Ser-MEK12 / total MEK12 | 1                              |                                |                                |
| Myocardium                   | Ischemic PC             | p-Ser-MEK12 / total MEK12 | 2.44                           |                                |                                |
| Myocardium                   | Ischemic PC + Chelerythrine | p-Ser-MEK12 / total MEK12 | 1.63                           |                                |                                |
| Myocardium                   | None                    | p-Tyr(204)-ERK12 / total ERK12 | 1                             |                                |                                |
| Myocardium                   | Ischemic PC             | p-Tyr(204)-ERK12 / total ERK12 | 4.05                           |                                |                                |
| Myocardium                   | Ischemic PC + Chelerythrine | p-Tyr(204)-ERK12 / total ERK12 | 1.53                           |                                |                                |
| Myocardium + PKC epsilon (KO) | None                    | p-Ser(727)-STAT1 / total STAT1 | 1                              |                                |                                |
| Myocardium + PKC epsilon (KO) | Ischemic PC             | p-Ser(727)-STAT1 / total STAT1 | 1.32                           |                                |                                |
| Myocardium + PKC epsilon (KO) | Ischemic PC             | p-Ser(727)-STAT3 / total STAT3 | 0.4134366 93.0                |                                |                                |
| Myocardium                   | None                    | p-Tyr(705)-STAT3 / total STAT3 | 1                              |                                |                                |
| Myocardium                   | Ischemic PC             | p-Tyr(705)-STAT3 / total STAT3 | 0.9882352 94.0                |                                |                                |
| Myocardium + PKC epsilon (KO) | None                    | p-Tyr(705)-STAT3 / total STAT3 | 0.72                           |                                |                                |
| Myocardium + PKC epsilon (KO) | Ischemic PC             | p-Tyr(705)-STAT3 / total STAT3 | 0.9819121 45                  |                                |                                |
| Myocardium                   | None                    | STAT1/3-DNA binding activity | 1                              |                                |                                |
| Myocardium                   | Ischemic PC             | STAT1/3-DNA binding activity | 5.5                            |                                |                                |
| Myocardium + PKC epsilon (KO) | None                    | STAT1/3-DNA binding activity | 1                              |                                |                                |
| Myocardium + PKC epsilon      | Ischemic PC             | STAT1/3-DNA binding activity | 2.4                            |                                |                                |
| (KO)                        | binding activity | COX-2 |  |
|-----------------------------|------------------|-------|---|
| myocardium                 | none             | COX-2 | 1 |
| myocardium                 | ischemic PC      | COX-2 | 4.5|
| myocardium + PKC epsilon (KO) | none             | COX-2 | 1 |
| myocardium + PKC epsilon (KO) | ischemic PC     | COX-2 | 2.25|

| Angiotensin II effects on STAT3 phosphorylation in cardiomyocytes: evidence for Erk-dependent Tyr705 dephosphorylation |
|----------------------------------------------------------------------------------------------------------------|
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 1 | 0min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 0.83 | 2min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 0.95 | 5min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 0.625 | 15min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 0.48 | 30min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 0.8 | 60min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 1.55 | 90min |
| Neonatal rat cardiomyocytes | AngII | p-Tyr705-STAT3 | 1.18 | 120min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1 | 0min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.44 | 2min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.75 | 5min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.17 | 15min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.6 | 30min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.375 | 60min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.3 | 90min |
| Neonatal rat cardiomyocytes | AngII | p-Ser727-STAT3 | 1.27 | 120min |
| Neonatal rat cardiomyocytes | none | p-Tyr705- | 1 | 30min pret and 30min Ang2 |
| Condition                          | Treatment          | STAT3   | p-Tyr705-STAT3 | Time (min)   |
|-----------------------------------|--------------------|---------|----------------|--------------|
| Neonatal rat cardiomyocytes       | AngII              | STAT3   | p-Tyr705-STAT3 | 0.5          |
| + cycloheximide                   |                    |         |                | 30min pret   |
|                                   |                    |         |                | and 30min    |
|                                   |                    |         |                | AngII Ang2   |
| Neonatal rat cardiomyocytes       | AngII              | ERK2    |                | 100          |
| + cycloheximide                   |                    |         |                | 5min         |
| Neonatal rat cardiomyocytes       | AngII              | ERK2    |                | 50           |
| + cycloheximide                   |                    |         |                | 30min        |
| Neonatal rat cardiomyocytes       | AngII              | ERK2    |                | 37.5         |
| + cycloheximide                   |                    |         |                | 60min        |
| Neonatal rat cardiomyocytes       | AngII              | ERK2    |                | 27.5         |
| + cycloheximide                   |                    |         |                | 120min       |
| Neonatal rat cardiomyocytes       | none               | p-Tyr705-STAT3 |                | 0.7          |
| + 100nM Ang2                      | PD98059 15uM       |         |                | 1.1          |
| Neonatal rat cardiomyocytes       | none               | p-Tyr705-STAT3 |                | 1            |
| + 100nM Ang2                      | vanadate           |         |                | 0.8          |
| Neonatal rat cardiomyocytes       | none               | p-Tyr705-STAT3 |                | 0.5          |
| + 100nM Ang2                      | vanadate           |         |                | 0.9          |

Cardiotrophin-1 Increases Angiotensinogen mRNA in Rat Cardiac Myocytes Through STAT3 An Autocrine Loop for Hypertrophy

| Treatment          | STAT1   | Time (min) |
|--------------------|---------|------------|
| NRVM CT1 STAT1     | 0       | 0min       |
| NRVM CT1 STAT1     | 0.02    | 2min       |
| NRVM CT1 STAT1     | 1       | 5min       |
| NRVM CT1 STAT1     | 5       | 10min      |
| NRVM CT1 STAT1     | 6       | 15min      |
| NRVM CT1 STAT1     | 2.5     | 30min      |
| NRVM CT1 STAT1     | 0       | 60min      |
| NRVM CT1 STAT1     | 0       | 120min     |
| NRVM CT1 STAT3     | 0       | 0min       |
|                | Treatment                        | Rac1 activation induces tumour necrosis factor- expression and cardiac dysfunction in endotoxemia |
|----------------|----------------------------------|-------------------------------------------------------------------------------------------------|
| NRVM CT1 STAT3| 1.5                              | 2min                                                                                             |
| NRVM CT1 STAT3| 3                                | 5min                                                                                             |
| NRVM CT1 STAT3| 4.7                              | 10min                                                                                            |
| NRVM CT1 STAT3| 2.7                              | 15min                                                                                           |
| NRVM CT1 STAT3| 2.5                              | 30min                                                                                           |
| NRVM CT1 STAT3| 0.5                              | 60min                                                                                           |
| NRVM CT1 STAT3| 0.02                             | 120min                                                                                           |
| Cardiomyocytes| CT1 3H-Leucine incorp 16          | losartan30min CT-1 treat                                                                         |
| Cardiomyocytes + Losartan| CT1 3H-Leucine incorp 6          | losartan30min CT-1 treat                                                                         |
| Cardiomyocytes| CT1 Protein content 25           | losartan30min CT-1 treat                                                                         |
| Cardiomyocytes + Losartan| CT1 Protein content 11.25       | losartan30min CT-1 treat                                                                         |
| Cardiomyocytes| CT1 Protein / DNA 30             | losartan30min CT-1 treat                                                                         |
| Cardiomyocytes + Losartan| CT1 Protein / DNA 15.7          | losartan30min CT-1 treat                                                                         |
| Neonetal Cardiomyocytes| LPS Rac1 0.15                | 0min                                                                                             |
| Neonetal Cardiomyocytes| LPS Rac1 0.225            | 5min                                                                                             |
| Neonetal Cardiomyocytes| LPS Rac1 0.31                | 15min                                                                                             |
| Neonetal Cardiomyocytes| LPS Rac1 0.25                | 30min                                                                                             |
| Neonetal Cardiomyocytes| LPS Rac1 0.23                | 60min                                                                                             |
| Adult male Racf/f mice| none Rac1 0.47           | 30min                                                                                             |
| Adult male Racf/f mice| LPS Rac1 0.95                | 30min                                                                                             |
| Neonetal Cardiomyocytes| none PIP3 production 2.1       | 30min                                                                                             |
| Neonetal Cardiomyocytes| LPS PIP3 production 3.3        | 30min                                                                                             |
| Cardiomyocytes| LPS Rac1 0.73                 | 30min                                                                                             |
| Cardiomyocytes| LPS + LY294002 Rac1 0.43       | 30min                                                                                             |
| Neonetal Cardiomyocytes| none ERK12 1.3               | 0min                                                                                             |
| Neonetal Cardiomyocytes| LPS ERK12 2.2                | 15min                                                                                             |
| Neonetal Cardiomyocytes| LPS ERK12 2.55               | 30min                                                                                             |
| Neonetal Cardiomyocytes| LPS ERK12 1.55               | 1h                                                                                               |
| Condition                        | Treatment          | ERK12  | Time  |
|---------------------------------|--------------------|--------|-------|
| Neonatal Cardiomyocytes         | LPS                | 1.27   | 2h    |
| Cardiomyocytes                  | none               | 0.67   | 30min |
| Cardiomyocytes                  | LPS                | 0.97   | 30min |
| Cardiomyocytes + Ad-GFP         | LPS + LY294002     | 0.7    | 30min |
| Cardiomyocytes + Ad-GFP         | none               | 0.6    | 30min |
| Cardiomyocytes + Ad-Rac1N17     | LPS                | 0.73   | 30min |

MEK kinases are regulated by EGF and selectively interact with Rac/Cdc42

| Condition                        | Treatment          | MEKK1  |      |
|----------------------------------|--------------------|--------|------|
| COS cells                        | none               | 1      |      |
| COS cells                        | EGF                | 2.1    |      |
| COS cells + Wortmannin + EGF    | MEKK1              | 2.1    |      |
| COS cells                        | none               | 1      |      |
| COS cells + EGF                  | MEKK2              | 3.9    |      |
| COS cells + Wortmannin + EGF    | MEKK2              | 4.1    |      |
| COS cells + Delta MEKK1 TF       | none               | 1      |      |
| COS cells + Delta MEKK2 TF       | none               | 5      |      |
| COS cells + Delta MEKK3 TF       | none               | 5      |      |
| COS cells + Delta MEKK4 TF       | none               | 5      |      |
| COS cells                        | none               | 1      |      |
| COS cells + Delta MEKK1 TF       | none               | 3      |      |
| COS cells + Delta MEKK2 TF       | none               | 2.5    |      |
| COS cells + Delta MEKK3 TF       | none               | 2.65   |      |
| COS cells + Delta MEKK4 TF       | none               | 1.6    |      |
| TF                        | COS cells          | EGF | JNK | 1   |
|--------------------------|--------------------|-----|-----|-----|
| COS cells                | EGF                |     | JNK | 4.3 |
| COS cells                | Wortmannin + EGF   |     | JNK | 4.7 |
| COS cells                | none               |     | ERK2| 1   |
| COS cells                | EGF                |     | ERK2| 5.25|
| COS cells                | Wortmannin + EGF   |     | ERK2| 5.35|
| COS cells + empty vector TF | none         |     | ERK | 1   |
| COS cells + empty vector TF | EGF         |     | ERK | 4.9 |
| COS cells + MEKK1KM expression | EGF     |     | ERK | 1.6 |
| COS cells + MEKK2KM expression | EGF     |     | ERK | 4.5 |
| COS cells + MEKK3KM expression | EGF     |     | ERK | 4.25|
| COS cells + MEKK4KM expression | EGF     |     | ERK | 4.75|
| COS cells + empty vector TF | none         |     | JNK | 1   |
| COS cells + empty vector TF | Cdc42       |     | JNK | 11  |
| COS cells + MEKK1KM expression | Cdc42   |     | JNK | 3.6 |
| COS cells + MEKK2KM expression | Cdc42   |     | JNK | 11.5|
| COS cells + MEKK3KM expression | Cdc42   |     | JNK | 9.3 |
| COS cells + MEKK4KM expression | Cdc42   |     | JNK | 5.5 |
| COS cells + empty vector TF | none         |     | JNK | 1   |
| COS cells + empty vector TF | Rac1        |     | JNK | 6.7 |
| COS cells + MEKK1KM expression | Rac1     |     | JNK | 3   |
| COS cells + MEKK2KM expression | Rac1     |     | JNK | 7.25|
| Condition | Protein | pSer-GSK3β | % of Insulin | Time (min) |
|-----------|---------|-------------|--------------|-----------|
| Male wistar rats Soleus muscles | Insulin (10mU/ml) | 100 | 30min |
| Male wistar rats Soleus muscles | Insulin (10mU/ml) + db-cAMP (5mM) | 125 | 30min |
| Male wistar rats Soleus muscles | none | 8 | 30min |
| Male wistar rats Soleus muscles | db-cAMP (5mM) | pSer-GSK3beta : %of Insulin | 25 | 30min |
|--------------------------------|---------------|-----------------------------|----|-------|
| Male wistar rats Soleus muscles | Insulin | pSer-GSK3beta : %of Insulin | 100 | 60min Epac 30min hormone |
| Male wistar rats Soleus muscles | Insulin + EPAC activator (1mM) | pSer-GSK3beta : %of Insulin | 104 | 60min Epac 30min hormone |
| Male wistar rats Soleus muscles | none | pSer-GSK3beta : %of Insulin | 8 | 60min Epac 30min hormone |
| Male wistar rats Soleus muscles | EPAC activator (1mM) | pSer-GSK3beta : %of Insulin | 12.5 | 60min Epac 30min hormone |
| Male wistar rats Soleus muscles | Insulin | pSer-GSK3beta : %of Insulin | 100 | 60min N6 30min Insulin |
| Male wistar rats Soleus muscles | Insulin + N6-Benzoyl-cAMP (2mM) | pSer-GSK3beta : %of Insulin | 138.5 | 60min N6 30min Insulin |
| Male wistar rats Soleus muscles | none | pSer-GSK3beta : %of Insulin | 5 | 60min N6 30min Insulin |
| Male wistar rats Soleus muscles | N6-Benzoyl-cAMP (2mM) | pSer-GSK3beta : %of Insulin | 25 | 60min N6 30min Insulin |
| Male wistar rats Soleus muscles | none | pSer-GSK3beta : %of Insulin | 2 | 60min H89 30min Hormone |
| Male wistar rats Soleus muscles | H89 (50uM) | pSer-GSK3beta : %of Insulin | 2 | 60min H89 30min Hormone |
| Male wistar rats Soleus muscles | Adrenaline (10^-6M) | pSer-GSK3beta : %of Insulin | 12.5 | 60min H89 30min Hormone |
| Group                                | Treatment                                                                 | pSer-GSK3beta : % of Insulin | Hormone |
|--------------------------------------|---------------------------------------------------------------------------|-------------------------------|---------|
| Male wistar rats Soleus muscles      | Insulin (10mU/ml) + Adrenaline (10^-6M) + Wort (1uM)                      | 12.5                          | 10min Wort 30min |
| Male wistar rats Soleus muscles      | none                                                                      | 100                           | 30min   |
| Male wistar rats Soleus muscles      | Adrenaline (10^-6M)                                                      | 125                           | 30min   |
| Male wistar rats Soleus muscles      | Insulin (10mU/ml)                                                        | 56                            | 30min   |
| Male wistar rats Soleus muscles      | Insulin (10mU/ml) + Adrenaline (10^-6M)                                  | 104                           | 30min   |

**Differential Regulation of Glycogen Synthase Kinase-3beta by Protein Kinase C Isotypes**

| Group                                | Treatment                                                                 | p-GSK3alpha/GSK3alpha         | PKC 25min c-Jun |
|--------------------------------------|---------------------------------------------------------------------------|-------------------------------|----------------|
| Rabbit skeletal muscle               | none                                                                      | 0.35                          | 2min           |
| Rabbit skeletal muscle               | PKC - alpha                                                               | 0.35                          | 30min          |
| Rabbit skeletal muscle               | none                                                                      | 0.16                          | 30min          |
| Rabbit skeletal muscle               | PKC - alpha                                                               | 1.75                          | 30min          |
| Rabbit skeletal muscle               | GSK3beta                                                                  | p-c-Jun                       | 1              |
| Rabbit skeletal muscle               | GSK3beta                                                                  | p-c-Jun                       | 2.5            |
| Rabbit skeletal muscle               | GSK3beta                                                                  | p-c-Jun                       | 5              |
| Rabbit skeletal muscle               | GSK3beta + PKC alpha 5units/ml                                            | p-c-Jun                       | 0.5            |
| Rabbit skeletal muscle               | GSK3beta + PKC alpha 5units/ml                                            | p-c-Jun                       | 1.25           |

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| Rabbit skeletal muscle | GSK3beta + PKC alpha 5units/ml | p-c-Jun | 2.5 | PKC 25min c-Jun 10min |
|-----------------------|----------------------------------|---------|-----|-----------------------|
| G protein-mediated inhibitory effect of a nitric oxide donor on the L-type Ca2+ current in rat ventricular myocytes. |
| RVM                   | none                             | Zero-current Ca2+ level (nA) | 1.13 | 0min |
| RVM                   | none                             | Zero-current Ca2+ level (nA) | 1    | 2.5min |
| RVM                   | ISO 10nM                         | Zero-current Ca2+ level (nA) | 1    | 4min |
| RVM                   | ISO 10nM                         | Zero-current Ca2+ level (nA) | 0.99 | 5min |
| RVM                   | ISO 10nM + DEANO 100uM           | Zero-current Ca2+ level (nA) | 2.1  | 7.5min |
| RVM                   | ISO 10nM + DEANO 100uM           | Zero-current Ca2+ level (nA) | 2.2  | 10min |
| RVM                   | ISO 10nM + DEANO 100uM           | Zero-current Ca2+ level (nA) | 2.2  | 12.5min |
| RVM                   | ISO 10nM + DEANO 100uM           | Zero-current Ca2+ level (nA) | 1.9  | 15min |
| COS1 cells + tag-ERK1(2ug.), MEK1(1ug), c-Raf TF(1ug) | CA PKC delta 1ug | Mobility shift of tag-ERK1 | 46 | 24hCulture |
| COS1 cells + tag-ERK1(2ug.), MEK1(1ug), c-Raf TF(1ug) | CA PKC delta 3ug | Mobility shift of tag-ERK1 | 34 | 24hCulture |
| COS1 cells + tag-ERK1(2ug.), MEK1(1ug), c-Raf TF(1ug) | none | Mobility shift of tag-ERK1 | 8 | 24hCulture |
| COS1 cells + tag-ERK1(2ug.), MEK1(1ug), c-Raf TF(1ug) | CA PKC epsilon 0.1ug | Mobility shift of tag-ERK1 | 8 | 24hCulture |
| COS1 cells + tag-ERK1(2ug.), MEK1(1ug), c-Raf TF(1ug) | CA PKC epsilon 0.3ug | Mobility shift of tag-ERK1 | 6 | 24hCulture |
| Description                                                                 | Treatment                                                                 | Mobility shift of tag-ERK1 | Relative MEK activity | Time  |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------|-----------------------|-------|
| COS1 cells + tag-ERK1(2ug), MEK1(1ug), c-Raf TF(1ug)                       | CA PKC epsilon 1ug                                                        | 7                           | 24hCulture            |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug), c-Raf TF(1ug)                       | CA PKC epsilon 3ug                                                        | 4                           | 24hCulture            |
| COS1 cells + tag-MEK1 TF(5ug)                                              | none                                                                      | Relative MEK activity       | 0.15                  | 24hCulture |
| COS1 cells + tag-MEK1 TF(5ug)                                              | CA PKC delta (1ug)                                                        | Relative MEK activity       | 0.17                  | 24hCulture |
| COS1 cells + tag-MEK1 TF(5ug)                                              | c-Raf(5ug)                                                                | Relative MEK activity       | 1                     | 24hCulture |
| COS1 cells + tag-MEK1 TF(5ug)                                              | CA PKC delta (1ug) + c-Raf(5ug)                                          | Relative MEK activity       | 5.4                   | 24hCulture |
| COS1 cells + tag-MEK1 TF(5ug)                                              | CA PKC delta (1ug) + c-Raf(5ug) + dn-Ras(5ug)                             | Relative MEK activity       | 5                     | 24hCulture |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug)                                     | none                                                                      | ERK activity                | 1                     | 24hCulture |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug)                                     | PKC delta (1ug)                                                           | ERK activity                | 2                     | 24hCulture |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug)                                     | CA PKC delta (1ug)                                                        | ERK activity                | 3.5                   | 24hCulture |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug)                                     | CA PKC delta (1ug) + c-Raf (1ug)                                         | ERK activity                | 5                     | 24hCulture |
| COS1 cells + tag-ERK1(2ug), MEK1(1ug)                                     | CA PKC delta (1ug) + dn-Ras (2ug)                                        | ERK activity                | 3                     | 24hCulture |
**Supplementary Data Set S2.** Experimental evidence of links in the cardiac signaling network.

| Target of regulation (Abbreviation) | Full name | Related links | Explanation | References (PMID) |
|-------------------------------------|-----------|---------------|-------------|------------------|
| BAR                                 | β-adrenergic receptor | ISO → BAR | Isoproterenol (ISO) activates betaAR | ISBN-10: 0071764011 ISBN-13: 978-0071764018 |
| BARp                                | Phosphorylated β-adrenergic receptor | PKA → (BAR → BARp) | 1) PKA-mediated phosphorylation of the beta1-adrenergic receptor promotes Gs/Gi switching (Figure 4b)  
2) PKA-mediated phosphorylation of beta2-AR decreases the affinity of the receptor for Gs and increases its affinity for Gi | 1) 15381255  
2) 9363896, 12063255 |
| BARd                                | Desensitized β-adrenergic receptor | bARKnPI3K → (BAR → BARd) bARKnPI3K → (BARp → BARd) | 1) betaARK preferentially phosphorylates the agonist-coupled form of betaAR  
2) betaARK phosphorylates and thereby inactivates agonist-occupied betaAR | 1) 2165947  
2) 9349395 |
| bARK                                | β-adrenergic receptor kinase | Gbg → bARK | 1) Gbg mediates the membrane targeting of the bARK in response to receptor activation  
2) Gbg recruit elevated levels of cytosolic GRK2(bARK1) to agonist-stimulated BARs in HF, leading to the chronic BAR desensitization, downregulation and pathological signaling that are hallmarks of HF | 1) 8463335, 1325672  
2) 20576935 |
| Gs                                  | stimulatory G protein | BAR → Gs | PKA-mediated phosphorylation of beta2-AR decreases the affinity of the receptor for Gs and increases its affinity for Gi | 9363896, 12063255 |
| Gi                                  | inhibitory G protein | BARp → Gi | PKA-mediated phosphorylation of beta2-AR decreases the affinity of the receptor for Gs and increases its affinity for Gi | 9363896, 12063255 |
| **AC** | **Adenylyl cyclase** | **Gs → AC** | **Gi → AC** | **AC is regulated by G proteins (Gs stimulating activity and Gi inhibiting it)** | **ISBN**: 0805366245 |
| --- | --- | --- | --- | --- | --- |
| **cAMP** | Cyclic adenosine monophosphate | **AC → cAMP** | **PDE34 → cAMP** | **activation of Gs-coupled receptors leads to an increase in intracellular cAMP and PKA activation** | **12381255**, **20530128** |
| **PKA** | Protein kinase A | **cAMP → PKA** | **cAMP activates PKA** | **20530128** |
| **epac** | Exchange factor directly activated by cAMP | **cAMP → epac** | **Epac1 is a guanine nucleotide exchange factor for Rap1 that is activated by direct binding of cAMP.** | **15550931** |
| **PDE34** | Phosphodiesterase type 3 and type 4 | **PKA → PDE34** | **PKC → PDE34** | **1) PDE4 activity increased two- to threefold in a PKA-dependent manner** 2) **In addition to PKA phosphorylation, human PDE3A enzyme is phosphorylated by PKC** | **1) 11606735** 2) **16153182** |
| **CREB** | cAMP response element-binding protein | **PKA → CREB** | **MSK1 → CREB** | **1) Phenylephrine induces activation of CREB in adult rat cardiac myocytes through MSK1 and PKA signaling pathways (Figure 3A, 3B)** 2) **ET and PE did not affect the transcriptional activation of CREB** | **1) 15522277** 2) **11799083** |
| **αAR** | α-adrenergic receptor | **PE → αAR** | **PE activates αAR** | **ISBN-10 : 0071764011**  **ISBN-13 : 978-0071764018** |
| **Gq** | Gq alpha subunit | **αAR → Gq** | **RGS4 → Gq** | **The inhibitory effect of ANP on ET-1–stimulated IP3 production was abolished in cells overexpressing RGS4DN (Figure 2A)** | **18443239** |
| **Gbg** | Beta and gamma subunit of G protein | **Gi → Gbg** | **Gq → Gbg** | **Gbg is generated simultaneously with activation of Gi or Gq** | **10819326** |
| **PLC** | Phospholipase C | **Gq → PLC** | **Gq stimulates the membrane-bound phospholipase C beta, which then cleaves PIP2 into two second messengers, IP3 and diacylglycerol (DAG)** | **21873996** |
| Substance | Description | Diagram | Notes |
|-----------|-------------|---------|-------|
| IP3       | Inositol triphosphate | $\text{PLC} \rightarrow \text{IP3}$ | Gq stimulates the membrane-bound phospholipase C beta, which then cleaves PIP2 into two second messengers, IP3 and diacylglycerol (DAG) |
| DAG       | Diacylglycerol | $\text{PLC} \rightarrow \text{DAG}$ | Gq stimulates the membrane-bound phospholipase C beta, which then cleaves PIP2 into two second messengers, IP3 and diacylglycerol (DAG) |
| PKC       | Protein kinase C | $\text{Ca} \rightarrow \text{PKC}$; $\text{DAG} \rightarrow \text{PKC}$; $\text{CaN} \rightarrow \text{PKC}$ | Inhibition of calcineurin with cyclosporine blocks PKCalpha and PKCtheta activation during load induced hypertrophy (Figure 8E) |
| TAK1      | Transforming growth factor beta-activated kinase 1 | $\text{PKC} \rightarrow \text{TAK1}$ | PKC acts by activating TAK1, which leads to ATF-2 activation |
| Ca        | Calcium      | $\text{PKA} \rightarrow \text{Ca}$; $\text{IP3} \rightarrow \text{Ca}$; $\text{PI3K} \rightarrow \text{Ca}$ | 1) PKA induces calcium influx from extracellular space while IP3 induces SR calcium release 2) PI3K offsets cAMP-mediated positive inotropic effect via inhibiting calcium influx in cardiomyocytes |
| CaM       | Calmodulin   | $\text{Ca} \rightarrow \text{CaM}$ | Calmodulin (CaM) is a multifunctional intermediate messenger protein that transduces calcium signals by binding calcium ions and then modifying its interaction with various target proteins |
| CaMK      | Calcium/calmodulin-dependent protein kinase II | $\text{CaM} \rightarrow \text{CaMK}$; $\text{epac} \rightarrow \text{CaMK}$; $\text{PKC} \rightarrow \text{CaMK}$ | Epac activation increased CaMK Thr286 phosphorylation and enhanced phosphorylation at CaMK phosphorylation sites on the ryanodine receptor (RyR2) and phospholamban in a PKC-dependent manner (Figure 3B) |
| CaN       | Calcineurin   | $\text{CaM} \rightarrow \text{CaN}$ | Binding of Ca-saturated CaM to CaN activates the catalytic activity of CaN |
| HDAC | Histone deacetylase | PKA $\rightarrow$ HDAC CaMK $\rightarrow$ HDAC PKC $\rightarrow$ HDAC |
|------|---------------------|--------------------------------|
|      |                     | 1) CaMK signaling detach HDACs from MEF2 (Figure 4C) |
|      |                     | 2) PKA phosphorylates HDAC5 and prevents its nuclear export, leading to the inhibition of gene transcription and cardiomyocyte hypertrophy (Figure 3B) |
|      |                     | 3) PKA inhibits nuclear export of HDAC regardless of the status of phosphorylation by CaMK or PKD |
|      |                     | 4) The general serine/threonine protein kinase inhibitor staurosporine and the PKC inhibitor Bis I were effective in blocking the PE-dependent export of HDAC5 (Fig. 3C and D). In contrast, inhibitors of CaMK (KN93), MEK1 (U1026), Rho kinase (Y-27632), diacylglycerol kinase (diacylglycerol kinase inhibitor II), phosphatidylinositol 3-kinase (wortmannin), S6 kinase (rapamycin), glycogen synthase kinase (SB216763), or an inhibitor of protein kinase G, myosin light-chain kinase, and protein kinase A (HA1077) did not significantly affect PE-induced nuclear export of HDAC5. |
|      |                     | 5) PE does not activate PKA |

1) 10737771  
2),3) 20716686  
4),5) 15367659
| NFATnuc | Nuclear factor of activated T-cells (nucleus) | CaN $\rightarrow$ NFATnuc | JNK $\rightarrow$ NFATnuc | p38 $\rightarrow$ NFATnuc | GSK3B $\rightarrow$ NFATnuc |
|---------|---------------------------------------------|-----------------------------|--------------------------|--------------------------|-----------------------------|
|         |                                             | 1) endogenous p38 signaling normally attenuates the efficiency of basal NFATc1 nuclear occupancy (Figure 5c) | 2) Inhibition of p38 signaling in cardiac myocytes enhances NFAT transcriptional activity | 3) MKK7/JNK pathway negatively regulates NFATc3 activation (Figure 5B) | 4) Coinfection of AdNFATc3 and AdCnA with wild-type AdMKK7, AdJNK1 or AdJNK2 significantly reduced the calcineurin-induced NFATc3 mobility shift, indicating partial blockade of nuclear translocation (Figure 5C). |
|         |                                             | 5) GSK3beta phosphorylates conserved serines necessary for nuclear export, promotes nuclear exit. | 6) MEK1 does not affect NFAT nuclear localization. | 7) In the presence of Ang2 or PE, NFAT is up-regulated. This up-regulation was completely abolished in the presence of CsA or FK506, supporting the conclusion that AngII and PE activate NFAT through a calcineurin-dependent signal transduction pathway (Figure 4H). | |

1), 2) 12750397  
3), 4) 14517246  
5) 9072970  
6) 15657416  
7) 9568714
| NFATact | Activated NFAT | cFos $\rightarrow$ NFATact  
|         |              | cJun $\rightarrow$ NFATact  
|         |              | GSK3B $\rightarrow$ NFATact |

Here, biological meaning of 'NFATact' is the transcriptional activity of NFAT.

1) MEK1-ERK1/2 signaling augments NFAT transcriptional activity independent of calcineurin, independent of changes in NFAT nuclear localization, and independent of alterations in NFAT transactivation potential. In contrast, MEK1-ERK1/2 signaling enhances NFAT-dependent gene expression through an indirect mechanism involving induction of cardiac AP-1 activity, which functions as a necessary NFAT interacting partner.

2) MEK1-ERK1/2 synergy with NFAT depends, in part, on AP-1 (Figure 5A).

3) MEK1-ERK1/2 directly regulates NFAT DNA binding activity.

4) MEK1-ERK1/2-induced synergy was blocked by the AP-1 inhibitory mutant protein TAM67. In cardiac myocytes, MEK1-ERK1/2 signaling significantly enhanced AP-1 transcriptional activity, which was blocked with TAM67.

5) GSK3B inhibits the DNA binding activity of NFATc

| EGFR | Epidermal growth factor receptor | EGF $\rightarrow$ EGFR | EGF induces EGFR dimerization and activation |
|      |                                 |                        |                                      | 14732694 |

| Src  | Proto-oncogene tyrosine-protein kinase Src | Gbg $\rightarrow$ Src  
|      |                                          | CaN $\rightarrow$ Src  
|      |                                          | FAK $\rightarrow$ Src  |

1) Calcineurin regulates the ISO-induced activation of ERKs possibly through the Src/Shc/Raf-1 kinase pathway (Fig 7).

2) FAK overexpression enhances ras-dependent integrin signaling to ERK2/MAPK through interactions with and activation of c-Src.

3) LPA stimulation or expression of Gbg subunits resulted in c-
| Src activation, as assessed by increased c-Src autophosphorylation. | She | SH2 domain protein C | Src $\rightarrow$ Shc, EGFR $\rightarrow$ Shc |
|---|---|---|---|
| | 1) Phosphorylation of Tyr1148 in EGFR is required for Shc binding. |
| | 2) Ang2 causes tyrosine phosphorylation of Shc and its association with Grb2 and mSos-1. |
| | 3) Overexpression of wild-type or constitutively active mutant c-Src, but not kinase inactive mutant c-Src, lead to increased tyrosine kinase activity in Shc immunoprecipitates. |
| 1) 16687399 |
| 2) 8631299 |
| 3) 8702633 |
| Grb2act | Activated growth factor receptor-bound protein 2 | EGFR $\rightarrow$ Grb2act, Shc $\rightarrow$ Grb2act |
| | 1) In beta-adrenergic cardiac hypertrophy, the Akt-GSK3b pathway, rather than the mitogen-activated protein kinase pathway, plays an essential role in transcription of atrial natriuretic factor (ANF). |
| | 2) Grb2(SH2 domain) associates with activated EGFR either directly or through tyrosyl-phosphorylated Shc. |
| 1) 11382772 |
| 2) 16687399, 11057895 |
| Grb2Sos | growth factor receptor-bound protein 2(Grb2)- Son of Sevenless(Sos) complex | Grb2act $\rightarrow$ Grb2Sos, Shc $\rightarrow$ Grb2Sos, ERK12 $\rightarrow$ Grb2Sos |
| | 1) Grb2(SH3 domain) associates with the cytoplasmic guanine nucleotide exchange factor SOS. |
| | 2) Inhibitory feedback phosphorylation of SOS by ERK provides a mechanism for the inhibition of Ras signaling. |
| | 3) SHP2 that binds to Gab1 was reported to be a positive regulator of the MAPK pathway. |
| | 4) Ang2 stimulates association of mSos-1 with Shc and translocates mSos-1 to the membrane fraction. |
| | 5) SHP2 contributes to the Ras activation in the same degree as EGF (Figure 5C). |
| 1) 9865697, 7781603 |
| 2) 7829473, 7592690 |
| 3) 16687399 |
| 4) 8631299 |
| 5) 11134009 |
| Protein Complex | Description | Action | Notes |
|-----------------|-------------|--------|-------|
| Grb2&Gab1       | growth factor receptor-bound protein 2-Grb2-Gab1 complex | Grb2act → Grb2nGab1, ERK12 → Grb2nGab1 | 1) Gab(PH domain) binds to Grb2(SH3 domain), The association of Gab1 with EGFR is thought to occur predominantly via Grb2 |
| Ras             | rat sarcoma viral oncogene homolog | Grb2Sos → Ras | EGF-induced recruitment of the SOS-Grb2 complex to the plasma membrane is critical for the initiation of the MAPK/ERK pathway |
| Rac             | Ras-Related C3 Botulinum Toxin Substrate | Ras → Rac, EGFR → Rac | The pattern of Ras-activation and Rac-activation is significantly different |
| Raf1            | Raf-1 Proto-Oncogene, Serine/Threonine Kinase | Ras → Raf1, PKC → Raf1, PKA → Raf1 | 1) Active Ras can induce MAP kinase activation in cardiac muscle cells. In addition, phenylephrine-induced activation of the MAP kinases requires Ras activity since a dominant negative Ras mutant (Ala15Ras) and a Ras-blocking, Raf mutant (C4B Raf) prevent activation of the MAP kinase Erk2 by phenylephrine. 2) Calcineurin activates PKC isoforms in vivo. 3) PKA can weaken the interaction of Raf-1 with Ras. 4) PKA can inhibit Raf1 function directly via phosphorylation of the Raf1 kinase domain. 5) PKA and PKC synergistically activate the Raf-1 in cardiomyocyte. |
| MEKK1           | Mitogen-Activated Protein Kinase Kinase Kinase 1 | Rac → MEKK1 | The pattern of MEKK-activation is significantly different from the pattern of Ras- or Rac- activation |
| MEKK234         | Mitogen-Activated Protein Kinase | Rac → MEKK234 | Rac is required as an interactive binding motifs |
| Kinase Kinase 2, 3, 4 | MEKK11 | Mitogen-Activated Protein Kinase Kinase 11 | Rac → MEKK11 | Rac is required as an interactive binding motifs | 10799501 |
|----------------------|--------|------------------------------------------|---------------|-------------------------------------------------|----------|
| MEK12                | Mitogen-Activated Protein Kinase Kinase 1, 2 | Raf1 → MEK12  | 1) Raf1 serves primarily as an ERK activator  
2) Activated Rac had no effect on ERK in the cardiac cells  
3) Only expression of a kinase-inactive inhibitory mutant of MEKK1 and not the kinase-inactive mutants of MEKK2, 3, or 4 inhibit ERK activation by EGF | 1),2) 9314533  
3) 9305638 | |
| MEK4                | Mitogen-Activated Protein Kinase Kinase 4 | MEKK1 → MEK4  
MEKK23 → MEK4 | MEK4 is activated by MEKK1 | 9405400 |
| MEK7                | Mitogen-Activated Protein Kinase Kinase 7 | MEKK23 → MEK7  
MEKK11 → MEK7 | MEKK23 directly activates MEK7 | 10347227 |
| MEK36               | Mitogen-Activated Protein Kinase Kinase 3, 6 | MEKK11 → MEK36  
TAK1 → MEK36 | 1) TAK1 activates MEK36  
2) Activated Rac had no effect on p38 | 1) 14681216  
2) 9314533 | |
| ERK12               | Mitogen-activated protein kinase 3, 1 | Gbg → ERK12  
MEK12 → ERK12  
| 1) MEK12 phosphorylate ERK12 at the conserved TEY motif (amino acids 183-185 in mouse Erk2) and thereby activate ERK12  
2) ERK(Thr188) phosphorylation was shown to be triggered by the association of Gq-derived Gbetagamma subunits with activated ERK12 (Fig 4B) | 1) 7601337,  
1628739  
2) 22843704 | 136 |
| Protein Kinase | Function | Regulation | Related Papers |
|---------------|----------|------------|---------------|
| JNK | Mitogen-Activated Protein Kinase 8 | MEK4 → JNK MEK7 → JNK CaN → JNK | 1) Inhibition of calcineurin with cyclosporine prevents activation of JNK (p54) during load induced hypertrophy (Figure 7) 2) JNK is activated through MEK4 |
| p38 | Mitogen-Activated Protein Kinase 14 | MEK4 → p38 MEK36 → p38 RhoA → p38 | 1) M KK6 stimulates MEF2 by activating p38 MAPK (Figure 1C) 2) MEK4 partially contributes to the activation of p38 3) RhoA was shown to be a potent activator of the p38 MAPKs 4) p38 is activated through MKK3 or MKK6 |
| PI3Krc | Recruited phosphatidylinositol-4,5-bisphosphate 3-kinase | Grb2 → PI3K | PI3K is recruited to receptor |
| Grb2&Gab1&PI3K | Grb2-associated binding protein 2(Grb2)-Grb2-associated binding protein 1(Gab1)-phosphatidylinositol-4,5-bisphosphate 3-kinase complex | Grb2 → PI3K | Gab1-mediated recruitment of p85 results in PI3K activation and the production of PIP3 in the plasma membrane |
| bARKnPI3K | β-adrenergic receptor kinase-phosphatidylinositol-4,5-bisphosphate 3-kinase complex | bARK → PI3K | 1) From Figure 1 of 15539636, we deduced the relative strength of recruitment of PI3K to each receptor 2) betaARK as well as Gbetagamma signaling is involved in beta1-AR-mediated PI3K activation |
| Akt | V-akt murine thymoma viral oncogene | PI3K → Akt | Akt is activated when binds to PIP3 via its PH domain. |
| Gene  | Description                          | Regulation Pathway                                                                 | Comment                                                                                                                                                                                                 |
|-------|--------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GSK3B | Glycogen synthase kinase 3 beta      | Akt → GSK3B                                                                        | Akt reverses GSK3B-induced inhibition of GATA4 in cardiac myocytes                                                                                                                                       |
| MEF2  | Myocyte enhancer factor 2            | p38 → MEF2 → ERK5 → MEF2 → HDAC → MEF2                                             | 1) MEF2 mediates synergistic transcriptional responses to the CaMK and MAPK signaling pathways MAPKs, which activate MEF2 by phosphorylation of the transcriptional activation domain, maximally stimulate MEF2 activity only when repression by HDACs is relieved by CaMK signaling to the DNA-binding domain (Figure 4A)  
2) BMK1/ERK5 regulates serum-induced early gene expression through transcriptional factor MEF2C (Figure 6B) |
| GATA4 | GATA binding protein 4               | ERK12 → GATA4 → p38 → GATA4 → PCK → GATA4 → GSK3B → GATA4                        | 1) PKC was shown to enhance activity of GATA4 in cell culture. Mutation of the PKC recognition motif (S419A S420A) in GATA4 reduced transcriptional activity of GATA4 more than 50%  
2) Only dominant-negative MEK1 blocked PE-induced GATA4 phosphorylation (Figure 2C)  
3) GATA4 activity is positively regulated by p38 MAPK  
4) GSK3B directly phosphorylates GATA4 and thereby decreases basal and betaAR-stimulated GATA4 expression in the nucleus by activating the nuclear export system (Figure 5B) |
| cFos  | FBJ murine osteosarcoma viral oncogene homolog | ERK12 → cFos                                                                       | MEK1-ERK1/2 signaling significantly enhanced AP-1 transcriptional activity                                                                                                                                 |
| cJun  | Jun proto-oncogene                   | JNK → cJun → p38 → cJun                                                            | In contrast to c-Fos, c-Jun has a basal level of transcription that likely represents its function in basal cellular homeostasis.                                                                                  |
| Protein | Description | Relation | Function | Reference |
|---------|-------------|----------|----------|-----------|
| AP1 | Activator protein 1 | cFos $\rightarrow$ AP1, cJun $\rightarrow$ AP1 | 1) AP-1 is homodimers or heterodimers of c-Fos and c-Jun  
2) c-fos, c-fos dimer cannot function as an AP-1  
3) DNJun inhibited the increase in the AP1 activation, 3H-Phe incorporation, cell size enhancement due to ET and PE | 1) 15795322  
2) 11799083 |
| MSK1 | Ribosomal protein S6 kinase, 90kDa, polypeptide 5 | ERK12 $\rightarrow$ MSK1, p38 $\rightarrow$ MSK1 | MSK1 is a substrate of both ERK12 and p38. | 16806820 |
| NOS | Nitric oxide synthase | Akt $\rightarrow$ NOS | PI3K/Akt-NO signal pathway is involved in cardiomyocyte hypertrophy | 26045205 |
| sGC | Sarcoglycan | NOS $\rightarrow$ sGC | NO activates sGC | 17700722 |
| cGMP | Cyclic guanosine monophosphate | sGC $\rightarrow$ cGMP, PDE5 $\rightarrow$ cGMP | 1) sGC generates cGMP  
2) PDE5 degrades cGMP and regulates the intracellular level of cGMP | 1) 17700722  
2) 10385692 |
| PKG | Protein kinase G | cGMP $\rightarrow$ PKG, PDE5 $\rightarrow$ PKG | 1) cGMP activates PKG  
2) PKG is activated by PDE5 inhibition | 1) 17700722  
2) 20177073 |
| PDE5 | Phosphodiesterase 5 | PKG $\rightarrow$ PDE5 | activation of PKG lead to phosphorylation and activation of PDE5 | 11723116 |
| RGS4 | Regulator of G-protein signaling 4 | PKG $\rightarrow$ RGS4 | activation of PKG lead to phosphorylation of RGS4, and association of RGS4 and Gq | 18443239 |
**Supplementary Data Set S3.** Results of the distribution perturbation analyses for apoptosis in the cardiac signaling network.

1a) Result of one-distribution perturbation analysis for apoptosis when each response function was separately applied

| Threshold: top 5% | Lin | Hill | Sat | Acc |
|------------------|-----|------|-----|-----|
|                  | Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1              | 1.029 | 0.370  | 0.999 | 0.214  | 1.020 | 0.462  | 1.021 | 0.968  |
| pm2              | 0.996 | 0.617  | 0.999 | 0.638  | 0.995 | 0.798  | 1.003 | 0.640  |
| pm3              | 0.989 | 0.756  | 1.024 | 0.627  | 1.002 | 0.210  | 1.009 | 0.355  |
| pm4              | 1.005 | 0.820  | 1.098 | 0.353  | 1.009 | 0.896  | 1.000 | 0.913  |
| pm5              | 0.998 | 0.972  | 0.995 | 0.530  | 0.998 | 0.337  | 1.001 | 0.739  |
| pm6              | 1.021 | 0.940  | 1.000 | 0.786  | 1.109 | 0.044  | 1.014 | 0.645  |
| pm7              | 2.069 | <0.001 | 1.646 | <0.001 | 2.483 | <0.001 | 1.871 | <0.001 |
| pm8              | 0.999 | 0.559  | 0.995 | 0.444  | 0.998 | 0.928  | 0.997 | 0.650  |
| pm9              | 1.031 | 0.775  | 1.053 | 0.593  | 1.020 | 0.985  | 1.031 | 0.734  |
| pm10             | 2.140 | <0.001 | 1.905 | <0.001 | 1.933 | <0.001 | 2.221 | <0.001 |
| pm11             | 1.001 | 0.476  | 1.010 | 0.846  | 0.994 | 0.105  | 1.020 | 0.729  |
| pm12             | 1.154 | 0.024  | 1.236 | <0.001 | 1.169 | 0.021  | 1.254 | <0.001 |
| pm13             | 1.007 | 0.549  | 1.015 | 0.609  | 1.003 | 0.158  | 1.009 | 0.727  |
| pm14             | 0.998 | 0.420  | 1.006 | 0.912  | 0.999 | 0.578  | 1.007 | 0.127  |
| pm15             | 1.002 | 0.210  | 1.007 | 0.587  | 1.005 | 0.750  | 1.007 | 0.296  |
| pm16             | 0.995 | 0.701  | 1.004 | 0.774  | 0.997 | 0.947  | 1.004 | 0.952  |
| pm17             | 1.001 | 0.931  | 1.004 | 0.885  | 0.996 | 0.417  | 1.004 | 0.118  |
| pm18             | 0.996 | 0.468  | 0.998 | 0.420  | 0.999 | 0.980  | 1.001 | 0.492  |
| pm19             | 0.997 | 0.532  | 0.999 | 0.322  | 0.999 | 0.661  | 1.001 | 0.395  |
| pm20             | 1.001 | 0.303  | 1.007 | 0.190  | 0.996 | 0.540  | 1.005 | 0.395  |
| pm21  | 1.163 | 0.023 | 1.273 | <0.001 | 1.484 | <0.001 | 1.167 | 0.021 |
|------|-------|-------|-------|--------|-------|--------|-------|-------|
| pm22  | 1.073 | 0.667 | 1.156 | 0.026  | 1.040 | 0.644  | 1.053 | 0.890 |
| pm23  | 1.087 | 0.726 | 1.331 | <0.001 | 1.064 | 0.550  | 1.059 | 0.314 |
| pm24  | 0.997 | 0.290 | 1.018 | 0.748  | 0.998 | 0.810  | 1.000 | 0.645 |
| pm25  | 0.997 | 0.740 | 1.001 | 0.802  | 0.999 | 0.374  | 1.001 | 0.272 |
| pm26  | 0.997 | 0.844 | 1.001 | 0.447  | 0.999 | 0.989  | 1.001 | 0.933 |
| pm27  | 1.021 | 0.867 | 1.041 | 0.972  | 1.020 | 0.177  | 1.008 | 0.131 |
| pm28  | 1.335 | <0.001 | 1.162 | 0.027  | 1.162 | 0.021  | 1.450 | <0.001 |
| pm29  | 1.033 | 0.148 | 1.190 | 0.056  | 0.995 | 0.395  | 1.112 | 0.603 |
| pm30  | 0.918 | 0.492 | 0.851 | 0.023  | 0.945 | 0.521  | 0.873 | 0.028 |
| pm31  | 1.016 | 0.652 | 1.042 | 0.239  | 1.019 | 0.633  | 1.013 | 0.539 |
| pm32  | 0.998 | 0.439 | 1.124 | 0.033  | 1.000 | 0.733  | 1.051 | 0.749 |
| pm33  | 0.997 | 0.158 | 1.002 | 0.959  | 0.999 | 0.715  | 1.001 | 0.315 |
| pm34  | 1.003 | 0.383 | 1.007 | 0.311  | 1.002 | 0.375  | 1.004 | 0.488 |
| pm35  | 1.001 | 0.555 | 1.001 | 0.334  | 1.012 | 0.779  | 1.008 | 0.625 |
| pm36  | 0.996 | 0.559 | 0.998 | 0.927  | 0.999 | 0.462  | 1.001 | 0.438 |
| pm37  | 0.994 | 0.281 | 1.008 | 0.533  | 0.999 | 0.846  | 1.008 | 0.252 |

| Threshold: top 10% | Lin Effect | Lin p-value | Hill Effect | Hill p-value | Sat Effect | Sat p-value | Acc Effect | Acc p-value |
|-------------------|------------|-------------|-------------|-------------|-----------|-------------|-----------|-------------|
| pm1               | 1.025      | 0.752       | 0.999       | 0.153       | 1.018     | 0.471       | 1.021     | 0.934       |
| pm2               | 0.995      | 0.941       | 0.999       | 0.731       | 0.995     | 0.590       | 1.002     | 0.981       |
| pm3               | 0.991      | 0.409       | 1.022       | 0.148       | 1.002     | 0.565       | 1.008     | 0.480       |
| pm4               | 1.006      | 0.308       | 1.091       | 0.168       | 1.007     | 0.934       | 1.000     | 0.991       |
| pm5               | 0.998      | 0.375       | 0.996       | 0.899       | 0.998     | 0.146       | 1.001     | 0.418       |
| pm6               | 1.016      | 0.668       | 1.000       | 0.177       | 1.116     | 0.042       | 1.013     | 0.948       |
| pm7 | 2.034 | <0.001 | 1.582 | <0.001 | 2.310 | <0.001 | 1.690 | <0.001 |
|-----|-------|--------|-------|--------|-------|--------|-------|--------|
| pm8 | 0.999 | 0.194  | 0.995 | 0.315  | 0.998 | 0.651  | 0.997 | 0.723  |
| pm9 | 1.034 | 0.154  | 1.055 | 0.769  | 1.022 | 0.529  | 1.027 | 0.434  |
| pm10| 2.130 | <0.001 | 1.769 | <0.001 | 1.906 | <0.001 | 2.271 | <0.001 |
| pm11| 1.001 | 0.368  | 1.009 | 0.250  | 0.994 | 0.967  | 1.017 | 0.756  |
| pm12| 1.123 | 0.046  | 1.206 | <0.001 | 1.122 | 0.045  | 1.282 | <0.001 |
| pm13| 1.007 | 0.767  | 1.014 | 0.239  | 1.003 | 0.944  | 1.008 | 0.897  |
| pm14| 0.998 | 0.306  | 1.006 | 0.888  | 0.999 | 0.184  | 1.006 | 0.446  |
| pm15| 1.002 | 0.537  | 1.008 | 0.814  | 1.004 | 0.376  | 1.008 | 0.809  |
| pm16| 0.995 | 0.421  | 1.003 | 0.210  | 0.998 | 0.761  | 1.004 | 0.956  |
| pm17| 1.001 | 0.202  | 1.004 | 0.804  | 0.996 | 0.342  | 1.003 | 0.198  |
| pm18| 0.997 | 0.665  | 0.998 | 0.257  | 0.999 | 0.622  | 1.001 | 0.133  |
| pm19| 0.997 | 0.633  | 0.999 | 0.189  | 0.999 | 0.744  | 1.001 | 0.602  |
| pm20| 1.001 | 0.346  | 1.007 | 0.722  | 0.996 | 0.168  | 1.004 | 0.191  |
| pm21| 1.147 | 0.022  | 1.315 | <0.001 | 1.428 | <0.001 | 1.151 | 0.024  |
| pm22| 1.074 | 0.497  | 1.135 | 0.065  | 1.050 | 0.403  | 1.055 | 0.496  |
| pm23| 1.092 | 0.737  | 1.285 | <0.001 | 1.054 | 0.361  | 1.056 | 0.941  |
| pm24| 0.997 | 0.859  | 1.017 | 0.114  | 0.998 | 0.756  | 1.000 | 0.906  |
| pm25| 0.997 | 0.150  | 1.001 | 0.499  | 0.999 | 0.842  | 1.001 | 0.110  |
| pm26| 0.997 | 0.127  | 1.001 | 0.230  | 0.999 | 0.533  | 1.001 | 0.737  |
| pm27| 1.021 | 0.988  | 1.039 | 0.334  | 1.017 | 0.718  | 1.007 | 0.678  |
| pm28| 1.319 | <0.001 | 1.137 | 0.042  | 1.143 | 0.027  | 1.422 | <0.001 |
| pm29| 1.035 | 0.346  | 1.189 | 0.016  | 0.996 | 0.347  | 1.087 | 0.401  |
| pm30| 0.921 | 0.655  | 0.875 | 0.021  | 0.957 | 0.231  | 0.898 | 0.038  |
| pm31| 1.015 | 0.531  | 1.046 | 0.540  | 1.020 | 0.593  | 1.011 | 0.679  |
| pm32| 0.998 | 0.612  | 1.103 | 0.205  | 1.000 | 0.823  | 1.049 | 0.694  |
| pm33 | 0.997 | 0.962 | 1.002 | 0.876 | 0.999 | 0.667 | 1.001 | 0.313 |
| pm34 | 1.003 | 0.461 | 1.006 | 0.535 | 1.002 | 0.923 | 1.003 | 0.239 |
| pm35 | 1.001 | 0.596 | 1.001 | 0.536 | 1.010 | 0.931 | 1.008 | 0.115 |
| pm36 | 0.997 | 0.838 | 0.998 | 0.744 | 0.999 | 0.397 | 1.001 | 0.427 |
| pm37 | 0.993 | 0.389 | 1.007 | 0.292 | 0.999 | 0.752 | 1.007 | 0.237 |

| Lin | Hill | Sat | Acc |
| --- | --- | --- | --- |
| Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1  | 1.021 | 0.319 | 0.999 | 0.288 | 1.014 | 0.134 | 1.019 | 0.253 |
| pm2  | 0.996 | 0.150 | 0.999 | 0.933 | 0.996 | 0.436 | 1.002 | 0.710 |
| pm3  | 0.992 | 0.245 | 1.019 | 0.130 | 1.002 | 0.459 | 1.006 | 0.934 |
| pm4  | 1.004 | 0.607 | 1.074 | 0.821 | 1.006 | 0.189 | 1.000 | 0.350 |
| pm5  | 0.998 | 0.352 | 0.997 | 0.119 | 0.998 | 0.283 | 1.001 | 0.737 |
| pm6  | 1.014 | 0.802 | 1.000 | 0.655 | 1.096 | 0.586 | 1.011 | 0.355 |
| pm7  | 1.907 | <0.001 | 1.494 | <0.001 | 2.074 | <0.001 | 1.583 | <0.001 |
| pm8  | 0.999 | 0.551 | 0.995 | 0.113 | 0.998 | 0.772 | 0.997 | 0.631 |
| pm9  | 1.029 | 0.814 | 1.045 | 0.992 | 1.018 | 0.826 | 1.021 | 0.370 |
| pm10 | 2.002 | <0.001 | 1.639 | <0.001 | 1.901 | <0.001 | 2.127 | <0.001 |
| pm11 | 1.001 | 0.291 | 1.007 | 0.109 | 0.995 | 0.189 | 1.015 | 0.633 |
| pm12 | 1.122 | 0.033 | 1.161 | 0.014 | 1.125 | 0.038 | 1.227 | <0.001 |
| pm13 | 1.005 | 0.346 | 1.012 | 0.747 | 1.002 | 0.741 | 1.007 | 0.888 |
| pm14 | 0.998 | 0.671 | 1.005 | 0.361 | 0.999 | 0.601 | 1.005 | 0.754 |
| pm15 | 1.002 | 0.751 | 1.006 | 0.420 | 1.003 | 0.316 | 1.007 | 0.159 |
| pm16 | 0.996 | 0.484 | 1.003 | 0.544 | 0.998 | 0.355 | 1.004 | 0.509 |
| pm17 | 1.001 | 0.247 | 1.003 | 0.727 | 0.997 | 0.376 | 1.003 | 0.228 |
| pm18 | 0.998 | 0.928 | 0.998 | 0.913 | 0.999 | 0.623 | 1.000 | 0.321 |
| pm19  | 0.998 | 0.263 | 0.999 | 0.740 | 1.000 | 0.749 | 1.000 | 0.634 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pm20  | 1.001 | 0.807 | 1.006 | 0.522 | 0.997 | 0.961 | 1.004 | 0.669 |
| pm21  | 1.117 | 0.038 | 1.251 | <0.001 | 1.338 | <0.001 | 1.147 | 0.035 |
| pm22  | 1.066 | 0.122 | 1.119 | 0.051 | 1.035 | 0.873 | 1.048 | 0.932 |
| pm23  | 1.081 | 0.934 | 1.232 | <0.001 | 1.039 | 0.854 | 1.053 | 0.483 |
| pm24  | 0.998 | 0.648 | 1.014 | 0.417 | 0.998 | 0.134 | 1.000 | 0.979 |
| pm25  | 0.997 | 0.588 | 1.001 | 0.277 | 0.999 | 0.665 | 1.000 | 0.872 |
| pm26  | 0.998 | 0.289 | 1.001 | 0.882 | 0.999 | 0.278 | 1.000 | 0.314 |
| pm27  | 1.017 | 0.107 | 1.035 | 0.402 | 1.014 | 0.363 | 1.006 | 0.990 |
| pm28  | 1.249 | <0.001 | 1.117 | 0.042 | 1.130 | 0.034 | 1.372 | <0.001 |
| pm29  | 1.029 | 0.380 | 1.165 | 0.016 | 0.996 | 0.359 | 1.079 | 0.918 |
| pm30  | 0.930 | 0.991 | 0.891 | 0.042 | 0.962 | 0.130 | 0.910 | 0.043 |
| pm31  | 1.013 | 0.840 | 1.041 | 0.769 | 1.018 | 0.247 | 1.010 | 0.479 |
| pm32  | 0.998 | 0.270 | 1.090 | 0.255 | 1.000 | 0.259 | 1.045 | 0.111 |
| pm33  | 0.997 | 0.304 | 1.002 | 0.359 | 0.999 | 0.134 | 1.000 | 0.671 |
| pm34  | 1.003 | 0.925 | 1.005 | 0.664 | 1.002 | 0.805 | 1.002 | 0.890 |
| pm35  | 1.001 | 0.782 | 1.001 | 0.392 | 1.009 | 0.944 | 1.007 | 0.819 |
| pm36  | 0.998 | 0.986 | 0.998 | 0.248 | 0.999 | 0.152 | 1.000 | 0.491 |
| pm37  | 0.994 | 0.144 | 1.006 | 0.250 | 0.999 | 0.855 | 1.006 | 0.276 |
1b) Result of one-distribution perturbation analysis for apoptosis when four different response function types were applied in a combined manner

|     | Top 5% |     | Top 10% |     | Top 20% |     |
|-----|--------|-----|---------|-----|---------|-----|
|     | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1 | 1.020  | 0.257 | 1.015  | 0.527 | 1.012  | 0.168 |
| pm2 | 0.997  | 0.887 | 0.997  | 0.124 | 0.998  | 0.787 |
| pm3 | 0.993  | 0.227 | 0.995  | 0.645 | 0.995  | 0.648 |
| pm4 | 1.004  | 0.646 | 1.004  | 0.862 | 1.003  | 0.571 |
| pm5 | 0.998  | 0.382 | 0.999  | 0.353 | 0.999  | 0.884 |
| pm6 | 1.014  | 0.438 | 1.011  | 0.216 | 1.008  | 0.247 |
| pm7 | 1.888  | <0.001 | 1.700  | <0.001 | 1.385  | <0.001 |
| pm8 | 0.999  | 0.605 | 1.000  | 0.310 | 1.000  | 0.128 |
| pm9 | 1.024  | 0.226 | 1.018  | 0.821 | 1.017  | 0.557 |
| pm10| 1.876  | <0.001 | 1.667  | <0.001 | 1.597  | <0.001 |
| pm11| 1.000  | 0.739 | 1.000  | 0.694 | 1.000  | 0.421 |
| pm12| 1.349  | <0.001 | 1.182  | 0.012 | 1.176  | 0.012 |
| pm13| 1.004  | 0.144 | 1.003  | 0.486 | 1.003  | 0.708 |
| pm14| 0.999  | 0.118 | 0.999  | 0.467 | 0.999  | 0.830 |
| pm15| 1.002  | 0.715 | 1.001  | 0.334 | 1.001  | 0.308 |
| pm16| 0.996  | 0.306 | 0.997  | 0.914 | 0.998  | 0.346 |
| pm17| 1.001  | 0.279 | 1.000  | 0.872 | 1.000  | 0.101 |
| pm18| 0.998  | 0.266 | 0.998  | 0.101 | 0.999  | 0.447 |
| pm19| 0.998  | 0.834 | 0.998  | 0.347 | 0.999  | 0.230 |
| pm20| 1.001  | 0.630 | 1.000  | 0.194 | 1.000  | 0.839 |
| pm21| 1.397  | <0.001 | 1.214  | <0.001 | 1.174  | 0.013 |
| pm22 | 1.055 | 0.676 | 1.040 | 0.739 | 1.039 | 0.206 |
|------|-------|-------|-------|-------|-------|-------|
| pm23 | 1.065 | 0.666 | 1.060 | 0.970 | 1.043 | 0.122 |
| pm24 | 0.998 | 0.799 | 0.998 | 0.636 | 0.999 | 0.992 |
| pm25 | 0.998 | 0.971 | 0.998 | 0.644 | 0.999 | 0.743 |
| pm26 | 0.998 | 0.121 | 0.998 | 0.963 | 0.999 | 0.893 |
| pm27 | 1.015 | 0.811 | 1.012 | 0.321 | 1.011 | 0.361 |
| pm28 | 1.332 | <0.001 | 1.188 | 0.012 | 1.166 | 0.028 |
| pm29 | 1.027 | 0.380 | 1.020 | 0.540 | 1.017 | 0.303 |
| pm30 | 0.947 | 0.519 | 0.948 | 0.317 | 0.958 | 0.809 |
| pm31 | 1.012 | 0.285 | 1.009 | 0.695 | 1.008 | 0.889 |
| pm32 | 0.999 | 0.533 | 0.999 | 0.711 | 0.999 | 0.494 |
| pm33 | 0.998 | 0.562 | 0.998 | 0.557 | 0.998 | 0.948 |
| pm34 | 1.002 | 0.968 | 1.002 | 0.679 | 1.002 | 0.969 |
| pm35 | 1.001 | 0.735 | 1.001 | 0.818 | 1.000 | 0.902 |
| pm36 | 0.998 | 0.385 | 0.998 | 0.530 | 0.999 | 0.602 |
| pm37 | 0.995 | 0.482 | 0.996 | 0.186 | 0.997 | 0.625 |
2a) Result of reverse one-distribution perturbation analysis for apoptosis when each response function was separately applied

| Threshold: top 5% | Lin | Hill | Sat | Acc |
|-------------------|-----|------|-----|-----|
|                   | Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1               | 0.962 | 0.788 | 0.972 | 0.108 | 0.971 | 0.182 | 0.957 | 0.218 |
| pm2               | 0.997 | 0.474 | 0.993 | 0.267 | 0.996 | 0.520 | 1.002 | 0.542 |
| pm3               | 0.990 | 0.170 | 0.961 | 0.476 | 0.998 | 0.930 | 0.989 | 0.168 |
| pm4               | 0.996 | 0.460 | 0.900 | 0.909 | 0.989 | 0.985 | 1.003 | 0.398 |
| pm5               | 0.995 | 0.390 | 1.001 | 0.415 | 1.000 | 0.875 | 0.997 | 0.656 |
| pm6               | 0.987 | 0.616 | 0.976 | 0.915 | 0.887 | 0.019 | 0.992 | 0.820 |
| pm7               | 0.012 | <0.001 | 0.214 | <0.001 | 0.024 | <0.001 | 0.130 | <0.001 |
| pm8               | 0.995 | 0.472 | 0.999 | 0.999 | 0.997 | 0.509 | 0.996 | 0.798 |
| pm9               | 0.952 | 0.670 | 0.957 | 0.444 | 0.975 | 0.334 | 0.969 | 0.152 |
| pm10              | 0.158 | <0.001 | 0.376 | <0.001 | 0.180 | <0.001 | 0.050 | <0.001 |
| pm11              | 0.987 | 0.980 | 0.996 | 0.984 | 0.997 | 0.860 | 0.986 | 0.352 |
| pm12              | 0.816 | 0.009 | 0.743 | <0.001 | 0.761 | <0.001 | 0.694 | <0.001 |
| pm13              | 1.010 | 0.625 | 1.031 | 0.133 | 0.987 | 0.676 | 0.995 | 0.607 |
| pm14              | 1.010 | 0.154 | 1.001 | 0.544 | 0.990 | 0.377 | 1.002 | 0.473 |
| pm15              | 0.981 | 0.702 | 0.992 | 0.324 | 0.983 | 0.202 | 0.978 | 0.469 |
| pm16              | 0.997 | 0.916 | 1.005 | 0.239 | 0.990 | 0.486 | 0.985 | 0.974 |
| pm17              | 0.981 | 0.941 | 0.998 | 0.783 | 0.976 | 0.987 | 0.978 | 0.667 |
| pm18              | 0.997 | 0.336 | 1.001 | 0.569 | 0.999 | 0.951 | 1.001 | 0.120 |
| pm19              | 0.997 | 0.892 | 0.998 | 0.484 | 0.999 | 0.143 | 1.001 | 0.783 |
| pm20              | 0.992 | 0.142 | 0.979 | 0.447 | 0.993 | 0.606 | 1.000 | 0.989 |
| pm21              | 0.981 | 0.611 | 1.008 | 0.872 | 0.643 | <0.001 | 0.967 | 0.714 |
|        | Lin | Hill | Sat | Acc |
|--------|-----|------|-----|-----|
| Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1    | 0.969 | 0.841 | 0.975 | 0.566 | 0.969 | 0.495 | 0.964 | 0.302 |
| pm2    | 0.997 | 0.736 | 0.992 | 0.242 | 0.997 | 0.883 | 1.002 | 0.821 |
| pm3    | 0.990 | 0.464 | 0.969 | 0.327 | 0.998 | 0.940 | 0.989 | 0.127 |
| pm4    | 0.996 | 0.420 | 0.922 | 0.321 | 0.987 | 0.479 | 1.003 | 0.600 |
| pm5    | 0.995 | 0.103 | 1.001 | 0.980 | 1.000 | 0.194 | 0.997 | 0.466 |
| pm6    | 0.987 | 0.336 | 0.978 | 0.514 | 0.883 | 0.038 | 0.992 | 0.946 |
| pm7    | 0.116 | <0.001 | 0.412 | <0.001 | 0.139 | <0.001 | 0.242 | <0.001 |

Threshold: top 10%
| pm8  | 0.995  | 0.309 | 0.999  | 0.612 | 0.997  | 0.450 | 0.996  | 0.402 |
|------|--------|-------|--------|-------|--------|-------|--------|-------|
| pm9  | 0.962  | 0.156 | 0.963  | 0.898 | 0.974  | 0.610 | 0.965  | 0.238 |
| pm10 | 0.158  | <0.001| 0.376  | <0.001| 0.180  | <0.001| 0.150  | <0.001|
| pm11 | 0.990  | 0.181 | 0.996  | 0.445 | 0.997  | 0.232 | 0.988  | 0.225 |
| pm12 | 0.854  | 0.010 | 0.806  | 0.006 | 0.814  | 0.008 | 0.746  | <0.001|
| pm13 | 1.009  | 0.901 | 1.028  | 0.914 | 0.987  | 0.816 | 0.995  | 0.461 |
| pm14 | 1.011  | 0.302 | 1.001  | 0.493 | 0.989  | 0.826 | 1.003  | 0.939 |
| pm15 | 0.983  | 0.475 | 0.992  | 0.420 | 0.981  | 0.709 | 0.983  | 0.294 |
| pm16 | 0.998  | 0.573 | 1.005  | 0.218 | 0.992  | 0.856 | 0.986  | 0.783 |
| pm17 | 0.985  | 0.721 | 0.998  | 0.583 | 0.978  | 0.924 | 0.980  | 0.235 |
| pm18 | 0.997  | 0.371 | 1.001  | 0.797 | 0.999  | 0.718 | 1.001  | 0.751 |
| pm19 | 0.997  | 0.903 | 0.998  | 0.833 | 0.999  | 0.350 | 1.001  | 0.875 |
| pm20 | 0.991  | 0.259 | 0.981  | 0.926 | 0.994  | 0.348 | 1.000  | 0.228 |
| pm21 | 0.985  | 0.336 | 1.008  | 0.847 | 0.694  | <0.001| 0.974  | 0.739 |
| pm22 | 1.037  | 0.400 | 1.083  | 0.266 | 1.036  | 0.435 | 1.026  | 0.937 |
| pm23 | 0.876  | 0.032 | 0.670  | <0.001| 0.817  | 0.009 | 0.837  | 0.011 |
| pm24 | 0.997  | 0.348 | 0.985  | 0.163 | 1.001  | 0.540 | 1.003  | 0.859 |
| pm25 | 0.997  | 0.887 | 1.001  | 0.171 | 0.999  | 0.586 | 1.001  | 0.933 |
| pm26 | 0.997  | 0.637 | 1.001  | 0.186 | 0.999  | 0.864 | 1.001  | 0.932 |
| pm27 | 0.984  | 0.326 | 0.957  | 0.173 | 0.974  | 0.777 | 0.992  | 0.724 |
| pm28 | 0.728  | <0.001| 0.811  | 0.011 | 0.822  | 0.013 | 0.605  | <0.001|
| pm29 | 1.194  | 0.536 | 1.208  | 0.374 | 1.123  | 0.312 | 1.258  | 0.885 |
| pm30 | 0.749  | <0.001| 0.565  | <0.001| 0.886  | 0.038 | 0.661  | <0.001|
| pm31 | 0.987  | 0.405 | 0.947  | 0.650 | 0.975  | 0.336 | 0.992  | 0.336 |
| pm32 | 1.001  | 0.736 | 0.917  | 0.079 | 0.999  | 0.644 | 0.936  | 0.468 |
| pm33 | 0.997  | 0.116 | 1.000  | 0.702 | 0.999  | 0.510 | 1.001  | 0.768 |
|       | Lin | Hill | Sat | Acc |
|-------|-----|------|-----|-----|
|       | Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1   | 0.976 | 0.300   | 0.977 | 0.425   | 0.974 | 0.213   | 0.969 | 0.873   |
| pm2   | 0.998 | 0.697   | 0.995 | 0.603   | 0.997 | 0.225   | 1.001 | 0.866   |
| pm3   | 0.993 | 0.854   | 0.976 | 0.856   | 0.998 | 0.243   | 0.991 | 0.285   |
| pm4   | 0.997 | 0.910   | 0.928 | 0.937   | 0.989 | 0.583   | 1.002 | 0.795   |
| pm5   | 0.996 | 0.137   | 1.001 | 0.964   | 1.000 | 0.888   | 0.997 | 0.822   |
| pm6   | 0.990 | 0.523   | 0.983 | 0.671   | 0.904 | 0.080   | 0.994 | 0.123   |
| pm7   | 0.302 | <0.001  | 0.536 | <0.001  | 0.255 | <0.001  | 0.387 | <0.001  |
| pm8   | 0.996 | 0.760   | 0.999 | 0.147   | 0.998 | 0.778   | 0.997 | 0.882   |
| pm9   | 0.968 | 0.731   | 0.972 | 0.558   | 0.978 | 0.856   | 0.972 | 0.458   |
| pm10  | 0.274 | <0.001  | 0.431 | <0.001  | 0.394 | <0.001  | 0.290 | <0.001  |
| pm11  | 0.991 | 0.384   | 0.997 | 0.203   | 0.998 | 0.825   | 0.989 | 0.478   |
| pm12  | 0.888 | 0.032   | 0.829 | 0.011   | 0.897 | 0.038   | 0.754 | <0.001  |
| pm13  | 1.007 | 0.616   | 1.025 | 0.105   | 0.990 | 0.370   | 0.996 | 0.822   |
| pm14  | 1.008 | 0.946   | 1.001 | 0.998   | 0.991 | 0.465   | 1.002 | 0.426   |
| pm15  | 0.986 | 0.426   | 0.995 | 0.479   | 0.984 | 0.362   | 0.986 | 0.152   |
| pm16  | 0.998 | 0.375   | 1.004 | 0.635   | 0.994 | 0.269   | 0.988 | 0.888   |
| pm17  | 0.988 | 0.597   | 0.998 | 0.415   | 0.982 | 0.282   | 0.982 | 0.158   |
| pm18  | 0.998 | 0.604   | 1.000 | 0.655   | 1.000 | 0.632   | 1.000 | 0.991   |
| pm19  | 0.998 | 0.347   | 0.998 | 0.908   | 0.999 | 0.138   | 1.000 | 0.835   |
| pm20  | 0.992 | 0.199 | 0.986 | 0.143 | 0.996 | 0.385 | 1.000 | 0.936 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pm21  | 0.986 | 0.322 | 1.006 | 0.235 | 0.720 | <0.001 | 0.976 | 0.681 |
| pm22  | 1.033 | 0.811 | 1.071 | 0.253 | 1.030 | 0.962 | 1.024 | 0.336 |
| pm23  | 0.890 | 0.039 | 0.729 | <0.001 | 0.863 | 0.011 | 0.897 | 0.042 |
| pm24  | 0.997 | 0.703 | 0.989 | 0.982 | 1.001 | 0.580 | 1.002 | 0.513 |
| pm25  | 0.998 | 0.749 | 1.001 | 0.721 | 0.999 | 0.832 | 1.000 | 0.611 |
| pm26  | 0.997 | 0.237 | 1.001 | 0.947 | 0.999 | 0.849 | 1.000 | 0.930 |
| pm27  | 0.988 | 0.603 | 0.960 | 0.181 | 0.980 | 0.283 | 0.994 | 0.848 |
| pm28  | 0.788 | <0.001 | 0.895 | 0.040 | 0.847 | 0.011 | 0.700 | <0.001 |
| pm29  | 1.177 | 0.541 | 1.175 | 0.800 | 1.115 | 0.529 | 1.207 | 0.717 |
| pm30  | 0.790 | <0.001 | 0.680 | <0.001 | 0.887 | 0.041 | 0.715 | <0.001 |
| pm31  | 0.989 | 0.615 | 0.959 | 0.414 | 0.979 | 0.630 | 0.994 | 0.930 |
| pm32  | 1.001 | 0.339 | 0.920 | 0.041 | 1.000 | 0.701 | 0.947 | 0.917 |
| pm33  | 0.998 | 0.697 | 1.000 | 0.995 | 0.999 | 0.457 | 1.000 | 0.673 |
| pm34  | 0.994 | 0.935 | 1.012 | 0.899 | 0.996 | 0.909 | 0.995 | 0.162 |
| pm35  | 1.005 | 0.282 | 1.008 | 0.350 | 1.004 | 0.273 | 1.001 | 0.860 |
| pm36  | 0.998 | 0.889 | 0.998 | 0.394 | 0.999 | 0.566 | 1.000 | 0.285 |
| pm37  | 0.992 | 0.381 | 1.007 | 0.932 | 1.000 | 0.438 | 1.000 | 0.950 |
2b) Result of reverse one-distribution perturbation analysis for apoptosis in cardiac signaling network when four different response function types were applied in a combined manner

|     | Top 5% |       |       | Top 10% |       |       | Top 20% |       |
|-----|--------|-------|-------|---------|-------|-------|---------|-------|
|     | Effect | p-value | Effect | p-value | Effect | p-value | Effect | p-value |
| pm1 | 1.024  | 0.580  | 1.022  | 0.108  | 1.018  | 0.160  |
| pm2 | 0.997  | 0.515  | 0.998  | 0.412  | 0.998  | 0.111  |
| pm3 | 0.993  | 0.616  | 0.994  | 0.947  | 0.995  | 0.853  |
| pm4 | 0.997  | 0.493  | 0.998  | 0.770  | 0.998  | 0.465  |
| pm5 | 0.996  | 0.741  | 0.997  | 0.908  | 0.997  | 0.714  |
| pm6 | 0.991  | 0.719  | 0.993  | 0.474  | 0.994  | 0.141  |
| pm7 | 0.192  | <0.001 | 0.413  | <0.001 | 0.497  | <0.001 |
| pm8 | 0.995  | 0.455  | 0.997  | 0.788  | 0.997  | 0.201  |
| pm9 | 0.965  | 0.234  | 0.972  | 0.729  | 0.976  | 0.110  |
| pm10| 0.338  | <0.001 | 0.391  | <0.001 | 0.518  | <0.001 |
| pm11| 0.992  | 0.914  | 0.993  | 0.719  | 0.995  | 0.273  |
| pm12| 0.775  | <0.001 | 0.853  | 0.028  | 0.891  | 0.040  |
| pm13| 1.006  | 0.396  | 1.005  | 0.124  | 1.004  | 0.519  |
| pm14| 1.009  | 0.590  | 1.007  | 0.603  | 1.005  | 0.348  |
| pm15| 0.985  | 0.224  | 0.987  | 0.596  | 0.990  | 0.618  |
| pm16| 0.998  | 0.511  | 0.998  | 0.313  | 0.999  | 0.529  |
| pm17| 0.986  | 0.944  | 0.990  | 0.180  | 0.992  | 0.241  |
| pm18| 0.998  | 0.842  | 0.998  | 0.522  | 0.999  | 0.283  |
| pm19| 0.998  | 0.153  | 0.998  | 0.778  | 0.999  | 0.507  |
| pm20| 0.993  | 0.674  | 0.994  | 0.114  | 0.995  | 0.272  |
| pm21| 0.986  | 0.167  | 0.988  | 0.866  | 0.992  | 0.834  |
| pm22 | 1.028 | 0.512 | 1.023 | 0.983 | 1.021 | 0.310 |
|------|-------|-------|-------|-------|-------|-------|
| pm23 | 0.797 | <0.001| 0.823 | 0.016 | 0.880 | 0.018 |
| pm24 | 0.997 | 0.360 | 0.998 | 0.529 | 0.998 | 0.976 |
| pm25 | 0.998 | 0.478 | 0.998 | 0.995 | 0.998 | 0.660 |
| pm26 | 0.997 | 0.649 | 0.998 | 0.256 | 0.998 | 0.137 |
| pm27 | 0.988 | 0.566 | 0.990 | 0.380 | 0.992 | 0.118 |
| pm28 | 0.778 | <0.001| 0.812 | 0.010 | 0.849 | 0.023 |
| pm29 | 1.056 | 0.531 | 1.014 | 0.691 | 1.011 | 0.497 |
| pm30 | 0.782 | <0.001| 0.822 | 0.011 | 0.848 | 0.022 |
| pm31 | 0.987 | 0.123 | 0.991 | 0.277 | 0.992 | 0.718 |
| pm32 | 1.001 | 0.719 | 1.001 | 0.885 | 1.001 | 0.809 |
| pm33 | 0.998 | 0.922 | 0.998 | 0.141 | 0.998 | 0.681 |
| pm34 | 0.994 | 0.236 | 0.995 | 0.251 | 0.996 | 0.466 |
| pm35 | 1.006 | 0.648 | 1.004 | 0.455 | 1.004 | 0.662 |
| pm36 | 0.997 | 0.966 | 0.998 | 0.657 | 0.998 | 0.520 |
| pm37 | 0.992 | 0.408 | 0.994 | 0.489 | 0.995 | 0.196 |
3a) Result of two-distribution perturbation analysis for apoptosis when each response function was separately applied (1 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin    | Hill   | Sat  | Acc  | Synergistic effect | p-value |
|-----|------------------------------------------|--------|--------|------|------|--------------------|---------|
| 1   | pm1-pm2                                  | 1.036  | 1.061  | 1    | 1.024| 0.016              | 0.35    |
| 2   | pm1-pm3                                  | 1.016  | 1.086  | 1.038| 1.041| 0.024              | 0.28    |
| 3   | pm1-pm4                                  | 1.038  | 1.039  | 1.043| 1.016| -0.008             | 0.569   |
| 4   | pm1-pm5                                  | 0.997  | 0.992  | 1.005| 1.006| -0.014             | 0.387   |
| 5   | pm1-pm6                                  | 1.059  | 1.042  | 1.134| 1.052| 0.02               | 0.369   |
| 6   | pm1-pm7                                  | 1.951  | 1.598  | 2.073| 1.591| -0.116             | 0.008   |
| 7   | pm1-pm8                                  | 1.018  | 1.048  | 1    | 1.025| 0.01               | 0.405   |
| 8   | pm1-pm9                                  | 1.058  | 1.125  | 1.047| 1.048| 0.02               | 0.399   |
| 9   | pm1-pm10                                 | 2.258  | 1.879  | 2.052| 2.261| 0.078              | 0.012   |
| 10  | pm1-pm11                                 | 1.048  | 1.061  | 1.004| 1.046| 0.019              | 0.338   |
| 11  | pm1-pm12                                 | 1.148  | 1.208  | 1.067| 1.28 | -0.023             | 0.213   |
| 12  | pm1-pm13                                 | 1.008  | 1.055  | 1.02 | 0.999| -0.003             | 0.736   |
| 13  | pm1-pm14                                 | 0.983  | 1.087  | 0.974| 1.009| -0.005             | 0.656   |
| 14  | pm1-pm15                                 | 1.03   | 1.058  | 1.062| 1.045| 0.027              | 0.259   |
| 15  | pm1-pm16                                 | 0.988  | 1.061  | 1.055| 1.027| 0.017              | 0.331   |
| 16  | pm1-pm17                                 | 1     | 1.024  | 1.011| 1.001| -0.008             | 0.409   |
| 17  | pm1-pm18                                 | 1.007  | 1.012  | 1.038| 1.026| 0.006              | 0.565   |
| 18  | pm1-pm19                                 | 1.011  | 1.029  | 1.015| 1.031| 0.007              | 0.423   |
| 19  | pm1-pm20                                 | 1.015  | 1.019  | 0.992| 1.024| -0.005             | 0.507   |
| 20  | pm1-pm21                                 | 1.158  | 1.313  | 1.41 | 1.037| -0.047             | 0.168   |
| 21  | pm1-pm22                                 | 1.087  | 1.183  | 1.103| 1.072| 0.017              | 0.352   |
| 22  | pm1-pm23                                 | 1.135  | 1.249  | 1.117| 1.057| 0.002              | 0.835   |
| 23  | pm1-pm24                                 | 0.999  | 1.068  | 1.004| 1.031| 0.007              | 0.569   |
| 24  | pm1-pm25                                 | 1.019  | 1.025  | 1.022| 1.034| 0.01               | 0.598   |
| pm1-pm26 | 1.028 | 1.039 | 0.992 | 1.009 | 0.002 | 0.782 |
|----------|-------|-------|-------|-------|-------|-------|
| pm1-pm27 | 1.009 | 1.09  | 1.021 | 1.038 | 0.003 | 0.776 |
| pm1-pm28 | 1.262 | 1.105 | 1.137 | 1.382 | -0.049| 0.161 |
| pm1-pm29 | 0.992 | 1.211 | 1.032 | 1.088 | -0.011| 0.359 |
| pm1-pm30 | 0.931 | 0.949 | 0.97  | 0.926 | 0.015 | 0.376 |
| pm1-pm31 | 1.021 | 1.052 | 1.046 | 1.022 | -0.004| 0.84  |
| pm1-pm32 | 1.022 | 1.187 | 1.05  | 1.053 | 0.025 | 0.226 |
| pm1-pm33 | 0.992 | 1.033 | 1.012 | 1.019 | -0.002| 0.918 |
| pm1-pm34 | 1.042 | 1.074 | 1.011 | 1.005 | 0.013 | 0.378 |
| pm1-pm35 | 1.037 | 1.093 | 1.02  | 1.031 | 0.025 | 0.278 |
| pm1-pm36 | 1.018 | 1.034 | 0.995 | 1.038 | 0.007 | 0.579 |
| pm1-pm37 | 1.011 | 1.03  | 0.985 | 1.014 | -0.008| 0.566 |
| pm2-pm3  | 0.986 | 1.023 | 1.031 | 0.996 | 0.005 | 0.553 |
| pm2-pm4  | 0.997 | 1.066 | 1.041 | 0.979 | -0.003| 0.72  |
| pm2-pm5  | 0.979 | 1     | 0.988 | 1.02  | 0.001 | 0.719 |
| pm2-pm6  | 1.007 | 1.013 | 1.104 | 1.027 | 0.004 | 0.602 |
| pm2-pm7  | 1.96  | 1.553 | 2.079 | 1.616 | -0.1  | 0.008 |
| pm2-pm8  | 0.995 | 1.018 | 0.992 | 0.979 | 0.001 | 0.93  |
| pm2-pm9  | 1.037 | 1.055 | 1.011 | 1.028 | 0.001 | 0.998 |
| pm2-pm10 | 2.284 | 1.898 | 2.183 | 2.302 | 0.15  | 0.009 |
| pm2-pm11 | 1.001 | 1.011 | 0.972 | 1.01  | -0.005| 0.831 |
| pm2-pm12 | 1.105 | 1.144 | 1.051 | 1.188 | -0.059| 0.031 |
| pm2-pm13 | 0.983 | 1.053 | 0.991 | 0.989 | -0.002| 0.918 |
| pm2-pm14 | 0.988 | 1.029 | 1.016 | 1.009 | 0.01  | 0.312 |
| pm2-pm15 | 0.997 | 1.035 | 1.018 | 1.018 | 0.014 | 0.362 |
| pm2-pm16 | 1.028 | 1.039 | 1.003 | 1.014 | 0.023 | 0.29  |
| pm2-pm17 | 1     | 1.004 | 0.985 | 0.974 | -0.008| 0.531 |
| pm2-pm18 | 0.991 | 0.999 | 0.981 | 1.018 | 0.001 | 0.804 |
| pm2-pm19 | 1.001 | 1.022 | 0.993 | 0.995 | 0.006 | 0.434 |
| pm2-pm20 | 1.015 | 1.033 | 0.996 | 0.993 | 0.009 | 0.546 |
|   | pm2-pm21   |      |      |      |      |      |
|---|-----------|------|------|------|------|------|
| 55|           | 1.093| 1.302| 1.39 | 1.007| -0.06|
| 56| pm2-pm22  | 1.045| 1.135| 1.096| 1.011| -0.005|
| 57| pm2-pm23  | 1.064| 1.239| 1.116| 1.051| -0.002|
| 58| pm2-pm24  | 0.966| 1.03 | 1.021| 0.975| -0.003|
| 59| pm2-pm25  | 0.991| 1    | 0.997| 1.017| 0.004|
| 60| pm2-pm26  | 0.981| 0.988| 0.987| 1.014| -0.005|
| 61| pm2-pm27  | 1.002| 1.012| 1.037| 1.008| -0.004|
| 62| pm2-pm28  | 1.216| 1.066| 1.108| 1.344| -0.07 |
| 63| pm2-pm29  | 1.024| 1.235| 0.998| 1.054| 0.003 |
| 64| pm2-pm30  | 0.923| 0.921| 0.992| 0.892| 0.021 |
| 65| pm2-pm31  | 0.984| 1.029| 1.031| 0.993| -0.012|
| 66| pm2-pm32  | 0.988| 1.136| 1.026| 1.038| 0.012 |
| 67| pm2-pm33  | 0.969| 0.982| 0.997| 0.995| -0.012|
| 68| pm2-pm34  | 0.984| 1.01 | 1.023| 1.021| 0.008 |
| 69| pm2-pm35  | 1.026| 1.011| 0.991| 1.003| 0.005 |
| 70| pm2-pm36  | 0.991| 1.007| 1.016| 1.002| 0.007 |
| 71| pm2-pm37  | 0.992| 0.991| 1.003| 1.027| 0.003 |
| 72| pm3-pm4   | 0.987| 1.038| 0.992| 1.008| -0.025|
| 73| pm3-pm5   | 0.976| 1.031| 1.017| 1.025| 0.008 |
| 74| pm3-pm6   | 1.046| 1.027| 1.081| 1.018| 0.001 |
| 75| pm3-pm7   | 1.951| 1.58 | 2.084| 1.62 | -0.101|
| 76| pm3-pm8   | 1.008| 1.031| 1.021| 1    | 0.012 |
| 77| pm3-pm9   | 1.038| 1.022| 1.047| 1.03 | -0.006|
| 78| pm3-pm10  | 2.282| 1.942| 2.455| 2.038| 0.155 |
| 79| pm3-pm11  | 0.999| 1.007| 1.01 | 1.004| -0.005|
| 80| pm3-pm12  | 1.11 | 1.214| 1.042| 1.21 | -0.045|
| 81| pm3-pm13  | 0.972| 1.058| 0.994| 0.97 | -0.015|
| 82| pm3-pm14  | 1.009| 1.054| 0.998| 0.985| 0.004 |
| 83| pm3-pm15  | 0.985| 1.028| 1.018| 1.01 | -0.001|
| 84| pm3-pm16  | 0.997| 1.017| 1.022| 1.014| 0.007 |
|    | pm3-pm17 |    |    |    |    |    |
|----|----------|----|----|----|----|----|
| 85 | 1.005    | 1.02 | 1.035 | 1.004 | 0.009 | 0.527 |
| 86 | 1.022    | 1.026 | 1.014 | 1.023 | 0.017 | 0.304 |
| 87 | 0.99     | 1.015 | 1.001 | 1.001 | -0.003 | 0.681 |
| 88 | 1.006    | 1.031 | 1.022 | 1.003 | 0.008 | 0.443 |
| 89 | 1.116    | 1.299 | 1.341 | 1.006 | -0.076 | 0.012 |
| 90 | 1.091    | 1.178 | 1.075 | 1.006 | 0.003 | 0.884 |
| 91 | 1.096    | 1.231 | 1.157 | 1.066 | 0.01 | 0.503 |
| 92 | 1.001    | 1.036 | 0.995 | 1.012 | 0.002 | 0.972 |
| 93 | 1.016    | 1.003 | 1.01 | 0.984 | -0.002 | 0.936 |
| 94 | 0.995    | 1.029 | 1.013 | 1.019 | 0.009 | 0.463 |
| 95 | 1.009    | 1.029 | 1.026 | 1.001 | -0.01 | 0.329 |
| 96 | 1.218    | 1.084 | 1.141 | 1.327 | -0.069 | 0.027 |
| 97 | 0.971    | 1.189 | 0.999 | 1.036 | -0.034 | 0.298 |
| 98 | 0.911    | 0.908 | 0.946 | 0.892 | -0.005 | 0.88 |
| 99 | 1.021    | 1.061 | 1.013 | 0.985 | -0.009 | 0.498 |
| 100| 0.991    | 1.139 | 1.04 | 1.046 | 0.011 | 0.336 |
| 101| 0.986    | 0.997 | 0.993 | 0.978 | -0.017 | 0.312 |
| 102| 1.042    | 1.071 | 1.014 | 0.982 | 0.018 | 0.322 |
| 103| 0.985    | 1.005 | 1.024 | 0.981 | -0.012 | 0.35 |
| 104| 0.979    | 0.963 | 0.999 | 1.018 | -0.015 | 0.358 |
| 105| 1.002    | 0.997 | 1.022 | 1.019 | 0.003 | 0.848 |
| 106| 1.001    | 1.041 | 1.003 | 1.023 | -0.007 | 0.522 |
| 107| 1.009    | 1.032 | 1.102 | 0.997 | -0.027 | 0.234 |
| 108| 1.898    | 1.608 | 2.094 | 1.598 | -0.13 | 0.006 |
| 109| 1.017    | 1.073 | 1.004 | 1.015 | 0.004 | 0.757 |
| 110| 1.041    | 1.077 | 1.038 | 1.021 | -0.016 | 0.365 |
| 111| 2.074    | 1.863 | 2.009 | 2.147 | -0.022 | 0.265 |
| 112| 0.986    | 1.049 | 1.017 | 1.029 | -0.011 | 0.343 |
| 113| 1.116    | 1.213 | 1.068 | 1.223 | -0.054 | 0.028 |
| 114| 0.98     | 1.023 | 1.037 | 0.963 | -0.033 | 0.207 |
|   | pm4-pm14 | 0.994  | 1.075   | 1.006  | 1.015  | -0.006  | 0.58  |
|---|----------|--------|---------|--------|--------|---------|------|
|   | pm4-pm15 | 1.003  | 1.085   | 1.048  | 0.996  | 0.002   | 0.991 |
|   | pm4-pm16 | 1.034  | 1.073   | 1.019  | 0.973  | -0.001  | 0.748 |
|   | pm4-pm17 | 1.014  | 1.063   | 1.02   | 0.999  | -0.003  | 0.657 |
|   | pm4-pm18 | 0.994  | 1.024   | 1.018  | 0.983  | -0.02   | 0.305 |
|   | pm4-pm19 | 1.001  | 1.022   | 1.0     | 0.989  | -0.022  | 0.269 |
|   | pm4-pm20 | 1.01   | 1.078   | 1.031  | 1.002  | 0.002   | 0.871 |
|   | pm4-pm21 | 1.155  | 1.311   | 1.425  | 1.039  | -0.054  | 0.041 |
|   | pm4-pm22 | 1.063  | 1.217   | 1.14   | 1.03   | 0.008   | 0.426 |
|   | pm4-pm23 | 1.151  | 1.424   | 1.126  | 1.07   | 0.045   | 0.158 |
|   | pm4-pm24 | 1.007  | 1.056   | 1.039  | 0.985  | -0.008  | 0.518 |
|   | pm4-pm25 | 0.995  | 1.077   | 0.992  | 1.005  | -0.008  | 0.558 |
|   | pm4-pm26 | 1.029  | 1.067   | 0.993  | 0.975  | -0.009  | 0.414 |
|   | pm4-pm27 | 1.031  | 1.045   | 1.014  | 1.002  | -0.024  | 0.222 |
|   | pm4-pm28 | 1.242  | 1.143   | 1.156  | 1.318  | -0.066  | 0.041 |
|   | pm4-pm29 | 1.033  | 1.344   | 1.001  | 1.089  | 0.014   | 0.326 |
|   | pm4-pm30 | 0.929  | 0.958   | 0.966  | 0.88   | -0.005  | 0.593 |
|   | pm4-pm31 | 1.008  | 1.066   | 1.057  | 1.029  | -0.009  | 0.483 |
|   | pm4-pm32 | 1.001  | 1.16    | 1.025  | 1.031  | -0.009  | 0.543 |
|   | pm4-pm33 | 1.023  | 1.047   | 1.009  | 1.001  | -0.006  | 0.495 |
|   | pm4-pm34 | 0.99   | 1.112   | 1.05   | 0.977  | 0.003   | 0.99  |
|   | pm4-pm35 | 1.028  | 1.042   | 1.006  | 0.994  | -0.013  | 0.371 |
|   | pm4-pm36 | 0.983  | 1.024   | 1.038  | 1.037  | -0.004  | 0.842 |
|   | pm4-pm37 | 1.02   | 1.049   | 1.016  | 0.988  | -0.009  | 0.465 |
|   | pm5-pm6  | 1.032  | 0.986   | 1.12   | 1.003  | 0.001   | 0.736 |
|   | pm5-pm7  | 1.937  | 1.583   | 2.1    | 1.597  | -0.098  | 0.015 |
|   | pm5-pm8  | 0.994  | 1.008   | 0.994  | 0.973  | -0.003  | 0.604 |
|   | pm5-pm9  | 1.012  | 1.033   | 1.01   | 1.044  | -0.008  | 0.446 |
|   | pm5-pm10 | 2.133  | 1.728   | 1.96   | 2.2    | -0.012  | 0.328 |
|   | pm5-pm11 | 0.989  | 0.978   | 0.991  | 1.027  | -0.007  | 0.487 |
| pm5-pm12  | 1.132 | 1.167 | 1.007 | 1.246 | -0.043 | 0.166 |
| pm5-pm13  | 0.988 | 0.992 | 1.004 | 0.98  | -0.015 | 0.323 |
| pm5-pm14  | 0.989 | 1.031 | 1.009 | 1.003 | 0.007  | 0.514 |
| pm5-pm15  | 0.987 | 1.014 | 0.99  | 1.002 | -0.005 | 0.581 |
| pm5-pm16  | 0.995 | 0.997 | 1.006 | 0.987 | -0.002 | 0.684 |
| pm5-pm17  | 1.002 | 0.974 | 0.994 | 0.991 | -0.009 | 0.522 |
| pm5-pm18  | 1.02  | 1.004 | 0.989 | 0.982 | 0.002  | 0.732 |
| pm5-pm19  | 0.975 | 0.987 | 0.999 | 0.997 | -0.008 | 0.465 |
| pm5-pm20  | 0.975 | 1.001 | 0.976 | 0.992 | -0.014 | 0.364 |
| pm5-pm21  | 1.1   | 1.305 | 1.356 | 1.046 | -0.057 | 0.044 |
| pm5-pm22  | 1.057 | 1.131 | 1.073 | 1.035 | -0.003 | 0.774 |
| pm5-pm23  | 1.073 | 1.187 | 1.126 | 1.055 | -0.01  | 0.447 |
| pm5-pm24  | 1.007 | 0.988 | 1.007 | 0.999 | -0.001 | 0.657 |
| pm5-pm25  | 0.992 | 0.981 | 0.979 | 1.001 | -0.009 | 0.439 |
| pm5-pm26  | 0.982 | 0.98  | 0.982 | 0.985 | -0.016 | 0.355 |
| pm5-pm27  | 0.992 | 1.021 | 1.012 | 1.013 | -0.01  | 0.46  |
| pm5-pm28  | 1.2   | 1.056 | 1.135 | 1.385 | -0.06  | 0.021 |
| pm5-pm29  | 1.013 | 1.157 | 0.95  | 1.106 | -0.018 | 0.399 |
| pm5-pm30  | 0.918 | 0.871 | 1.008 | 0.881 | 0.009  | 0.546 |
| pm5-pm31  | 1.021 | 1.04  | 1.041 | 1.043 | 0.015  | 0.347 |
| pm5-pm32  | 1.01  | 1.141 | 1.013 | 1.033 | 0.014  | 0.331 |
| pm5-pm33  | 1.023 | 0.989 | 0.994 | 1.007 | 0.005  | 0.475 |
| pm5-pm34  | 0.997 | 1.015 | 1.013 | 0.972 | -0.003 | 0.615 |
| pm5-pm35  | 1.011 | 1.021 | 1.007 | 0.997 | 0.006  | 0.435 |
| pm5-pm36  | 1.004 | 1.018 | 1.015 | 1.01  | 0.015  | 0.303 |
| pm5-pm37  | 0.99  | 1.008 | 1.018 | 1.012 | 0.007  | 0.542 |
| pm6-pm7   | 1.997 | 1.544 | 2.276 | 1.657 | -0.072 | 0.019 |
| pm6-pm8   | 1.016 | 1.052 | 1.113 | 1.028 | 0.018  | 0.333 |
| pm6-pm9   | 1.055 | 1.034 | 1.13  | 1.045 | -0.004 | 0.612 |
| pm6-pm10  | 2.271 | 1.951 | 2.296 | 2.345 | 0.161  | 0.004 |
| pm6-pm11  | 1.041 | 1.002 | 1.098 | 1.009 | -0.004 | 0.999 |
|---------|-------|-------|-------|-------|--------|-------|
| pm6-pm12 | 1.115 | 1.19  | 1.124 | 1.25  | -0.05  | 0.195 |
| pm6-pm13 | 0.993 | 1.013 | 1.087 | 1.004 | -0.02  | 0.37  |
| pm6-pm14 | 1.023 | 1.083 | 1.087 | 1.018 | 0.014  | 0.389 |
| pm6-pm15 | 1.046 | 1.02  | 1.128 | 1.04  | 0.016  | 0.315 |
| pm6-pm16 | 1.045 | 1.008 | 1.084 | 1.033 | 0.006  | 0.525 |
| pm6-pm17 | 1.042 | 1.014 | 1.093 | 0.991 | -0.002 | 0.672 |
| pm6-pm18 | 1.018 | 0.998 | 1.102 | 1.015 | -0.002 | 0.903 |
| pm6-pm19 | 1.013 | 1.027 | 1.112 | 1.033 | 0.011  | 0.335 |
| pm6-pm20 | 1.037 | 1.02  | 1.11  | 1.016 | 0.008  | 0.525 |
| pm6-pm21 | 1.131 | 1.323 | 1.527 | 1.043 | -0.041 | 0.183 |
| pm6-pm22 | 1.095 | 1.139 | 1.187 | 1.015 | -0.006 | 0.451 |
| pm6-pm23 | 1.068 | 1.25  | 1.2   | 1.06  | -0.014 | 0.387 |
| pm6-pm24 | 1.036 | 1.027 | 1.1   | 1.025 | 0.008  | 0.533 |
| pm6-pm25 | 1.012 | 1.008 | 1.109 | 0.982 | -0.008 | 0.533 |
| pm6-pm26 | 1.033 | 0.991 | 1.093 | 1.031 | 0.001  | 0.646 |
| pm6-pm27 | 1.053 | 1.06  | 1.145 | 1.025 | 0.013  | 0.323 |
| pm6-pm28 | 1.299 | 1.095 | 1.209 | 1.312 | -0.063 | 0.041 |
| pm6-pm29 | 0.996 | 1.156 | 1.12  | 1.115 | -0.016 | 0.362 |
| pm6-pm30 | 0.931 | 0.945 | 1.056 | 0.917 | 0.013  | 0.375 |
| pm6-pm31 | 1.044 | 1.038 | 1.074 | 1.023 | -0.015 | 0.389 |
| pm6-pm32 | 1.026 | 1.15  | 1.124 | 1.069 | 0.018  | 0.359 |
| pm6-pm33 | 1.031 | 1.012 | 1.138 | 1.016 | 0.013  | 0.399 |
| pm6-pm34 | 1.04  | 1.007 | 1.118 | 0.992 | -0.001 | 0.908 |
| pm6-pm35 | 1.026 | 1.006 | 1.081 | 1.012 | -0.01  | 0.424 |
| pm6-pm36 | 1.045 | 1.028 | 1.102 | 1.003 | 0.01   | 0.564 |
| pm6-pm37 | 1.046 | 1.027 | 1.116 | 1.005 | 0.01   | 0.317 |
| pm7-pm8  | 1.99  | 1.637 | 2.088 | 1.584 | -0.077 | 0.011 |
| pm7-pm9  | 1.994 | 1.588 | 2.136 | 1.638 | -0.099 | 0.013 |
| pm7-pm10 | 3.999 | 2.559 | 3.892 | 3.354 | 0.528  | <0.001 |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 205 | pm7-pm11 | 1.953 | 1.633 | 2.11 | 1.632 | -0.077 | 0.013 |
| 206 | pm7-pm12 | 2.128 | 1.767 | 2.169 | 1.926 | -0.09 | 0.011 |
| 207 | pm7-pm13 | 1.942 | 1.559 | 2.048 | 1.578 | -0.13 | 0.005 |
| 208 | pm7-pm14 | 2.013 | 1.556 | 2.114 | 1.584 | -0.09 | 0.08 |
| 209 | pm7-pm15 | 1.976 | 1.589 | 2.047 | 1.564 | -0.116 | 0.007 |
| 210 | pm7-pm16 | 1.984 | 1.593 | 2.072 | 1.612 | -0.089 | 0.016 |
| 211 | pm7-pm17 | 1.995 | 1.535 | 2.121 | 1.601 | -0.092 | 0.019 |
| 212 | pm7-pm18 | 1.967 | 1.522 | 2.03 | 1.554 | -0.092 | 0.10 |
| 213 | pm7-pm19 | 1.962 | 1.54 | 2.127 | 1.57 | -0.090 | 0.008 |
| 214 | pm7-pm20 | 1.997 | 1.556 | 2.068 | 1.6 | -0.097 | 0.02 |
| 215 | pm7-pm21 | 2.089 | 1.712 | 2.277 | 1.659 | -0.048 | 0.163 |
| 216 | pm7-pm22 | 2.075 | 1.827 | 2.22 | 1.657 | -0.081 | 0.019 |
| 217 | pm7-pm23 | 2.075 | 1.827 | 2.22 | 1.657 | -0.081 | 0.019 |
| 218 | pm7-pm24 | 1.966 | 1.602 | 2.118 | 1.579 | -0.091 | 0.014 |
| 219 | pm7-pm25 | 1.952 | 1.523 | 2.093 | 1.596 | -0.113 | 0.007 |
| 220 | pm7-pm26 | 1.992 | 1.593 | 2.083 | 1.595 | -0.088 | 0.018 |
| 221 | pm7-pm27 | 1.976 | 1.544 | 2.097 | 1.641 | -0.111 | 0.009 |
| 222 | pm7-pm28 | 2.444 | 1.62 | 2.338 | 2.196 | -0.01 | 0.435 |
| 223 | pm7-pm29 | 2.073 | 1.85 | 2.041 | 1.698 | -0.066 | 0.021 |
| 224 | pm7-pm30 | 2.09 | 1.7 | 2.366 | 1.457 | 0.086 | 0.015 |
| 225 | pm7-pm31 | 2.021 | 1.676 | 2.101 | 1.623 | 0.072 | 0.016 |
| 226 | pm7-pm32 | 1.939 | 1.609 | 2.035 | 1.639 | -0.136 | 0.005 |
| 227 | pm7-pm33 | 1.962 | 1.532 | 2.078 | 1.586 | -0.114 | 0.006 |
| 228 | pm7-pm34 | 1.962 | 1.593 | 2.066 | 1.596 | -0.104 | 0.008 |
| 229 | pm7-pm35 | 1.987 | 1.535 | 2.09 | 1.59 | -0.108 | 0.007 |
| 230 | pm7-pm36 | 1.953 | 1.547 | 2.108 | 1.58 | -0.106 | 0.009 |
| 231 | pm7-pm37 | 1.972 | 1.55 | 2.093 | 1.598 | -0.103 | 0.007 |
| 232 | pm8-pm9 | 0.99 | 1.08 | 1.025 | 1.021 | -0.003 | 0.673 |
| 233 | pm8-pm10 | 2.268 | 2 | 2.162 | 2.042 | 0.102 | 0.008 |
| 234 | pm8-pm11 | 1.019 | 0.991 | 0.995 | 1.008 | 0.001 | 0.654 |
|     | pm8-pm12 | pm8-pm13 | pm8-pm14 | pm8-pm15 | pm8-pm16 | pm8-pm17 | pm8-pm18 | pm8-pm19 | pm8-pm20 | pm8-pm21 | pm8-pm22 | pm8-pm23 | pm8-pm24 | pm8-pm25 | pm8-pm26 | pm8-pm27 | pm8-pm28 | pm8-pm29 | pm8-pm30 | pm8-pm31 | pm8-pm32 | pm8-pm33 | pm8-pm34 | pm8-pm35 | pm8-pm36 | pm8-pm37 | pm9-pm10 | pm9-pm11 | pm9-pm12 | pm9-pm13 |
|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 235 | 1.077    | 1.031    | 1.206    | -0.061   | 0.026    |
| 236 | 0.977    | 0.977    | 0.966    | -0.026   | 0.266    |
| 237 | 0.998    | 0.982    | 0.986    | 0.005    | 0.499    |
| 238 | 1.039    | 1.02     | 1.031    | 0.011    | 0.342    |
| 239 | 0.996    | 1.032    | 0.992    | 0.016    | 0.376    |
| 240 | 1.015    | 1.017    | 0.993    | 0.009    | 0.537    |
| 241 | 1.01     | 0.976    | 1.015    | 0.001    | 0.855    |
| 242 | 1.003    | 0.988    | 1.001    | -0.006   | 0.476    |
| 243 | 0.982    | 0.994    | 1.016    | 0.006    | 0.522    |
| 244 | 1.125    | 1.372    | 1.016    | -0.06    | 0.03     |
| 245 | 1.074    | 1.168    | 1.105    | 1.044    | 0.022    | 0.201    |
| 246 | 1.075    | 1.25     | 1.117    | 1.052    | 0.004    | 0.745    |
| 247 | 0.968    | 1.014    | 1.002    | -0.003   | 0.986    |
| 248 | 0.983    | 0.981    | 1        | -0.001   | 0.847    |
| 249 | 0.996    | 0.977    | 1.003    | -0.003   | 0.853    |
| 250 | 1.003    | 1.02     | 1.003    | -0.004   | 0.736    |
| 251 | 1.232    | 1.092    | 1.346    | -0.066   | 0.029    |
| 252 | 1.019    | 0.998    | 1.077    | -0.01    | 0.377    |
| 253 | 0.938    | 0.949    | 0.923    | 0.016    | 0.304    |
| 254 | 1.004    | 1.033    | 1.009    | 0.004    | 0.742    |
| 255 | 0.977    | 1.013    | 1.025    | -0.003   | 0.935    |
| 256 | 0.991    | 0.985    | 0.995    | -0.005   | 0.445    |
| 257 | 0.986    | 1.008    | 0.981    | 0.003    | 0.8      |
| 258 | 1.021    | 0.992    | 0.986    | 0.011    | 0.35     |
| 259 | 0.992    | 1.011    | 1.004    | 0.007    | 0.505    |
| 260 | 1.001    | 1.004    | 1.006    | 0.002    | 0.744    |
| 261 | 2.292    | 2.194    | 2.06     | 0.089    | 0.017    |
| 262 | 1.029    | 1.033    | 1.037    | -0.007   | 0.599    |
| 263 | 1.162    | 1.083    | 1.259    | -0.046   | 0.198    |
| 264 | 0.998    | 1.029    | 1.005    | -0.024   | 0.271    |
|   | pm9-pm14 | pm9-pm15 | pm9-pm16 | pm9-pm17 | pm9-pm18 | pm9-pm19 | pm9-pm20 | pm9-pm21 | pm9-pm22 | pm9-pm23 | pm9-pm24 | pm9-pm25 | pm9-pm26 | pm9-pm27 | pm9-pm28 | pm9-pm29 | pm9-pm30 | pm9-pm31 | pm9-pm32 | pm9-pm33 | pm9-pm34 | pm9-pm35 | pm9-pm36 | pm9-pm37 | pm10-pm11 | pm10-pm12 | pm10-pm13 | pm10-pm14 | pm10-pm15 | pm10-pm16 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|   | 1.016    | 1.022    | 1.067    | 1.019    | 1.022    | 1.028    | 1.031    | 1.151    | 1.098    | 1.097    | 1.047    | 1.056    | 1.028    | 1.032    | 1.262    | 1.038    | 0.962    | 1.046    | 1.013    | 1.03    | 1.044    | 1.015    | 1.009    | 1.033    | 2.295    | 2.283    | 2.262    |
|   | 1.076    | 1.038    | 1.027    | 1.059    | 0.998    | 1.029    | 1.017    | 1.349    | 1.212    | 1.293    | 1.05    | 1.022    | 1.059    | 1.059    | 1.104    | 1.199    | 0.952    | 1.102    | 1.167    | 1.067    | 1.062    | 1.063    | 1.057    | 1.946    | 1.992    | 1.861    |
|   | 1.057    | 1.075    | 1.006    | 1.06    | 1.017    | 1.02    | 1.147    | 1.413    | 1.127    | 1.136    | 1.006    | 1.047    | 1.026    | 1.048    | 1.16    | 1.049    | 1.016    | 1.058    | 1.026    | 1.038    | 1.015    | 1.037    | 1.023    | 2.154    | 1.922    | 2.064    |
|   | 1.035    | 1.019    | 1.031    | 0.99    | 1.028    | 1.045    | 1.026    | 1.042    | 1.017    | 1.041    | 1.003    | 1.019    | 1.042    | 1.039    | 1.366   | 1.101    | 0.908    | 1.019    | 1.047    | 1.006    | 1.002    | 1.093    | 2.083    | 2.437    | 2.222    |
|   | 0.009    | -0.001   | -0.001   | -0.003  | -0.017   | -0.003   | -0.008   | -0.056   | 0.008    | -0.015   | -0.011   | 0.002    | 0.005    | -0.011   | -0.067   | -0.014   | 0.012    | -0.001   | -0.009   | 0.001    | -0.007   | -0.012   | -0.01    | -0.012   | -0.011   | -0.014   |
|   | 0.529    | 0.807    | 0.766    | 0.609    | 0.34     | 0.766    | 0.568    | 0.027    | 0.452    | 0.37     | 0.302    | 0.681    | 0.695    | 0.354    | 0.022    | 0.312    | 0.312    | 0.719    | 0.595    | 0.699    | 0.543    | 0.389    | 0.344    | 0.902    | 0.014    | 0.044    |
|    | pm10-pm17 |    | pm10-pm18 |    | pm10-pm19 |    | pm10-pm20 |    | pm10-pm21 |    | pm10-pm22 |    | pm10-pm23 |    | pm10-pm24 |    | pm10-pm25 |    | pm10-pm26 |    | pm10-pm27 |    | pm10-pm28 |    | pm10-pm29 |    | pm10-pm30 |    | pm10-pm31 |    | pm10-pm32 |    | pm10-pm33 |    | pm10-pm34 |    | pm10-pm35 |    | pm10-pm36 |    | pm10-pm37 |    | pm11-pm12 |    | pm11-pm13 |    | pm11-pm14 |    | pm11-pm15 |    | pm11-pm16 |    | pm11-pm17 |    | pm11-pm18 |    | pm11-pm19 |    | pm11-pm20 |    |
|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|-----------|----|
| 295| 2.314     | 1.971| 2.113     | 2.049| 0.092     | 0.014| 2.003     | 1.748| 1.889     | 2.064| -0.092    | 0.017| 2.166     | 1.89 | 2.071     | 2.278| 0.083     | 0.013| 2.307     | 2.005| 2.149     | 2.053| 0.107     | 0.009| 2.214     | 2.142| 2.587     | 2.074| -0.025    | 0.283| 2.07      | 1.874| 1.97      | 2.09 | -0.097    | 0.019| 2.107     | 1.96 | 2.037     | 2.129| -0.083    | 0.013| 2.098     | 1.852| 1.963     | 2.127| -0.012    | 0.341| 2.109     | 1.754| 1.996     | 2.149| -0.016    | 0.329| 2.315     | 1.913| 2.189     | 2.073| 0.104     | 0.009| 2.051     | 1.736| 1.876     | 2.07 | -0.107    | 0.005| 2.401     | 1.714| 2.069     | 2.725| -0.047    | 0.184| 2.018     | 1.908| 1.887     | 2.206| -0.091    | 0.017| 2.138     | 1.982| 2.073     | 1.838| 0.076     | 0.013| 2.029     | 1.712| 1.89      | 2.098| -0.11     | 0.01 | 2.166     | 1.953| 2.084     | 2.319| 0.074     | 0.017| 2.264     | 1.949| 2.167     | 2.009| 0.079     | 0.017| 2.29      | 2.022| 2.147     | 2.066| 0.108     | 0.009| 2.302     | 1.998| 2.093     | 2.057| 0.089     | 0.019| 2.268     | 2.002| 2.171     | 2.016| 0.096     | 0.013| 2.292     | 1.985| 2.196     | 2.012| 0.1       | 0.008| 1.099     | 1.182| 1.041     | 1.263| -0.042    | 0.162| 0.987     | 1.05 | 1.008     | 0.977| -0.007    | 0.509| 1.02      | 1.066| 1.035     | 1.005| 0.025     | 0.289| 1.016     | 1.013| 0.983     | 1.016| -0.004    | 0.986| 0.993     | 1.045| 1.004     | 1.043| 0.016     | 0.312| 0.982     | 0.995| 0.981     | 0.971| -0.024    | 0.238| 1.003     | 0.971| 1.006     | 1.027| -0.002    | 0.871| 0.965     | 0.985| 1.009     | 0.982| -0.019    | 0.327| 1       | 1.018| 0.995     | 0.992| -0.006    | 0.558|
|   | pm11-pm21  | pm11-pm22  | pm11-pm23  | pm11-pm24  | pm11-pm25  | pm11-pm26  | pm11-pm27  | pm11-pm28  | pm11-pm29  | pm11-pm30  | pm11-pm31  | pm11-pm32  | pm11-pm33  | pm11-pm34  | pm11-pm35  | pm11-pm36  | pm11-pm37  | pm11-pm38  | pm11-pm39  | pm11-pm40  | pm11-pm41  | pm11-pm42  | pm11-pm43  | pm11-pm44  | pm11-pm45  | pm11-pm46  | pm11-pm47  | pm11-pm48  | pm11-pm49  | pm11-pm50  |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 325| 1.096     | 1.277     | 1.351     | 1.011     | -0.082    | 0.02      |
| 326| 1.042     | 1.184     | 1.093     | 1.04      | 0.006     | 0.486     |
| 327| 1.078     | 1.258     | 1.14      | 1.054     | 0.006     | 0.478     |
| 328| 0.994     | 1.021     | 1.003     | 1.001     | -0.004    | 0.875     |
| 329| 0.997     | 1.017     | 1.008     | 1.015     | 0.005     | 0.532     |
| 330| 0.991     | 0.987     | 1.01      | 1.02      | -0.002    | 0.706     |
| 331| 1.03      | 1.041     | 1.026     | 1.009     | 0         | 0.737     |
| 332| 1.233     | 1.058     | 1.103     | 1.349     | -0.075    | 0.019     |
| 333| 1.005     | 1.187     | 0.98      | 1.068     | -0.022    | 0.294     |
| 334| 0.933     | 0.864     | 0.982     | 0.911     | 0.005     | 0.4       |
| 335| 1.023     | 1.048     | 1.026     | 1.009     | -0.002    | 0.785     |
| 336| 0.981     | 1.128     | 1.007     | 1.047     | -0.002    | 0.884     |
| 337| 1.015     | 1.003     | 0.981     | 1.043     | 0.006     | 0.51      |
| 338| 1.012     | 1.046     | 1.013     | 0.994     | 0.008     | 0.542     |
| 339| 0.969     | 1.004     | 1.016     | 1         | -0.013    | 0.348     |
| 340| 0.977     | 0.964     | 1         | 1.027     | -0.011    | 0.387     |
| 341| 0.984     | 0.956     | 0.993     | 1.042     | -0.013    | 0.334     |
| 342| 1.098     | 1.182     | 1.003     | 1.234     | -0.062    | 0.025     |
| 343| 1.094     | 1.196     | 1.075     | 1.234     | -0.036    | 0.249     |
| 344| 1.11      | 1.139     | 1.033     | 1.28      | -0.048    | 0.182     |
| 345| 1.138     | 1.229     | 1.055     | 1.223     | -0.022    | 0.281     |
| 346| 1.113     | 1.237     | 1.031     | 1.225     | -0.033    | 0.298     |
| 347| 1.088     | 1.185     | 1.038     | 1.227     | -0.047    | 0.186     |
| 348| 1.087     | 1.163     | 1.027     | 1.205     | -0.062    | 0.041     |
| 349| 1.111     | 1.139     | 1.039     | 1.195     | -0.064    | 0.041     |
| 350| 1.267     | 1.525     | 1.414     | 1.249     | -0.08     | 0.014     |
| 351| 1.167     | 1.342     | 1.155     | 1.249     | -0.034    | 0.254     |
| 352| 1.193     | 1.42      | 1.137     | 1.304     | -0.041    | 0.198     |
| 353| 1.095     | 1.156     | 1.041     | 1.233     | -0.055    | 0.028     |
| 354| 1.119     | 1.163     | 1.051     | 1.224     | -0.043    | 0.192     |
|      | pm12-pm26 | pm12-pm27 | pm12-pm28 | pm12-pm29 | pm12-pm30 | pm12-pm31 |
|------|-----------|-----------|-----------|-----------|-----------|-----------|
| 355  | 1.103     | 1.118     | 1.377     | 1.126     | 1.042     | 1.117     |
| 356  | 1.17      | 1.184     | 1.232     | 1.411     | 1.054     | 1.206     |
| 357  | 1.037     | 1.061     | 1.19      | 1.06      | 0.938     | 1.089     |
| 358  | 1.197     | 1.257     | 1.636     | 1.297     | 1.146     | 1.238     |
| 359  | -0.056    | -0.049    | -0.08     | -0.036    | -0.051    | -0.044    |
| 360  | 0.029     | 0.152     | 0.011     | 0.254     | 0.033     | 0.19      |
| 361  |          |          |          |          |          |          |
| 362  |          |          |          |          |          |          |
| 363  |          |          |          |          |          |          |
| 364  |          |          |          |          |          |          |
| 365  |          |          |          |          |          |          |
| 366  |          |          |          |          |          |          |
| 367  |          |          |          |          |          |          |
| 368  |          |          |          |          |          |          |
| 369  |          |          |          |          |          |          |
| 370  |          |          |          |          |          |          |
| 371  |          |          |          |          |          |          |
| 372  |          |          |          |          |          |          |
| 373  |          |          |          |          |          |          |
| 374  |          |          |          |          |          |          |
| 375  |          |          |          |          |          |          |
| 376  |          |          |          |          |          |          |
| 377  |          |          |          |          |          |          |
| 378  |          |          |          |          |          |          |
| 379  |          |          |          |          |          |          |
| 380  |          |          |          |          |          |          |
| 381  |          |          |          |          |          |          |
| 382  |          |          |          |          |          |          |
| 383  |          |          |          |          |          |          |
| 384  |          |          |          |          |          |          |
|     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|
| 385 | pm13-pm32 | 0.974 | 1.15 | 1.01 | 1.016 | -0.008 | 0.402 |
| 386 | pm13-pm33 | 0.999 | 1.063 | 0.994 | 1.009 | 0.009 | 0.516 |
| 387 | pm13-pm34 | 1.004 | 0.999 | 0.992 | 0.962 | -0.023 | 0.27 |
| 388 | pm13-pm35 | 0.956 | 1.005 | 0.996 | 0.942 | -0.038 | 0.266 |
| 389 | pm13-pm36 | 0.981 | 1.038 | 1.008 | 1.011 | 0.003 | 0.971 |
| 390 | pm13-pm37 | 0.996 | 1.06 | 1.009 | 0.98 | 0.002 | 0.728 |
| 391 | pm14-pm15 | 1.023 | 0.978 | 1.004 | 0.981 | -0.011 | 0.387 |
| 392 | pm14-pm16 | 0.971 | 0.99 | 1.002 | 0.962 | -0.021 | 0.223 |
| 393 | pm14-pm17 | 1.015 | 0.982 | 1.004 | 0.972 | -0.01 | 0.44 |
| 394 | pm14-pm18 | 1.021 | 1.038 | 1.017 | 0.977 | 0.012 | 0.334 |
| 395 | pm14-pm19 | 1.021 | 1.044 | 1.007 | 0.967 | 0.008 | 0.507 |
| 396 | pm14-pm20 | 0.981 | 1.036 | 0.999 | 0.989 | -0.003 | 0.912 |
| 397 | pm14-pm21 | 1.11 | 1.341 | 1.401 | 1.013 | -0.047 | 0.177 |
| 398 | pm14-pm22 | 1.075 | 1.144 | 1.088 | 1.024 | 0.002 | 0.637 |
| 399 | pm14-pm23 | 1.053 | 1.197 | 1.117 | 1.016 | -0.028 | 0.279 |
| 400 | pm14-pm24 | 1 | 1.055 | 0.986 | 1.001 | 0.005 | 0.766 |
| 401 | pm14-pm25 | 1.013 | 1.056 | 1.023 | 1.011 | 0.024 | 0.295 |
| 402 | pm14-pm26 | 0.989 | 1.02 | 1.031 | 1.011 | 0.011 | 0.383 |
| 403 | pm14-pm27 | 1.018 | 1.031 | 1.027 | 1.003 | -0.004 | 0.763 |
| 404 | pm14-pm28 | 1.257 | 1.138 | 1.108 | 1.33 | -0.049 | 0.159 |
| 405 | pm14-pm29 | 0.977 | 1.141 | 0.98 | 1.02 | -0.05 | 0.164 |
| 406 | pm14-pm30 | 0.921 | 0.867 | 0.941 | 0.896 | -0.009 | 0.468 |
| 407 | pm14-pm31 | 1.032 | 1.119 | 1.021 | 1 | 0.018 | 0.31 |
| 408 | pm14-pm32 | 0.993 | 1.165 | 0.999 | 1.031 | 0.007 | 0.502 |
| 409 | pm14-pm33 | 0.986 | 1.032 | 1.011 | 1.016 | 0.009 | 0.582 |
| 410 | pm14-pm34 | 0.993 | 1.036 | 1.011 | 0.994 | 0.002 | 0.86 |
| 411 | pm14-pm35 | 0.978 | 0.991 | 1.026 | 0.993 | -0.01 | 0.328 |
| 412 | pm14-pm36 | 1.004 | 1.019 | 1.019 | 1.006 | 0.011 | 0.385 |
| 413 | pm14-pm37 | 0.995 | 1.023 | 0.997 | 0.994 | -0.002 | 0.745 |
| 414 | pm15-pm16 | 1.01 | 1.007 | 0.983 | 0.993 | -0.007 | 0.489 |
|        | pm15-pm17   |       |       |       |       |       |
|--------|-------------|-------|-------|-------|-------|-------|
| 415    | 0.987       | 1.01  | 1.024 | 0.977 | -0.007| 0.498 |
| 416    | 0.966       | 1.018 | 1.038 | 0.983 | -0.003| 0.787 |
| 417    | 0.997       | 0.998 | 1.012 | 1.013 | 0      | 0.733 |
| 418    | 1.001       | 1.049 | 1.029 | 0.968 | 0.004  | 0.818 |
| 419    | 1.117       | 1.267 | 1.385 | 1.042 | -0.063 | 0.029 |
| 420    | 1.059       | 1.115 | 1.106 | 1.007 | -0.012 | 0.37  |
| 421    | 1.058       | 1.259 | 1.096 | 1.004 | -0.023 | 0.268 |
| 422    | 1.006       | 1.021 | 1.005 | 1.018 | 0.004  | 0.802 |
| 423    | 0.979       | 1.055 | 1.016 | 0.989 | 0.005  | 0.735 |
| 424    | 1.004       | 1.034 | 1.035 | 1.006 | 0.015  | 0.311 |
| 425    | 1          | 1.063 | 1.013 | 1.015 | -0.004 | 0.962 |
| 426    | 1.235       | 1.108 | 1.187 | 1.313 | -0.05  | 0.168 |
| 427    | 1.005       | 1.109 | 0.97  | 1.076 | -0.042 | 0.15  |
| 428    | 0.9         | 0.894 | 1.011 | 0.886 | 0.004  | 0.778 |
| 429    | 1.033       | 1.061 | 1.074 | 1.024 | 0.019  | 0.38  |
| 430    | 0.989       | 1.103 | 1.028 | 1.023 | -0.007 | 0.523 |
| 431    | 0.985       | 1.004 | 1.035 | 1.006 | 0.002  | 0.957 |
| 432    | 1.002       | 0.991 | 0.984 | 0.978 | -0.021 | 0.291 |
| 433    | 0.974       | 0.978 | 1.001 | 0.975 | -0.028 | 0.237 |
| 434    | 0.968       | 1.014 | 1.018 | 1.016 | -0.001 | 0.836 |
| 435    | 0.998       | 1.022 | 1.012 | 1.011 | 0.003  | 0.622 |
| 436    | 0.968       | 1.011 | 1.002 | 0.979 | -0.011 | 0.367 |
| 437    | 1.004       | 0.984 | 1.017 | 0.991 | 0      | 0.972 |
| 438    | 1.013       | 0.994 | 1.042 | 1.004 | 0.014  | 0.375 |
| 439    | 1.006       | 0.997 | 1.01  | 0.975 | -0.005 | 0.483 |
| 440    | 1.105       | 1.325 | 1.371 | 1.053 | -0.047 | 0.201 |
| 441    | 1.044       | 1.166 | 1.073 | 1.03  | -0.001 | 0.677 |
| 442    | 1.089       | 1.216 | 1.113 | 1.009 | -0.015 | 0.333 |
| 443    | 1.008       | 1.032 | 1.055 | 0.971 | 0.013  | 0.318 |
| 444    | 1.021       | 0.855 | 1.012 | 1.189 | 0.02   | 0.397 |
|     | pm16-pm26 |    |     | pm16-pm27 |    |     | pm16-pm28 |    |     | pm16-pm29 |    |     | pm16-pm30 |    |     | pm16-pm31 |    |     | pm16-pm32 |    |     | pm16-pm33 |    |     | pm16-pm34 |    |     | pm16-pm35 |    |     | pm16-pm36 |    |     | pm16-pm37 |    |     | pm16-pm38 |    |     | pm16-pm39 |    |     | pm17-pm18 |    |     | pm17-pm19 |    |     | pm17-pm20 |    |     | pm17-pm21 |    |     | pm17-pm22 |    |     | pm17-pm23 |    |     | pm17-pm24 |    |     | pm17-pm25 |    |     | pm17-pm26 |    |     | pm17-pm27 |    |     | pm17-pm28 |    |     | pm17-pm29 |    |     | pm17-pm30 |    |     | pm17-pm31 |    |     | pm17-pm32 |    |     | pm17-pm33 |    |     | pm17-pm34 |    |     | pm17-pm35 |    |     | pm17-pm36 |    |     | pm17-pm37 |    |     | pm17-pm38 |    |     | pm17-pm39 |    |     | pm17-pm40 |    |     |
|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|-----------|-----|-----|
| 445 | 0.938     | 0.853 | 0.794 | 0.996     | 0.105 | 0.009 |
| 446 | 1.022     | 1.073 | 1.025 | 0.992     | 0.006 | 0.582 |
| 447 | 1.228     | 1.129 | 1.138 | 1.357     | -0.042 | 0.158 |
| 448 | 1.046     | 1.174 | 0.938 | 1.051     | -0.025 | 0.297 |
| 449 | 0.896     | 0.812 | 0.964 | 0.923     | -0.014 | 0.331 |
| 450 | 0.987     | 1.067 | 1.045 | 0.994     | 0     | 0.963 |
| 451 | 0.998     | 1.122 | 1.036 | 1.058     | 0.016 | 0.382 |
| 452 | 0.991     | 1.032 | 0.984 | 1.014     | 0.005 | 0.481 |
| 453 | 1.015     | 0.966 | 1.007 | 0.983     | -0.011 | 0.304 |
| 454 | 0.978     | 0.985 | 1.015 | 0.982     | -0.015 | 0.386 |
| 455 | 0.968     | 1.003 | 1.012 | 0.984     | -0.007 | 0.541 |
| 456 | 1.002     | 1.013 | 1.01  | 1.023     | 0.01  | 0.383 |
| 457 | 1.007     | 0.981 | 1.011 | 0.992     | 0.009 | 0.599 |
| 458 | 0.984     | 1.015 | 0.99  | 0.982     | -0.01  | 0.346 |
| 459 | 1.109     | 1.257 | 1.382 | 0.986     | -0.078 | 0.015 |
| 460 | 1.023     | 1.076 | 1.073 | 0.997     | -0.037 | 0.231 |
| 461 | 1.072     | 1.174 | 1.126 | 1        | -0.03  | 0.296 |
| 462 | 1.016     | 1.012 | 1.024 | 0.983     | 0.004 | 0.943 |
| 463 | 1.022     | 1.002 | 0.991 | 0.995     | 0.002 | 0.792 |
| 464 | 0.983     | 1.01  | 0.995 | 0.974     | -0.01  | 0.387 |
| 465 | 0.996     | 0.992 | 1.032 | 0.979     | -0.023 | 0.216 |
| 466 | 1.217     | 1.083 | 1.175 | 1.353     | -0.049 | 0.163 |
| 467 | 0.971     | 1.206 | 0.971 | 1.014     | -0.037 | 0.235 |
| 468 | 0.888     | 0.857 | 0.929 | 0.863     | -0.03  | 0.2  |
| 469 | 0.996     | 1.029 | 1.03  | 0.983     | -0.015 | 0.368 |
| 470 | 0.979     | 1.175 | 1.011 | 1.006     | 0.004 | 0.771 |
| 471 | 0.985     | 0.99  | 1.008 | 0.973     | -0.012 | 0.372 |
| 472 | 0.991     | 0.949 | 0.998 | 0.969     | -0.028 | 0.219 |
| 473 | 0.992     | 0.95  | 1.015 | 0.978     | -0.022 | 0.256 |
|   | pm17-pm36 | pm17-pm37 | pm18-pm19 | pm18-pm20 | pm18-pm21 | pm18-pm22 | pm18-pm23 | pm18-pm24 | pm18-pm25 | pm18-pm26 | pm18-pm27 | pm18-pm28 | pm18-pm29 | pm18-pm30 | pm18-pm31 | pm18-pm32 | pm18-pm33 | pm18-pm34 | pm18-pm35 | pm18-pm36 | pm18-pm37 | pm19-pm20 | pm19-pm21 | pm19-pm22 | pm19-pm23 | pm19-pm24 | pm19-pm25 | pm19-pm26 | pm19-pm27 | pm19-pm28 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 475 | 0.996 | 0.978 | 1.018 | 0.95 | -0.014 | 0.392 |
| 476 | 0.978 | 1.023 | 1.001 | 0.991 | -0.004 | 0.832 |
| 477 | 0.984 | 1.009 | 0.994 | 0.991 | -0.003 | 0.996 |
| 478 | 0.987 | 1.009 | 1.008 | 1.012 | 0.003 | 0.622 |
| 479 | 1.098 | 1.237 | 1.418 | 1.034 | -0.062 | 0.04 |
| 480 | 1.039 | 1.181 | 1.083 | 1.004 | -0.001 | 0.751 |
| 481 | 1.102 | 1.227 | 1.129 | 1.064 | 0.01 | 0.563 |
| 482 | 0.984 | 1.015 | 0.979 | 1.003 | -0.007 | 0.43 |
| 483 | 0.996 | 1.015 | 0.986 | 0.981 | -0.004 | 0.902 |
| 484 | 0.981 | 0.993 | 1 | 1.016 | -0.001 | 0.721 |
| 485 | 0.997 | 1.035 | 1.014 | 1.011 | -0.006 | 0.455 |
| 486 | 1.233 | 1.11 | 1.108 | 1.406 | -0.039 | 0.204 |
| 487 | 1.017 | 1.226 | 0.965 | 1.041 | -0.013 | 0.307 |
| 488 | 0.926 | 0.882 | 0.972 | 0.887 | 0.005 | 0.448 |
| 489 | 1.019 | 1.016 | 1.033 | 1.021 | 0 | 0.957 |
| 490 | 0.997 | 1.159 | 1.002 | 1.023 | 0.009 | 0.466 |
| 491 | 0.991 | 1.019 | 0.983 | 0.987 | -0.003 | 0.737 |
| 492 | 1.005 | 1.044 | 0.984 | 0.991 | 0.004 | 0.672 |
| 493 | 0.985 | 1.013 | 0.987 | 0.972 | -0.014 | 0.354 |
| 494 | 1.003 | 0.986 | 0.985 | 1.011 | -0.001 | 0.991 |
| 495 | 1.015 | 1.014 | 1.015 | 1.026 | 0.017 | 0.391 |
| 496 | 1.006 | 0.996 | 1.012 | 1.014 | 0.006 | 0.509 |
| 497 | 1.107 | 1.287 | 1.371 | 1.007 | -0.067 | 0.022 |
| 498 | 1.04 | 1.156 | 1.099 | 1.038 | 0.005 | 0.559 |
| 499 | 1.073 | 1.207 | 1.104 | 1.032 | -0.017 | 0.307 |
| 500 | 0.979 | 1.045 | 1.007 | 1.014 | 0.009 | 0.477 |
| 501 | 1.001 | 0.984 | 0.992 | 0.987 | -0.008 | 0.582 |
| 502 | 0.992 | 0.996 | 1.003 | 0.988 | -0.004 | 0.616 |
| 503 | 1.03 | 1.007 | 1.042 | 1.027 | 0.006 | 0.529 |
| 504 | 1.208 | 1.094 | 1.127 | 1.32 | -0.067 | 0.042 |
|     | pm19-pm29 | pm19-pm30 | pm19-pm31 | pm19-pm32 | pm19-pm33 | pm19-pm34 | pm19-pm35 | pm19-pm36 | pm19-pm37 | pm19-pm38 | pm19-pm39 | pm19-pm40 | pm19-pm41 |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 505 | 1.039     | 1.24      | 1.026     | 1.063     | 0.016     | 0.3       |
| 506 | 0.917     | 0.88      | 0.969     | 0.895     | 0.003     | 0.688     |
| 507 | 1.021     | 1.028     | 1.032     | 0.995     | -0.003    | 0.794     |
| 508 | 0.978     | 1.137     | 0.988     | 1.038     | -0.001    | 0.996     |
| 509 | 1.006     | 1.017     | 0.99      | 1.014     | 0.008     | 0.451     |
| 510 | 0.974     | 1.03      | 1.025     | 0.986     | 0.001     | 0.886     |
| 511 | 1.036     | 1.014     | 0.981     | 1.009     | 0.006     | 0.583     |
| 512 | 1.003     | 0.996     | 1.016     | 1.017     | 0.01      | 0.313     |
| 513 | 1.014     | 0.979     | 1.008     | 1.03      | 0.007     | 0.404     |
| 514 | 1.115     | 1.218     | 1.393     | 1.022     | -0.075    | 0.014     |
| 515 | 1.082     | 1.153     | 1.089     | 1.01      | 0.003     | 0.717     |
| 516 | 1.076     | 1.244     | 1.094     | 1.05      | -0.008    | 0.58      |
| 517 | 1.017     | 1.012     | 0.979     | 1         | -0.003    | 0.869     |
| 518 | 1.003     | 1.024     | 0.993     | 0.979     | -0.002    | 0.744     |
| 519 | 0.979     | 0.982     | 1.016     | 0.973     | -0.014    | 0.392     |
| 520 | 1.028     | 1.064     | 1.03      | 1.041     | 0.018     | 0.335     |
| 521 | 1.228     | 1.062     | 1.151     | 1.363     | -0.056    | 0.035     |
| 522 | 1.055     | 1.178     | 1.011     | 1.099     | 0.007     | 0.586     |
| 523 | 0.906     | 0.889     | 0.964     | 0.874     | -0.007    | 0.547     |
| 524 | 1.025     | 1.019     | 1.032     | 1.028     | 0.001     | 0.983     |
| 525 | 1.007     | 1.133     | 0.983     | 1.032     | -0.001    | 0.827     |
| 526 | 0.984     | 1.028     | 1.003     | 0.987     | -0.001    | 0.737     |
| 527 | 0.989     | 1.006     | 1.005     | 1.005     | 0.009     | 0.529     |
| 528 | 1.005     | 1.018     | 0.977     | 0.987     | -0.01     | 0.342     |
| 529 | 1.013     | 1.019     | 0.981     | 0.984     | -0.002    | 0.822     |
| 530 | 1.019     | 1         | 0.993     | 1.01      | 0.002     | 0.843     |
| 531 | 1.192     | 1.397     | 1.468     | 1.043     | -0.064    | 0.044     |
| 532 | 1.182     | 1.537     | 1.539     | 1.076     | -0.049    | 0.201     |
| 533 | 1.131     | 1.305     | 1.392     | 1.021     | -0.051    | 0.037     |
| 534 | 1.133     | 1.306     | 1.382     | 1.012     | -0.052    | 0.039     |
|   | pm21-pm26     | pm21-pm27     | pm21-pm28     | pm21-pm29     | pm21-pm30     | pm21-pm31     |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| 535| 1.083        | 1.267        | 1.383        | 1.023        | -0.071       | 0.015        |
| 536| 1.081        | 1.26          | 1.388        | 1.037        | -0.09        | 0.015        |
| 537| 1.382        | 1.337        | 1.517        | 1.38         | -0.112       | 0.007        |
| 538| 1.119        | 1.495        | 1.409        | 1.103        | -0.056       | 0.022        |
| 539| 1.036        | 1.169        | 1.344        | 0.91         | -0.059       | 0.043        |
| 540| 1.154        | 1.346        | 1.367        | 1.045        | -0.056       | 0.039        |
| 541| 1.104        | 1.437        | 1.361        | 1.051        | -0.059       | 0.025        |
| 542| 1.149        | 1.266        | 1.392        | 1.03         | -0.051       | 0.033        |
| 543| 1.112        | 1.295        | 1.348        | 0.996        | -0.076       | 0.012        |
| 544| 1.136        | 1.29          | 1.395        | 1.062        | -0.044       | 0.163        |
| 545| 1.1          | 1.28          | 1.378        | 1.019        | -0.065       | 0.025        |
| 546| 1.133        | 1.316        | 1.339        | 1.008        | -0.063       | 0.035        |
| 547| 1.384        | 1.546        | 1.414        | 1.037        | 0.145        | 0.009        |
| 548| 1.051        | 1.229        | 1.102        | 1.019        | 0.018        | 0.373        |
| 549| 1.045        | 1.103        | 1.133        | 1.011        | -0.005       | 0.511        |
| 550| 1.038        | 1.17          | 1.114        | 1.014        | 0.006        | 0.464        |
| 551| 1.034        | 1.195        | 1.112        | 1.027        | -0.008       | 0.474        |
| 552| 1.304        | 1.246        | 1.287        | 1.42         | -0.02        | 0.375        |
| 553| 1.107        | 1.277        | 1.053        | 1.059        | -0.031       | 0.233        |
| 554| 0.939        | 1.012        | 1.042        | 0.934        | -0.01        | 0.485        |
| 555| 1.048        | 1.21          | 1.104        | 1.028        | -0.004       | 0.689        |
| 556| 1.054        | 1.271        | 1.068        | 1.066        | -0.002       | 0.86         |
| 557| 1.058        | 1.149        | 1.065        | 1.006        | -0.009       | 0.486        |
| 558| 1.061        | 1.168        | 1.074        | 1.03         | 0.001        | 0.654        |
| 559| 1.039        | 1.097        | 1.083        | 1.027        | -0.022       | 0.247        |
| 560| 1.037        | 1.15          | 1.112        | 1.006        | -0.001       | 0.624        |
| 561| 1.052        | 1.126        | 1.129        | 1.017        | 0.001        | 0.997        |
| 562| 1.125        | 1.271        | 1.092        | 1.036        | 0.006        | 0.481        |
| 563| 1.066        | 1.272        | 1.089        | 1.009        | -0.012       | 0.393        |
| 564| 1.121        | 1.279        | 1.1          | 1.035        | 0.012        | 0.323        |
| pm23-pm27 | 1.112 | 1.263 | 1.137 | 1.036 | -0.006 | 0.495 |
| pm23-pm28 | 1.349 | 1.398 | 1.244 | 1.39  | -0.032 | 0.243 |
| pm23-pm29 | 1.073 | 1.417 | 1.054 | 1.085 | -0.041 | 0.157 |
| pm23-pm30 | 0.961 | 1.114 | 1.051 | 0.917 | -0.024 | 0.237 |
| pm23-pm31 | 1.083 | 1.292 | 1.106 | 1.055 | -0.011 | 0.39  |
| pm23-pm32 | 1.09  | 1.382 | 1.106 | 1.09  | 0.008  | 0.485 |
| pm23-pm33 | 1.06  | 1.257 | 1.117 | 1.009 | -0.011 | 0.32  |
| pm23-pm34 | 1.045 | 1.279 | 1.091 | 1.028 | -0.015 | 0.362 |
| pm23-pm35 | 1.061 | 1.231 | 1.098 | 1.017 | -0.025 | 0.3   |
| pm23-pm36 | 1.11  | 1.214 | 1.124 | 1.053 | 0.005  | 0.943 |
| pm23-pm37 | 1.053 | 1.297 | 1.131 | 1.05  | 0.009  | 0.42  |
| pm24-pm25 | 1.017 | 0.976 | 1.011 | 1.002 | -0.001 | 0.753 |
| pm24-pm26 | 0.997 | 1.062 | 0.987 | 1.011 | 0.011  | 0.349 |
| pm24-pm27 | 0.988 | 1.078 | 1.037 | 0.981 | -0.004 | 0.713 |
| pm24-pm28 | 1.24  | 1.125 | 1.176 | 1.327 | -0.042 | 0.181 |
| pm24-pm29 | 1.01  | 1.158 | 1.031 | 1.035 | -0.022 | 0.294 |
| pm24-pm30 | 0.919 | 0.913 | 0.96  | 0.88  | 0.002  | 0.952 |
| pm24-pm31 | 1.017 | 1.057 | 1.044 | 0.996 | 0.002  | 0.684 |
| pm24-pm32 | 0.983 | 1.145 | 1.014 | 1.031 | 0.002  | 0.707 |
| pm24-pm33 | 0.968 | 0.993 | 0.995 | 0.995 | -0.016 | 0.389 |
| pm24-pm34 | 1.01  | 1.048 | 0.989 | 1.009 | 0.007  | 0.555 |
| pm24-pm35 | 1.021 | 1    | 1.015 | 0.972 | -0.006 | 0.518 |
| pm24-pm36 | 0.974 | 1    | 0.992 | 0.994 | -0.012 | 0.36  |
| pm24-pm37 | 1.005 | 1.009 | 1.021 | 1.003 | 0.004  | 0.841 |
| pm25-pm26 | 1.001 | 0.98  | 1.016 | 1.015 | 0.004  | 0.653 |
| pm25-pm27 | 1.011 | 1.007 | 1.04  | 0.998 | -0.007 | 0.498 |
| pm25-pm28 | 1.233 | 1.044 | 1.119 | 1.339 | -0.071 | 0.013 |
| pm25-pm29 | 0.996 | 1.179 | 1.026 | 1.032 | -0.018 | 0.329 |
| pm25-pm30 | 0.95  | 0.862 | 0.936 | 0.924 | 0.006  | 0.555 |
| pm25-pm31 | 1.012 | 1.051 | 1.043 | 1.012 | 0.007  | 0.551 |
|      |         |         |         |         |         |         |
|------|---------|---------|---------|---------|---------|---------|
| 595  | pm25-pm32 | 0.992   | 1.127   | 1.022   | 1.051   | 0.011   | 0.333   |
| 596  | pm25-pm33 | 0.989   | 0.995   | 1.012   | 1.002   | 0       | 0.975   |
| 597  | pm25-pm34 | 1.02    | 1.017   | 1.021   | 1.005   | 0.013   | 0.324   |
| 598  | pm25-pm35 | 1.011   | 0.994   | 1.015   | 0.97    | -0.007  | 0.448   |
| 599  | pm25-pm36 | 0.982   | 0.98    | 0.98    | 1.011   | -0.01   | 0.317   |
| 600  | pm25-pm37 | 0.998   | 1       | 0.983   | 0.998   | -0.006  | 0.584   |
| 601  | pm26-pm27 | 1.014   | 1.035   | 1.045   | 1.004   | 0.004   | 0.783   |
| 602  | pm26-pm28 | 1.242   | 1.071   | 1.11    | 1.383   | -0.054  | 0.029   |
| 603  | pm26-pm29 | 1.006   | 1.179   | 0.979   | 1.067   | -0.018  | 0.361   |
| 604  | pm26-pm30 | 0.928   | 0.914   | 0.945   | 0.9     | 0.009   | 0.567   |
| 605  | pm26-pm31 | 1.029   | 1.029   | 1.046   | 1.024   | 0.009   | 0.514   |
| 606  | pm26-pm32 | 0.989   | 1.094   | 1.024   | 1.054   | 0.003   | 0.952   |
| 607  | pm26-pm33 | 0.992   | 1.004   | 1.003   | 1.02    | 0.005   | 0.528   |
| 608  | pm26-pm34 | 1.006   | 1.028   | 0.996   | 1.02    | 0.009   | 0.415   |
| 609  | pm26-pm35 | 0.997   | 1.04    | 1.002   | 0.995   | 0.004   | 0.9     |
| 610  | pm26-pm36 | 1.002   | 1.013   | 1.007   | 1.006   | 0.009   | 0.556   |
| 611  | pm26-pm37 | 0.98    | 1.016   | 0.992   | 1.016   | 0       | 0.817   |
| 612  | pm27-pm28 | 1.231   | 1.151   | 1.148   | 1.377   | -0.05   | 0.178   |
| 613  | pm27-pm29 | 1.026   | 1.23    | 1.029   | 1.054   | -0.013  | 0.335   |
| 614  | pm27-pm30 | 0.956   | 0.928   | 0.984   | 0.907   | 0.01    | 0.595   |
| 615  | pm27-pm31 | 1.022   | 1.119   | 1.057   | 1.028   | 0.012   | 0.305   |
| 616  | pm27-pm32 | 0.994   | 1.166   | 1.019   | 1.036   | -0.005  | 0.555   |
| 617  | pm27-pm33 | 1.016   | 1.033   | 0.995   | 1.022   | -0.005  | 0.821   |
| 618  | pm27-pm34 | 1.036   | 1.052   | 1.052   | 1.004   | 0.011   | 0.375   |
| 619  | pm27-pm35 | 1.011   | 1.085   | 1.043   | 0.998   | 0.008   | 0.444   |
| 620  | pm27-pm36 | 1.003   | 1.069   | 1.014   | 0.998   | 0.001   | 0.944   |
| 621  | pm27-pm37 | 1.001   | 1.066   | 1.026   | 1.036   | 0.009   | 0.467   |
| 622  | pm28-pm29 | 1.332   | 1.228   | 1.122   | 1.4     | -0.041  | 0.161   |
| 623  | pm28-pm30 | 1.156   | 0.989   | 1.082   | 1.238   | -0.052  | 0.032   |
| 624  | pm28-pm31 | 1.264   | 1.086   | 1.162   | 1.39    | -0.053  | 0.043   |
|       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|
| 625   | pm28-pm32 | 1.227 | 1.173 | 1.13  | 1.396 | -0.061 | 0.039 |
| 626   | pm28-pm33 | 1.204 | 1.016 | 1.136 | 1.347 | -0.079 | 0.014 |
| 627   | pm28-pm34 | 1.245 | 1.1   | 1.121 | 1.361 | -0.052 | 0.038 |
| 628   | pm28-pm35 | 1.263 | 1.107 | 1.153 | 1.328 | -0.047 | 0.19  |
| 629   | pm28-pm36 | 1.224 | 1.068 | 1.155 | 1.309 | -0.065 | 0.035 |
| 630   | pm28-pm37 | 1.209 | 1.061 | 1.14  | 1.343 | -0.069 | 0.037 |
| 631   | pm29-pm30 | 1.001 | 1.296 | 0.781 | 0.927 | 0.012  | 0.375 |
| 632   | pm29-pm31 | 1.04  | 1.257 | 1.003 | 1.072 | -0.007 | 0.405 |
| 633   | pm29-pm32 | 1.054 | 1.343 | 0.983 | 1.08  | 0.001  | 0.671 |
| 634   | pm29-pm33 | 0.967 | 1.15  | 0.99  | 1.027 | -0.043 | 0.193 |
| 635   | pm29-pm34 | 1.022 | 1.123 | 0.985 | 1.047 | -0.036 | 0.26  |
| 636   | pm29-pm35 | 1.012 | 1.093 | 0.971 | 1.079 | -0.043 | 0.189 |
| 637   | pm29-pm36 | 1.017 | 1.181 | 1     | 1.07  | -0.008 | 0.591 |
| 638   | pm29-pm37 | 1.011 | 1.193 | 1.008 | 1.039 | -0.016 | 0.309 |
| 639   | pm30-pm31 | 0.925 | 0.974 | 0.984 | 0.901 | 0.01   | 0.343 |
| 640   | pm30-pm32 | 0.92  | 0.992 | 0.99  | 0.929 | 0.008  | 0.432 |
| 641   | pm30-pm33 | 0.954 | 0.913 | 0.969 | 0.909 | 0.023  | 0.258 |
| 642   | pm30-pm34 | 0.887 | 0.924 | 0.971 | 0.892 | 0.002  | 0.786 |
| 643   | pm30-pm35 | 0.946 | 0.905 | 0.961 | 0.909 | 0.012  | 0.36  |
| 644   | pm30-pm36 | 0.956 | 0.875 | 0.95  | 0.935 | 0.017  | 0.392 |
| 645   | pm30-pm37 | 0.967 | 0.876 | 0.951 | 0.921 | 0.014  | 0.379 |
| 646   | pm31-pm32 | 1.01  | 1.143 | 1.034 | 1.046 | -0.002 | 0.816 |
| 647   | pm31-pm33 | 1.01  | 0.999 | 1.04  | 1.018 | -0.006 | 0.471 |
| 648   | pm31-pm34 | 1.032 | 1.069 | 1.026 | 1.007 | 0.006  | 0.592 |
| 649   | pm31-pm35 | 1.007 | 1.07  | 1.026 | 1.012 | 0     | 0.796 |
| 650   | pm31-pm36 | 0.996 | 1.036 | 1.028 | 1.029 | 0     | 0.657 |
| 651   | pm31-pm37 | 1.006 | 1.062 | 1.046 | 0.992 | 0.002  | 0.832 |
| 652   | pm32-pm33 | 0.992 | 1.155 | 1.006 | 1.025 | 0.007  | 0.413 |
| 653   | pm32-pm34 | 1.028 | 1.188 | 1.021 | 1.03  | 0.025  | 0.237 |
| 654   | pm32-pm35 | 1.026 | 1.113 | 0.992 | 1.04  | 0     | 0.666 |
3b) Result of two-distribution perturbation analysis for apoptosis when each response function was separately applied (10 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin   | Hill   | Sat   | Acc   | Synergistic effect | p-value |
|-----|------------------------------------------|-------|--------|-------|-------|-------------------|---------|
| 1   | pm1-pm2                                  | 1.048 | 1.052  | 1.026 | 1.047 | 0.03              | 0.272   |
| 2   | pm1-pm3                                  | 1.034 | 1.082  | 1.05  | 1.04  | 0.03              | 0.294   |
| 3   | pm1-pm4                                  | 1.034 | 1.062  | 1.008 | 1.023 | -0.01             | 0.356   |
| 4   | pm1-pm5                                  | 1.011 | 0.992  | 1.013 | 0.997 | -0.01             | 0.362   |
| 5   | pm1-pm6                                  | 1.062 | 1.043  | 1.14  | 1.057 | 0.023             | 0.248   |
| 6   | pm1-pm7                                  | 1.949 | 1.617  | 2.101 | 1.595 | -0.104            | 0.008   |
| 7   | pm1-pm8                                  | 1.033 | 1.045  | 1.024 | 1.019 | 0.017             | 0.369   |
| 8   | pm1-pm9                                  | 1.073 | 1.108  | 1.057 | 1.059 | 0.024             | 0.287   |
| 9   | pm1-pm10                                 | 2.249 | 1.902  | 2.079 | 2.235 | 0.082             | 0.012   |
| 10  | pm1-pm11                                 | 1.022 | 1.053  | 0.993 | 1.039 | 0.006             | 0.596   |
| pm1-pm12 | 1.125 | 1.235 | 1.063 | 1.244 | -0.032 | 0.247 |
|----------|-------|-------|-------|-------|--------|-------|
| pm1-pm13 | 0.982 | 1.051 | 0.996 | 0.983 | -0.021 | 0.21  |
| pm1-pm14 | 1.008 | 1.085 | 0.994 | 1.022 | 0.009  | 0.493 |
| pm1-pm15 | 1.033 | 1.066 | 1.044 | 1.015 | 0.018  | 0.314 |
| pm1-pm16 | 0.994 | 1.08  | 1.028 | 1.033 | 0.018  | 0.354 |
| pm1-pm17 | 0.988 | 1.025 | 1.013 | 0.995 | -0.011 | 0.31  |
| pm1-pm18 | 1.031 | 1   | 1.028 | 1.023 | 0.006  | 0.49  |
| pm1-pm19 | 1.012 | 1.004 | 1.032 | 1.02  | 0.002  | 0.972 |
| pm1-pm20 | 1.027 | 1.027 | 1.016 | 1.029 | 0.007  | 0.59  |
| pm1-pm21 | 1.172 | 1.305 | 1.4   | 1.037 | -0.048 | 0.161 |
| pm1-pm22 | 1.089 | 1.201 | 1.109 | 1.064 | 0.021  | 0.212 |
| pm1-pm23 | 1.135 | 1.241 | 1.145 | 1.067 | 0.009  | 0.58  |
| pm1-pm24 | 1.019 | 1.082 | 1.001 | 1.018 | 0.011  | 0.373 |
| pm1-pm25 | 1.028 | 1.036 | 1.02  | 1.019 | 0.011  | 0.353 |
| pm1-pm26 | 0.999 | 1.045 | 0.981 | 1.002 | -0.009 | 0.576 |
| pm1-pm27 | 1.01  | 1.077 | 1.018 | 1.013 | -0.007 | 0.527 |
| pm1-pm28 | 1.248 | 1.1   | 1.132 | 1.372 | -0.056 | 0.035 |
| pm1-pm29 | 1.026 | 1.209 | 1.007 | 1.092 | -0.009 | 0.447 |
| pm1-pm30 | 0.946 | 0.954 | 0.974 | 0.912 | 0.018  | 0.391 |
| pm1-pm31 | 1.035 | 1.064 | 1.034 | 1.033 | 0.003  | 0.799 |
| pm1-pm32 | 1.021 | 1.186 | 1.051 | 1.04  | 0.022  | 0.287 |
| pm1-pm33 | 1.002 | 1.065 | 1.019 | 1.009 | 0.008  | 0.505 |
| pm1-pm34 | 1.039 | 1.102 | 1.009 | 0.995 | 0.017  | 0.309 |
| pm1-pm35 | 1.024 | 1.097 | 1.002 | 1.035 | 0.019  | 0.361 |
| pm1-pm36 | 1.003 | 1.055 | 1.029 | 1.053 | 0.02   | 0.23  |
| pm1-pm37 | 1.006 | 1.049 | 0.994 | 1.02  | 0      | 0.817 |
| pm2-pm3  | 1.015 | 1.022 | 1.02  | 0.999 | 0.01   | 0.318 |
| pm2-pm4  | 1.007 | 1.054 | 1.04  | 0.984 | -0.003 | 0.998 |
| pm2-pm5  | 0.98 | 0.989 | 0.959 | 1.028 | -0.007 | 0.401 |
| pm2-pm6  | 1.013 | 0.982 | 1.093 | 1.015 | -0.009 | 0.463 |
|   | pm2-pm7 | 1.973 | 1.555 | 2.079 | 1.615 | -0.096 | 0.012 |
|---|---------|-------|-------|-------|-------|--------|-------|
| 42| pm2-pm8 | 0.996 | 1.022 | 0.987 | 0.985 | 0.002  | 0.941 |
| 43| pm2-pm9 | 1.015 | 1.044 | 1.024 | 1.001 | -0.011 | 0.374 |
| 44| pm2-pm10| 2.259 | 1.895 | 2.144 | 2.299 | 0.132  | 0.009 |
| 45| pm2-pm11| 0.982 | 0.991 | 0.992 | 0.998 | -0.012 | 0.31  |
| 46| pm2-pm12| 1.109 | 1.154 | 1.027 | 1.172 | -0.066 | 0.024 |
| 47| pm2-pm13| 0.974 | 1.054 | 1.011 | 1.004 | 0.005  | 0.732 |
| 48| pm2-pm14| 0.968 | 1.031 | 1.004 | 0.989 | -0.003 | 0.979 |
| 49| pm2-pm15| 1.004 | 1.042 | 0.991 | 1.002 | 0.006  | 0.44  |
| 50| pm2-pm16| 1.029 | 1.025 | 0.993 | 1.027 | 0.021  | 0.252 |
| 51| pm2-pm17| 0.988 | 1.03  | 1.018 | 0.98  | 0.005  | 0.582 |
| 52| pm2-pm18| 0.998 | 1.017 | 0.979 | 0.998 | 0.001  | 0.908 |
| 53| pm2-pm19| 0.994 | 1.004 | 1.016 | 0.988 | 0.004  | 0.908 |
| 54| pm2-pm20| 1.011 | 1.043 | 1.01  | 0.98  | 0.011  | 0.33  |
| 55| pm2-pm21| 1.123 | 1.275 | 1.383 | 1.015 | -0.059 | 0.022 |
| 56| pm2-pm22| 1.055 | 1.134 | 1.076 | 1.009 | -0.008 | 0.449 |
| 57| pm2-pm23| 1.064 | 1.231 | 1.119 | 1.068 | 0.001  | 0.909 |
| 58| pm2-pm24| 1.011 | 1.043 | 1.01  | 0.98  | 0.011  | 0.33  |
| 59| pm2-pm25| 0.973 | 0.964 | 0.996 | 1.003 | -0.013 | 0.327 |
| 60| pm2-pm26| 1.009 | 0.999 | 1.004 | 0.984 | 0.001  | 0.656 |
| 61| pm2-pm27| 1.018 | 1.036 | 1.044 | 1.027 | 0.012  | 0.372 |
| 62| pm2-pm28| 1.224 | 1.061 | 1.121 | 1.329 | -0.069 | 0.024 |
| 63| pm2-pm29| 1.016 | 1.215 | 1.002 | 1.072 | 0.002  | 0.811 |
| 64| pm2-pm30| 0.937 | 0.921 | 0.973 | 0.876 | 0.016  | 0.352 |
| 65| pm2-pm31| 0.978 | 1.018 | 1.018 | 0.992 | -0.02  | 0.321 |
| 66| pm2-pm32| 1.003 | 1.133 | 1.014 | 1.011 | 0.005  | 0.867 |
| 67| pm2-pm33| 0.983 | 1.015 | 1.009 | 1.015 | 0.008  | 0.479 |
| 68| pm2-pm34| 0.961 | 1.034 | 1.013 | 1.016 | 0.004  | 0.882 |
| 69| pm2-pm35| 1.029 | 1.027 | 1.003 | 1.016 | 0.016  | 0.398 |
| 70| pm2-pm36| 1.009 | 0.992 | 1.013 | 1.001 | 0.007  | 0.581 |
|   |   | pm2-pm37 | pm3-pm4 | pm3-pm5 | pm3-pm6 | pm3-pm7 | pm3-pm8 | pm3-pm9 | pm3-pm10 | pm3-pm11 | pm3-pm12 | pm3-pm13 | pm3-pm14 | pm3-pm15 | pm3-pm16 | pm3-pm17 | pm3-pm18 | pm3-pm19 | pm3-pm20 | pm3-pm21 | pm3-pm22 | pm3-pm23 | pm3-pm24 | pm3-pm25 | pm3-pm26 | pm3-pm27 | pm3-pm28 | pm3-pm29 | pm3-pm30 | pm3-pm31 | pm3-pm32 | pm3-pm33 | pm3-pm34 | pm3-pm35 | pm3-pm36 | pm3-pm37 | pm3-pm38 | pm3-pm39 | pm3-pm40 | pm3-pm41 | pm3-pm42 | pm3-pm43 | pm3-pm44 | pm3-pm45 | pm3-pm46 | pm3-pm47 | pm3-pm48 | pm3-pm49 | pm3-pm50 | pm3-pm51 | pm3-pm52 | pm3-pm53 | pm3-pm54 | pm3-pm55 | pm3-pm56 | pm3-pm57 | pm3-pm58 | pm3-pm59 | pm3-pm60 | pm3-pm61 | pm3-pm62 | pm3-pm63 | pm3-pm64 | pm3-pm65 | pm3-pm66 | pm3-pm67 | pm3-pm68 | pm3-pm69 | pm3-pm70 | pm3-pm71 | pm3-pm72 | pm3-pm73 | pm3-pm74 | pm3-pm75 | pm3-pm76 | pm3-pm77 | pm3-pm78 | pm3-pm79 | pm3-pm80 | pm3-pm81 | pm3-pm82 | pm3-pm83 | pm3-pm84 | pm3-pm85 | pm3-pm86 | pm3-pm87 | pm3-pm88 | pm3-pm89 | pm3-pm90 | pm3-pm91 | pm3-pm92 | pm3-pm93 | pm3-pm94 | pm3-pm95 | pm3-pm96 | pm3-pm97 | pm3-pm98 | pm3-pm99 | pm3-pm100 |
|---|---|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|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|
|   | pm3-pm33 |     |     |     |     |     |
|---|----------|-----|-----|-----|-----|-----|
| 101| 0.984    | 1.001| 0.995| 0.995| -0.011| 0.355|
| 102| 1.02     | 1.074| 0.995| 0.976| 0.007 | 0.421|
| 103| 0.998    | 1.005| 1.012| 0.966| -0.015| 0.355|
| 104| 0.989    | 0.965| 1.006| 0.997| -0.015| 0.36 |
| 105| 0.999    | 0.993| 1.011| 1.004| -0.006| 0.548|
| 106| 1.002    | 1.045| 0.977| 1.024| -0.012| 0.374|
| 107| 1.018    | 1.006| 1.073| 1.001| -0.038| 0.294|
| 108| 1.915    | 1.605| 2.076| 1.619| -0.126| 0.007|
| 109| 0.996    | 1.069| 1.017| 1.015| 0.001 | 0.891|
| 110| 1.017    | 1.087| 1.03 | 1.045| -0.015| 0.319|
| 111| 2.1      | 1.875| 1.999| 2.151| -0.014| 0.322|
| 112| 0.99     | 1.052| 1.035| 1.001| -0.012| 0.357|
| 113| 1.095    | 1.23 | 1.066| 1.219| -0.057| 0.039|
| 114| 0.974    | 1.039| 1.029| 0.992| -0.025| 0.217|
| 115| 1.032    | 1.079| 1.043| 0.991| 0.008 | 0.514|
| 116| 1.002    | 1.081| 1.06 | 1.013| 0.008 | 0.505|
| 117| 1.037    | 1.084| 1.033| 0.999| 0.012 | 0.319|
| 118| 0.99     | 1.079| 1.009| 0.971| -0.015| 0.321|
| 119| 1.018    | 1.015| 0.988| 0.981| -0.024| 0.265|
| 120| 1.02     | 1.002| 1.016| 0.987| -0.019| 0.338|
| 121| 1.009    | 1.086| 1.028| 0.992| 0.001 | 0.62 |
| 122| 1.139    | 1.312| 1.419| 1.012| -0.066| 0.025|
| 123| 1.057    | 1.237| 1.13 | 1.034| 0.01  | 0.304|
| 124| 1.141    | 1.41 | 1.141| 1.032| 0.033 | 0.294|
| 125| 0.986    | 1.051| 1.03 | 0.973| -0.019| 0.379|
| 126| 1.01     | 1.048| 0.992| 0.999| -0.013| 0.348|
| 127| 1.022    | 1.075| 1.006| 0.969| -0.007| 0.568|
| 128| 1.05     | 1.04 | 1.041| 1.014| -0.011| 0.331|
| 129| 1.252    | 1.167| 1.14 | 1.313| -0.063| 0.04 |
| 130| 1.017    | 1.33 | 1    | 1.116| 0.013 | 0.33 |
|   | pm4-pm30 | 0.953 | 0.962 | 0.978 | 0.893 | 0.008 | 0.471 |
|---|----------|--------|--------|--------|--------|--------|------|
| 132 | pm4-pm31 | 0.987 | 1.064 | 1.054 | 1.026 | -0.017 | 0.351 |
| 133 | pm4-pm32 | 1.006 | 1.131 | 1.013 | 1.036 | -0.017 | 0.324 |
| 134 | pm4-pm33 | 1.006 | 1.053 | 1.03  | 1.006 | -0.002 | 0.716 |
| 135 | pm4-pm34 | 1.006 | 1.106 | 1.04  | 0.977 | 0.002  | 0.872 |
| 136 | pm4-pm35 | 0.996 | 1.044 | 0.973 | 0.97  | -0.035 | 0.294 |
| 137 | pm4-pm36 | 1.008 | 1.051 | 1.029 | 1.021 | 0.003  | 0.959 |
| 138 | pm4-pm37 | 0.998 | 1.04  | 1.01  | 0.986 | -0.019 | 0.36  |
| 139 | pm5-pm6  | 1.059 | 1.001 | 1.098 | 1.007 | 0.007  | 0.459 |
| 140 | pm5-pm7  | 1.946 | 1.573 | 2.09  | 1.57  | -0.107 | 0.008 |
| 141 | pm5-pm8  | 1.003 | 0.976 | 0.978 | 1     | -0.006 | 0.42  |
| 142 | pm5-pm9  | 0.991 | 1.032 | 1.014 | 1.046 | -0.012 | 0.389 |
| 143 | pm5-pm10 | 2.147 | 1.704 | 1.967 | 2.185 | -0.016 | 0.359 |
| 144 | pm5-pm11 | 1.013 | 0.99  | 0.975 | 1.017 | -0.004 | 0.964 |
| 145 | pm5-pm12 | 1.125 | 1.188 | 1.018 | 1.245 | -0.038 | 0.277 |
| 146 | pm5-pm13 | 0.976 | 1.008 | 0.996 | 0.965 | -0.02  | 0.333 |
| 147 | pm5-pm14 | 1.014 | 1.039 | 1.043 | 0.987 | 0.02   | 0.215 |
| 148 | pm5-pm15 | 1.007 | 1.015 | 1.001 | 1     | 0.002  | 0.678 |
| 149 | pm5-pm16 | 0.997 | 0.978 | 1.002 | 0.987 | -0.007 | 0.455 |
| 150 | pm5-pm17 | 1.039 | 0.993 | 0.977 | 0.989 | 0      | 0.677 |
| 151 | pm5-pm18 | 1.005 | 0.974 | 0.977 | 0.981 | -0.013 | 0.358 |
| 152 | pm5-pm19 | 0.998 | 0.983 | 0.991 | 1.015 | -0.001 | 0.847 |
| 153 | pm5-pm20 | 1.002 | 0.987 | 0.986 | 1.007 | -0.005 | 0.779 |
| 154 | pm5-pm21 | 1.122 | 1.291 | 1.366 | 1.015 | -0.06  | 0.022 |
| 155 | pm5-pm22 | 1.07  | 1.103 | 1.095 | 1.017 | -0.006 | 0.515 |
| 156 | pm5-pm23 | 1.087 | 1.207 | 1.121 | 1.072 | 0.002  | 0.717 |
| 157 | pm5-pm24 | 0.997 | 0.993 | 0.976 | 1.023 | -0.004 | 0.844 |
| 158 | pm5-pm25 | 0.983 | 0.979 | 0.975 | 0.991 | -0.016 | 0.349 |
| 159 | pm5-pm26 | 0.998 | 0.972 | 0.989 | 0.981 | -0.013 | 0.314 |
| 160 | pm5-pm27 | 1.001 | 0.988 | 1.042 | 0.998 | -0.012 | 0.331 |
|   | pm5-pm28  | 1.204 | 1.025 | 1.12 | 1.373 | -0.073 | 0.015 |
|---|-----------|-------|-------|------|-------|--------|-------|
| 162| pm5-pm29  | 0.982 | 1.174 | 0.958| 1.098 | -0.022 | 0.222 |
| 163| pm5-pm30  | 0.916 | 0.864 | 0.998| 0.899 | 0.008  | 0.496 |
| 164| pm5-pm31  | 1.008 | 1.033 | 1.024| 1.019 | 0      | 0.733 |
| 165| pm5-pm32  | 1.008 | 1.143 | 0.987| 1.03  | 0.007  | 0.491 |
| 166| pm5-pm33  | 0.991 | 0.978 | 0.988| 0.995 | -0.01  | 0.439 |
| 167| pm5-pm34  | 1.013 | 1.03  | 1.007| 0.968 | 0.003  | 0.78  |
| 168| pm5-pm35  | 0.986 | 1.027 | 0.98 | 1.009 | -0.002 | 0.898 |
| 169| pm5-pm36  | 1.002 | 0.997 | 0.989| 0.996 | -0.001 | 0.913 |
| 170| pm5-pm37  | 0.984 | 0.996 | 1.012| 1.03  | 0.006  | 0.476 |
| 171| pm6-pm7   | 1.985 | 1.567 | 2.266| 1.627 | -0.079 | 0.011 |
| 172| pm6-pm8   | 1.018 | 1.038 | 1.107| 1.004 | 0.008  | 0.54  |
| 173| pm6-pm9   | 1.058 | 1.028 | 1.143| 1.044 | -0.002 | 0.836 |
| 174| pm6-pm10  | 2.281 | 1.967 | 2.291| 2.352 | 0.167  | 0.002 |
| 175| pm6-pm11  | 1.036 | 1     | 1.095| 1.012 | -0.006 | 0.589 |
| 176| pm6-pm12  | 1.137 | 1.203 | 1.145| 1.243 | -0.038 | 0.217 |
| 177| pm6-pm13  | 1.017 | 1.026 | 1.076| 1.021 | -0.009 | 0.513 |
| 178| pm6-pm14  | 1.033 | 1.066 | 1.11 | 1.013 | 0.017  | 0.308 |
| 179| pm6-pm15  | 1.017 | 0.998 | 1.096| 1.024 | -0.008 | 0.428 |
| 180| pm6-pm16  | 1.033 | 1.011 | 1.116| 1.009 | 0.006  | 0.521 |
| 181| pm6-pm17  | 1.021 | 1.01  | 1.093| 1.006 | -0.005 | 0.604 |
| 182| pm6-pm18  | 1.05  | 0.996 | 1.105| 1.014 | 0.006  | 0.452 |
| 183| pm6-pm19  | 1.017 | 1.042 | 1.107| 1.013 | 0.009  | 0.481 |
| 184| pm6-pm20  | 1.054 | 1.012 | 1.109| 1.018 | 0.01   | 0.498 |
| 185| pm6-pm21  | 1.146 | 1.328 | 1.525| 1.054 | -0.033 | 0.298 |
| 186| pm6-pm22  | 1.092 | 1.129 | 1.169| 1.016 | -0.014 | 0.362 |
| 187| pm6-pm23  | 1.085 | 1.223 | 1.218| 1.042 | -0.016 | 0.342 |
| 188| pm6-pm24  | 1.032 | 1.025 | 1.075| 1.014 | -0.003 | 0.85  |
| 189| pm6-pm25  | 1.03  | 1.013 | 1.106| 1.013 | 0.005  | 0.653 |
| 190| pm6-pm26  | 1.038 | 0.997 | 1.082| 1.005 | -0.005 | 0.518 |
|    |         |    |    |    |    |    |    |
|----|---------|----|----|----|----|----|----|
| 191| pm6-pm27 | 1.061 | 1.054 | 1.142 | 1.028 | 0.014 | 0.327 |
| 192| pm6-pm28 | 1.297 | 1.117 | 1.205 | 1.304 | -0.061 | 0.026 |
| 193| pm6-pm29 | 1.023 | 1.152 | 1.111 | 1.114 | -0.013 | 0.372 |
| 194| pm6-pm30 | 0.93 | 0.931 | 1.058 | 0.895 | 0.004 | 0.737 |
| 195| pm6-pm31 | 1.056 | 1.049 | 1.106 | 1.041 | 0.003 | 0.948 |
| 196| pm6-pm32 | 1.033 | 1.148 | 1.098 | 1.078 | 0.015 | 0.316 |
| 197| pm6-pm33 | 1.022 | 1.032 | 1.128 | 1.024 | 0.015 | 0.356 |
| 198| pm6-pm34 | 1.041 | 1.044 | 1.13 | 0.996 | 0.013 | 0.38 |
| 199| pm6-pm35 | 1.03 | 1.017 | 1.08 | 1.028 | -0.003 | 0.843 |
| 200| pm6-pm36 | 1.038 | 1.015 | 1.106 | 1.03 | 0.012 | 0.362 |
| 201| pm6-pm37 | 1.033 | 1.015 | 1.127 | 1.015 | 0.009 | 0.494 |
| 202| pm6-pm38 | 1.986 | 1.642 | 2.085 | 1.613 | -0.07 | 0.016 |
| 203| pm7-pm9 | 2.015 | 1.578 | 2.133 | 1.663 | -0.091 | 0.011 |
| 204| pm7-pm10 | 3.979 | 2.552 | 3.882 | 3.334 | 0.514 | <0.001 |
| 205| pm7-pm11 | 1.941 | 1.636 | 2.086 | 1.652 | -0.08 | 0.014 |
| 206| pm7-pm12 | 2.152 | 1.786 | 2.18 | 1.949 | -0.071 | 0.018 |
| 207| pm7-pm13 | 1.953 | 1.579 | 2.079 | 1.585 | -0.113 | 0.008 |
| 208| pm7-pm14 | 2.005 | 1.552 | 2.096 | 1.585 | -0.097 | 0.018 |
| 209| pm7-pm15 | 1.968 | 1.608 | 2.049 | 1.584 | -0.107 | 0.007 |
| 210| pm7-pm16 | 1.995 | 1.583 | 2.083 | 1.615 | -0.085 | 0.01 |
| 211| pm7-pm17 | 1.986 | 1.521 | 2.114 | 1.606 | -0.098 | 0.011 |
| 212| pm7-pm18 | 1.957 | 1.518 | 2.043 | 1.552 | -0.136 | 0.008 |
| 213| pm7-pm19 | 1.945 | 1.54 | 2.13 | 1.596 | -0.101 | 0.009 |
| 214| pm7-pm20 | 1.965 | 1.588 | 2.075 | 1.609 | -0.097 | 0.01 |
| 215| pm7-pm21 | 2.177 | 1.948 | 2.795 | 1.619 | -0.03 | 0.266 |
| 216| pm7-pm22 | 2.083 | 1.731 | 2.255 | 1.661 | -0.05 | 0.041 |
| 217| pm7-pm23 | 2.049 | 1.832 | 2.231 | 1.672 | -0.08 | 0.019 |
| 218| pm7-pm24 | 1.99 | 1.591 | 2.114 | 1.583 | -0.088 | 0.016 |
| 219| pm7-pm25 | 1.954 | 1.522 | 2.102 | 1.62 | -0.104 | 0.008 |
| 220| pm7-pm26 | 1.975 | 1.617 | 2.087 | 1.575 | -0.09 | 0.016 |
|   | pm7-pm27 | 1.98 | 1.546 | 2.129 | 1.612 | -0.109 | 0.008 |
|---|----------|------|--------|--------|--------|--------|------|
| 222 | pm7-pm28 | 2.433 | 1.614 | 2.329 | 2.178 | -0.021 | 0.201 |
| 223 | pm7-pm29 | 2.08 | 1.849 | 2.054 | 1.683 | -0.065 | 0.022 |
| 224 | pm7-pm30 | 2.108 | 1.707 | 2.35 | 1.44 | 0.085 | 0.015 |
| 225 | pm7-pm31 | 2.015 | 1.677 | 2.136 | 1.605 | -0.069 | 0.041 |
| 226 | pm7-pm32 | 1.939 | 1.626 | 2.045 | 1.649 | -0.127 | 0.009 |
| 227 | pm7-pm33 | 1.964 | 1.538 | 2.065 | 1.604 | -0.111 | 0.009 |
| 228 | pm7-pm34 | 1.965 | 1.593 | 2.099 | 1.594 | -0.095 | 0.012 |
| 229 | pm7-pm35 | 1.985 | 1.519 | 2.106 | 1.575 | -0.113 | 0.007 |
| 230 | pm7-pm36 | 1.956 | 1.547 | 2.084 | 1.581 | -0.111 | 0.008 |
| 231 | pm7-pm37 | 1.983 | 1.557 | 2.073 | 1.586 | -0.106 | 0.006 |
| 232 | pm8-pm9 | 1.001 | 1.065 | 1.015 | 1.001 | -0.011 | 0.327 |
| 233 | pm8-pm10 | 2.286 | 1.979 | 2.161 | 2.033 | 0.099 | 0.01 |
| 234 | pm8-pm11 | 1.024 | 0.981 | 0.988 | 0.995 | -0.005 | 0.558 |
| 235 | pm8-pm12 | 1.104 | 1.155 | 1.05 | 1.177 | -0.059 | 0.034 |
| 236 | pm8-pm13 | 1.008 | 1.01 | 0.987 | 0.978 | -0.009 | 0.494 |
| 237 | pm8-pm14 | 0.985 | 1.055 | 1.016 | 1.015 | 0.018 | 0.319 |
| 238 | pm8-pm15 | 1.026 | 0.994 | 1.002 | 1.027 | 0.009 | 0.469 |
| 239 | pm8-pm16 | 1.002 | 1.014 | 1.024 | 0.99 | 0.01 | 0.326 |
| 240 | pm8-pm17 | 1.013 | 1.015 | 0.992 | 0.984 | 0.003 | 0.706 |
| 241 | pm8-pm18 | 0.991 | 0.991 | 0.981 | 0.983 | -0.01 | 0.514 |
| 242 | pm8-pm19 | 0.982 | 0.978 | 0.996 | 0.996 | -0.008 | 0.451 |
| 243 | pm8-pm20 | 0.991 | 1.001 | 0.988 | 0.983 | -0.009 | 0.577 |
| 244 | pm8-pm21 | 1.111 | 1.256 | 1.371 | 1.028 | -0.066 | 0.027 |
| 245 | pm8-pm22 | 1.076 | 1.14 | 1.073 | 1.024 | 0.002 | 0.688 |
| 246 | pm8-pm23 | 1.072 | 1.252 | 1.105 | 1.041 | -0.002 | 0.656 |
| 247 | pm8-pm24 | 1.004 | 0.992 | 0.989 | 0.977 | -0.01 | 0.312 |
| 248 | pm8-pm25 | 1.007 | 1.019 | 1.003 | 1.005 | 0.012 | 0.327 |
| 249 | pm8-pm26 | 1.004 | 0.99 | 0.993 | 1.012 | 0.003 | 0.677 |
| 250 | pm8-pm27 | 1.003 | 1.044 | 1.017 | 1.007 | -0.001 | 0.75 |
|    | pm8-pm28 |    | pm8-pm29 |    | pm8-pm30 |    | pm8-pm31 |    | pm8-pm32 |    | pm8-pm33 |    | pm8-pm34 |    | pm8-pm35 |    | pm8-pm36 |    | pm8-pm37 |    | pm9-pm10 |    | pm9-pm11 |    | pm9-pm12 |    | pm9-pm13 |    | pm9-pm14 |    | pm9-pm15 |    | pm9-pm16 |    | pm9-pm17 |    | pm9-pm18 |    | pm9-pm19 |    | pm9-pm20 |    | pm9-pm21 |    | pm9-pm22 |    | pm9-pm23 |    | pm9-pm24 |    | pm9-pm25 |    | pm9-pm26 |    | pm9-pm27 |    | pm9-pm28 |    | pm9-pm29 |    |
|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|
| 251| 1.229    | 1.094 | 1.081    | 1.346 | -0.065   | 0.045  | 1.027    | 1.161 | 0.995    | 1.109 | -0.001   | 0.7   | 0.953    | 0.881 | 0.963    | 0.905 | 0.015    | 0.321  | 1.021    | 1.038 | 1.019    | 1.018 | 0.003    | 0.935  | 0.985    | 1.112 | 1.022    | 1.024 | 0.001    | 0.87   | 1.023    | 0.998 | 0.987    | 0.992 | 0.003    | 0.743  | 0.971    | 1.015 | 1.0    | 0.983 | -0.009   | 0.535  | 1.02     | 1.034 | 0.99    | 1.009 | 0.011    | 0.358  | 0.983    | 1.017 | 0.993    | 1.003 | 0.003    | 0.732  | 0.993    | 0.988 | 1.003   | 0.989 | -0.006   | 0.512  | 2.3      | 2.005 | 2.199   | 2.059 | 0.088    | 0.013  | 1.037    | 1.025 | 1.023   | 1.04  | -0.008   | 0.525  | 1.173    | 1.182 | 1.045   | 1.269 | -0.05    | 0.039  | 1.019    | 1.018 | 1.039   | 0.994 | -0.025   | 0.283  | 1.023    | 1.078 | 1.032   | 1.029 | 0.004    | 0.842  | 1.026    | 1.045 | 1.081   | 1.017 | 0.002    | 0.862  | 1.042    | 1.04  | 1.009   | 1.044 | -0.001   | 0.933  | 1.034    | 1.041 | 1.061   | 1.003 | -0.001   | 0.616  | 1.009    | 1.002 | 1.009   | 0.996 | -0.029   | 0.264  | 1.019    | 1.042 | 1.012   | 1.019 | -0.01    | 0.335  | 1.01     | 1.037 | 1.036   | 1.035 | -0.007   | 0.466  | 1.147    | 1.344 | 1.434   | 1.031 | -0.056   | 0.021  | 1.105    | 1.201 | 1.127   | 1.037 | 0.005    | 0.627  | 1.083    | 1.269 | 1.107   | 1.055 | -0.027   | 0.262  | 1.051    | 1.048 | 1.002   | 1.006 | -0.011   | 0.33   | 1.043    | 1.043 | 1.037   | 1.046 | 0.009    | 0.455  | 1.018    | 1.062 | 1.004   | 1.019 | -0.008   | 0.408  | 1.046    | 1.082 | 1.039   | 1.02  | -0.009   | 0.474  | 1.272    | 1.123 | 1.171   | 1.383 | -0.053   | 0.04   | 1.04     | 1.178 | 1.014   | 1.082 | -0.032   | 0.269  |
|   | pm9-pm30     |   | pm9-pm31     |   | pm9-pm32     |   | pm9-pm33     |   | pm9-pm34     |   | pm9-pm35     |   |
|---|-------------|---|-------------|---|-------------|---|-------------|---|-------------|---|-------------|---|
| 281| 0.951       |   | 0.957       |   | 1.004       |   | 0.904       |   | 0.007       |   | 0.552       |   |
| 282| 1.046       |   | 1.107       |   | 1.074       |   | 1.054       |   | 0.01        |   | 0.381       |   |
| 283| 0.919       |   | 1.153       |   | 1.044       |   | 1.065       |   | -0.002      |   | 0.962       |   |
| 284| 1.003       |   | 1.072       |   | 1.044       |   | 1.025       |   | 0.002       |   | 0.892       |   |
| 285| 1.046       |   | 1.054       |   | 1.017       |   | -0.01       |   | 0.325       |   |
| 286| 1.023       |   | 1.089       |   | 1.016       |   | 0.996       |   | -0.008      |   | 0.431       |   |
| 287| 1.023       |   | 1.041       |   | 1.058       |   | 1.026       |   | 0.004       |   | 0.694       |   |
| 288| 1.036       |   | 1.066       |   | 1.018       |   | 1.01        |   | -0.003      |   | 0.817       |   |
| 289| 2.331       |   | 1.929       |   | 2.154       |   | 2.105       |   | 0.106       |   | 0.007       |   |
| 290| 2.193       |   | 1.975       |   | 1.925       |   | 2.436       |   | -0.07       |   | 0.016       |   |
| 291| 2.301       |   | 2.006       |   | 2.138       |   | 2.005       |   | 0.086       |   | 0.018       |   |
| 292| 2.242       |   | 1.856       |   | 2.062       |   | 2.246       |   | 0.08        |   | 0.014       |   |
| 293| 2.094       |   | 1.91        |   | 2.099       |   | 2.246       |   | 0.063       |   | 0.028       |   |
| 294| 1.989       |   | 1.758       |   | 1.853       |   | 2.022       |   | -0.113      |   | 0.006       |   |
| 295| 2.297       |   | 1.969       |   | 2.121       |   | 2.042       |   | 0.087       |   | 0.019       |   |
| 296| 1.988       |   | 1.717       |   | 1.888       |   | 2.073       |   | -0.101      |   | 0.006       |   |
| 297| 2.16        |   | 1.891       |   | 2.079       |   | 2.272       |   | 0.082       |   | 0.017       |   |
| 298| 2.307       |   | 2.005       |   | 2.155       |   | 2.052       |   | 0.108       |   | 0.008       |   |
| 299| 2.202       |   | 2.14        |   | 2.56        |   | 2.061       |   | -0.039      |   | 0.297       |   |
| 300| 2.041       |   | 1.902       |   | 1.964       |   | 2.104       |   | -0.095      |   | 0.018       |   |
| 301| 2.142       |   | 1.941       |   | 2.038       |   | 2.126       |   | -0.079      |   | 0.018       |   |
| 302| 2.098       |   | 1.831       |   | 1.965       |   | 2.108       |   | -0.022      |   | 0.237       |   |
| 303| 2.108       |   | 1.766       |   | 2.004       |   | 2.127       |   | -0.017      |   | 0.378       |   |
| 304| 2.306       |   | 1.94        |   | 2.177       |   | 2.049       |   | 0.099       |   | 0.018       |   |
| 305| 2.053       |   | 1.747       |   | 1.88        |   | 2.065       |   | -0.104      |   | 0.009       |   |
| 306| 2.408       |   | 1.732       |   | 2.049       |   | 2.745       |   | -0.041      |   | 0.19        |   |
| 307| 2.01        |   | 1.939       |   | 1.889       |   | 2.204       |   | -0.085      |   | 0.016       |   |
| 308| 2.119       |   | 1.883       |   | 2.074       |   | 2.126       |   | 0.119       |   | 0.008       |   |
| 309| 2.051       |   | 1.693       |   | 1.875       |   | 2.084       |   | -0.116      |   | 0.006       |   |
| 310| 2.201       |   | 1.953       |   | 2.084       |   | 2.325       |   | 0.085       |   | 0.011       |   |
|     | pm10-pm33 | pm10-pm34 | pm10-pm35 | pm10-pm36 | pm10-pm37 | pm10-pm38 |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 311 | 2.273     | 1.943     | 2.193     | 2.021     | 0.089     | 0.015     |
| 312 | 2.303     | 2.025     | 2.127     | 2.066     | 0.108     | 0.01      |
| 313 | 2.279     | 1.984     | 2.128     | 2.042     | 0.084     | 0.01      |
| 314 | 2.243     | 1.987     | 2.148     | 2.027     | 0.083     | 0.016     |
| 315 | 2.295     | 2.001     | 2.178     | 2.007     | 0.1       | 0.02      |
| 316 | 1.107     | 1.156     | 1.029     | 1.254     | -0.052    | 0.03      |
| 317 | 0.999     | 1.053     | 1.04      | 0.986     | 0.007     | 0.473     |
| 318 | 1.023     | 1.031     | 1.042     | 0.993     | 0.015     | 0.337     |
| 319 | 1.008     | 1.039     | 1.011     | 1.014     | 0.008     | 0.577     |
| 320 | 1.025     | 1.041     | 1.027     | 1.047     | 0.03      | 0.235     |
| 321 | 0.977     | 1.001     | 0.997     | 0.954     | -0.024    | 0.26      |
| 322 | 0.982     | 0.963     | 0.991     | 1.019     | -0.015    | 0.371     |
| 323 | 0.971     | 0.976     | 0.978     | 0.985     | -0.027    | 0.264     |
| 324 | 0.982     | 1.038     | 0.995     | 0.986     | -0.007    | 0.59      |
| 325 | 1.105     | 1.276     | 1.357     | 1.003     | -0.08     | 0.014     |
| 326 | 1.05      | 1.179     | 1.084     | 1.041     | 0.005     | 0.755     |
| 327 | 1.065     | 1.247     | 1.115     | 1.064     | -0.004    | 0.706     |
| 328 | 0.979     | 1.031     | 1.021     | 0.993     | -0.003    | 0.833     |
| 329 | 1.02      | 1.02      | 1.001     | 1.014     | 0.009     | 0.498     |
| 330 | 0.969     | 1         | 1         | 0.983     | -0.017    | 0.339     |
| 331 | 1.007     | 1.042     | 1.028     | 0.983     | -0.011    | 0.346     |
| 332 | 1.259     | 1.037     | 1.104     | 1.337     | -0.076    | 0.019     |
| 333 | 1.021     | 1.177     | 0.986     | 1.093     | -0.012    | 0.396     |
| 334 | 0.917     | 0.894     | 0.955     | 0.918     | 0.003     | 0.731     |
| 335 | 1.025     | 1.026     | 1.016     | 1.007     | -0.01     | 0.52      |
| 336 | 0.997     | 1.126     | 0.993     | 1.026     | -0.007    | 0.568     |
| 337 | 1.01      | 1         | 0.973     | 1.039     | 0.001     | 0.933     |
| 338 | 0.986     | 1.046     | 1.001     | 0.971     | -0.008    | 0.46      |
| 339 | 0.974     | 1.015     | 1.017     | 1.002     | -0.008    | 0.581     |
| 340 | 1.011     | 0.998     | 0.985     | 1.019     | 0         | 0.911     |
|   | pm11-pm37  | pm12-pm13  | pm12-pm14  | pm12-pm15  | pm12-pm16  | pm12-pm17  | pm12-pm18  | pm12-pm19  | pm12-pm20  | pm12-pm21  | pm12-pm22  | pm12-pm23  | pm12-pm24  | pm12-pm25  | pm12-pm26  | pm12-pm27  | pm12-pm28  | pm12-pm29  | pm12-pm30  | pm12-pm31  | pm12-pm32  | pm12-pm33  | pm12-pm34  | pm12-pm35  | pm12-pm36  | pm12-pm37  | pm13-pm14  | pm13-pm15  | pm13-pm16  | pm13-pm17  |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 341| 1.004      | 0.989      | 0.987      | 1.046      | 0          | 0.65       |
| 342| 1.075      | 1.172      | 0.994      | 1.243      | -0.07      | 0.034      |
| 343| 1.102      | 1.198      | 1.073      | 1.226      | -0.036     | 0.222      |
| 344| 1.087      | 1.12       | 1.017      | 1.252      | -0.07      | 0.029      |
| 345| 1.132      | 1.22       | 1.017      | 1.244      | -0.03      | 0.232      |
| 346| 1.105      | 1.215      | 1.015      | 1.233      | -0.042     | 0.182      |
| 347| 1.09       | 1.161      | 1.041      | 1.209      | -0.057     | 0.033      |
| 348| 1.095      | 1.163      | 1.036      | 1.209      | -0.057     | 0.026      |
| 349| 1.122      | 1.142      | 1.01       | 1.214      | -0.063     | 0.038      |
| 350| 1.272      | 1.536      | 1.428      | 1.255      | -0.071     | 0.016      |
| 351| 1.154      | 1.35       | 1.149      | 1.245      | -0.037     | 0.297      |
| 352| 1.178      | 1.426      | 1.134      | 1.312      | -0.043     | 0.195      |
| 353| 1.079      | 1.168      | 1.024      | 1.234      | -0.06      | 0.023      |
| 354| 1.099      | 1.168      | 1.069      | 1.224      | -0.043     | 0.159      |
| 355| 1.104      | 1.168      | 1.036      | 1.22       | -0.051     | 0.023      |
| 356| 1.115      | 1.193      | 1.072      | 1.26       | -0.044     | 0.172      |
| 357| 1.403      | 1.197      | 1.184      | 1.65       | -0.08      | 0.013      |
| 358| 1.122      | 1.448      | 1.056      | 1.3        | -0.028     | 0.238      |
| 359| 1.067      | 1.051      | 0.973      | 1.12       | -0.043     | 0.156      |
| 360| 1.112      | 1.215      | 1.062      | 1.239      | -0.05      | 0.198      |
| 361| 1.085      | 1.297      | 1.027      | 1.275      | -0.05      | 0.191      |
| 362| 1.071      | 1.125      | 1.046      | 1.201      | -0.072     | 0.019      |
| 363| 1.112      | 1.205      | 1.026      | 1.162      | -0.061     | 0.021      |
| 364| 1.088      | 1.226      | 1.037      | 1.169      | -0.058     | 0.022      |
| 365| 1.111      | 1.149      | 1.016      | 1.213      | -0.06      | 0.041      |
| 366| 1.098      | 1.162      | 1.028      | 1.206      | -0.061     | 0.038      |
| 367| 0.994      | 1.028      | 0.999      | 1          | -0.005     | 0.863      |
| 368| 1        | 0.964      | 1.011      | 0.977      | -0.025     | 0.264      |
| 369| 1        | 0.975      | 0.994      | 1.001      | -0.016     | 0.33       |
| 370| 0.957      | 0.968      | 1          | 0.952      | -0.04      | 0.296      |
|   |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|
| 371 | pm13-pm18 | 1.009 | 1.045 | 1.003 | 0.952 | -0.004 | 0.817 |
| 372 | pm13-pm19 | 1.002 | 1.027 | 0.992 | 0.965 | -0.011 | 0.353 |
| 373 | pm13-pm20 | 1.011 | 1.03 | 1.008 | 1.017 | 0.007 | 0.547 |
| 374 | pm13-pm21 | 1.116 | 1.332 | 1.398 | 0.999 | -0.057 | 0.021 |
| 375 | pm13-pm22 | 1.017 | 1.166 | 1.095 | 1 | -0.017 | 0.377 |
| 376 | pm13-pm23 | 1.099 | 1.22 | 1.104 | 1.036 | -0.015 | 0.363 |
| 377 | pm13-pm24 | 0.984 | 1.062 | 1.006 | 0.998 | 0.001 | 0.921 |
| 378 | pm13-pm25 | 0.979 | 1.035 | 1.002 | 0.984 | -0.007 | 0.525 |
| 379 | pm13-pm26 | 0.995 | 1.047 | 0.969 | 0.994 | -0.006 | 0.424 |
| 380 | pm13-pm27 | 0.971 | 1.067 | 0.999 | 0.998 | -0.021 | 0.214 |
| 381 | pm13-pm28 | 1.242 | 1.13 | 1.148 | 1.348 | -0.046 | 0.19 |
| 382 | pm13-pm29 | 0.968 | 1.129 | 0.964 | 1.052 | -0.056 | 0.037 |
| 383 | pm13-pm30 | 0.894 | 0.895 | 0.919 | 0.872 | -0.026 | 0.236 |
| 384 | pm13-pm31 | 1.011 | 1.025 | 1.005 | 1.007 | -0.019 | 0.311 |
| 385 | pm13-pm32 | 1.01 | 1.17 | 0.992 | 1.007 | 0 | 0.861 |
| 386 | pm13-pm33 | 1.027 | 1.044 | 0.997 | 0.973 | 0.003 | 0.938 |
| 387 | pm13-pm34 | 1.01 | 0.999 | 0.964 | 0.971 | -0.025 | 0.216 |
| 388 | pm13-pm35 | 0.961 | 1.017 | 0.972 | 0.962 | -0.035 | 0.218 |
| 389 | pm13-pm36 | 0.981 | 1.031 | 0.988 | 0.992 | -0.009 | 0.416 |
| 390 | pm13-pm37 | 0.99 | 1.034 | 1.009 | 0.983 | -0.006 | 0.592 |
| 391 | pm14-pm15 | 0.991 | 0.955 | 1.031 | 0.987 | -0.017 | 0.348 |
| 392 | pm14-pm16 | 0.993 | 0.978 | 1.007 | 0.952 | -0.02 | 0.298 |
| 393 | pm14-pm17 | 0.976 | 0.99 | 1.018 | 0.972 | -0.015 | 0.319 |
| 394 | pm14-pm18 | 1.015 | 1.058 | 1.004 | 0.987 | 0.015 | 0.328 |
| 395 | pm14-pm19 | 0.993 | 1.058 | 1.006 | 0.971 | 0.006 | 0.6 |
| 396 | pm14-pm20 | 0.99 | 1.04 | 1.004 | 0.981 | -0.001 | 0.799 |
| 397 | pm14-pm21 | 1.105 | 1.315 | 1.395 | 1.009 | -0.057 | 0.027 |
| 398 | pm14-pm22 | 1.068 | 1.161 | 1.107 | 1.007 | 0.005 | 0.728 |
| 399 | pm14-pm23 | 1.063 | 1.19 | 1.11 | 1.028 | -0.026 | 0.298 |
| 400 | pm14-pm24 | 1.007 | 1.025 | 1.009 | 0.999 | 0.004 | 0.785 |
|   | pm14-pm25 | pm14-pm26 | pm14-pm27 | pm14-pm28 | pm14-pm29 | pm14-pm30 | pm14-pm31 | pm14-pm32 | pm14-pm33 | pm14-pm34 | pm14-pm35 | pm14-pm36 | pm14-pm37 | pm15-pm16 | pm15-pm17 | pm15-pm18 | pm15-pm19 | pm15-pm20 | pm15-pm21 | pm15-pm22 | pm15-pm23 | pm15-pm24 | pm15-pm25 | pm15-pm26 | pm15-pm27 | pm15-pm28 | pm15-pm29 | pm15-pm30 | pm15-pm31 | pm15-pm32 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 401 | 1.021 | 1.048 | 1.005 | 1.001 | 0.017 | 0.32 |
| 402 | 1.012 | 1.041 | 1.017 | 0.993 | 0.014 | 0.316 |
| 403 | 1.016 | 1.058 | 1.041 | 1.008 | 0.007 | 0.415 |
| 404 | 1.254 | 1.108 | 1.104 | 1.326 | -0.06 | 0.035 |
| 405 | 0.972 | 1.128 | 0.985 | 1.028 | -0.051 | 0.043 |
| 406 | 0.913 | 0.877 | 0.95 | 0.877 | -0.011 | 0.306 |
| 407 | 1.042 | 1.106 | 1.011 | 1.004 | 0.015 | 0.385 |
| 408 | 1.009 | 1.147 | 1.021 | 1.021 | 0.009 | 0.579 |
| 409 | 1.012 | 1.023 | 1.018 | 0.991 | 0.009 | 0.578 |
| 410 | 0.983 | 1.021 | 0.982 | 0.976 | -0.016 | 0.302 |
| 411 | 0.983 | 0.997 | 1.029 | 0.993 | -0.007 | 0.458 |
| 412 | 0.985 | 1.006 | 1.018 | 1 | 0.001 | 0.766 |
| 413 | 1.008 | 1.028 | 0.99 | 1 | 0.002 | 0.836 |
| 414 | 1.014 | 1.012 | 1.017 | 1.019 | 0.01 | 0.508 |
| 415 | 1.014 | 0.986 | 1.022 | 0.999 | -0.001 | 0.701 |
| 416 | 0.97 | 1.019 | 1.022 | 0.997 | -0.002 | 0.898 |
| 417 | 1.009 | 0.999 | 1.013 | 1.032 | 0.009 | 0.455 |
| 418 | 1.009 | 1.031 | 1.043 | 0.971 | 0.006 | 0.432 |
| 419 | 1.104 | 1.269 | 1.383 | 1.05 | -0.064 | 0.039 |
| 420 | 1.067 | 1.112 | 1.087 | 1.015 | -0.014 | 0.306 |
| 421 | 1.068 | 1.236 | 1.069 | 1.003 | -0.033 | 0.24 |
| 422 | 1.005 | 0.986 | 1.024 | 1.031 | 0.002 | 0.922 |
| 423 | 0.997 | 1.051 | 1.022 | 0.993 | 0.011 | 0.38 |
| 424 | 0.989 | 1.048 | 1.039 | 1.021 | 0.019 | 0.363 |
| 425 | 0.995 | 1.068 | 1.023 | 1.019 | 0 | 0.66 |
| 426 | 1.238 | 1.103 | 1.212 | 1.348 | -0.036 | 0.209 |
| 427 | 1.015 | 1.095 | 0.995 | 1.1 | -0.031 | 0.223 |
| 428 | 0.894 | 0.903 | 0.991 | 0.889 | 0.001 | 0.613 |
| 429 | 1.027 | 1.047 | 1.05 | 1.018 | 0.007 | 0.482 |
| 430 | 0.97 | 1.107 | 1.028 | 1.033 | -0.009 | 0.509 |
|     |         |     |     |     |     |     |
|-----|---------|-----|-----|-----|-----|-----|
| 431 | pm15-pm33 | 0.959 | 1.003 | 1.034 | 1.002 | -0.006 | 0.566 |
| 432 | pm15-pm34 | 1.027 | 0.987 | 1.012 | 0.982 | -0.007 | 0.566 |
| 433 | pm15-pm35 | 0.967 | 0.972 | 0.992 | 1 | -0.028 | 0.267 |
| 434 | pm15-pm36 | 0.985 | 1.039 | 1.012 | 0.995 | 0.004 | 0.933 |
| 435 | pm15-pm37 | 0.991 | 1.022 | 1.017 | 0.995 | -0.001 | 0.991 |
| 436 | pm16-pm17 | 0.963 | 1.012 | 1.011 | 0.991 | -0.007 | 0.572 |
| 437 | pm16-pm18 | 0.99 | 1.004 | 1.02 | 1.001 | 0.005 | 0.73 |
| 438 | pm16-pm19 | 0.998 | 1.027 | 1.021 | 0.989 | 0.01 | 0.586 |
| 439 | pm16-pm20 | 0.979 | 0.999 | 1.001 | 0.974 | -0.014 | 0.396 |
| 440 | pm16-pm21 | 1.135 | 1.327 | 1.36 | 1.025 | -0.049 | 0.177 |
| 441 | pm16-pm22 | 1.037 | 1.163 | 1.072 | 1.003 | -0.01 | 0.538 |
| 442 | pm16-pm23 | 1.077 | 1.216 | 1.101 | 1.012 | -0.02 | 0.266 |
| 443 | pm16-pm24 | 0.995 | 1.048 | 1.017 | 0.994 | 0.01 | 0.575 |
| 444 | pm16-pm25 | 0.827 | 1.047 | 1.033 | 1.178 | 0.022 | 0.266 |
| 445 | pm16-pm26 | 1.018 | 1.049 | 1.006 | 0.985 | 0.015 | 0.303 |
| 446 | pm16-pm27 | 1.018 | 1.059 | 1.018 | 0.996 | 0.001 | 0.871 |
| 447 | pm16-pm28 | 1.231 | 1.132 | 1.113 | 1.374 | -0.043 | 0.179 |
| 448 | pm16-pm29 | 1.043 | 1.18 | 0.955 | 1.053 | -0.019 | 0.347 |
| 449 | pm16-pm30 | 0.903 | 0.846 | 0.928 | 0.919 | -0.014 | 0.357 |
| 450 | pm16-pm31 | 1.004 | 1.067 | 1.049 | 0.996 | 0.006 | 0.415 |
| 451 | pm16-pm32 | 0.983 | 1.107 | 1.027 | 1.064 | 0.008 | 0.485 |
| 452 | pm16-pm33 | 1.021 | 1.038 | 0.982 | 0.987 | 0.007 | 0.548 |
| 453 | pm16-pm34 | 1.018 | 0.961 | 1.025 | 0.96 | -0.013 | 0.397 |
| 454 | pm16-pm35 | 0.971 | 0.97 | 1.004 | 0.976 | -0.024 | 0.288 |
| 455 | pm16-pm36 | 0.996 | 0.984 | 1.008 | 1.004 | -0.001 | 0.918 |
| 456 | pm16-pm37 | 0.994 | 1.024 | 1.021 | 1.007 | 0.01 | 0.394 |
| 457 | pm17-pm18 | 0.976 | 0.975 | 1.023 | 0.987 | -0.01 | 0.53 |
| 458 | pm17-pm19 | 1.007 | 1.003 | 1.044 | 1.005 | 0.015 | 0.382 |
| 459 | pm17-pm20 | 0.961 | 1.027 | 1.004 | 0.98 | -0.01 | 0.319 |
| 460 | pm17-pm21 | 1.089 | 1.251 | 1.38 | 0.971 | -0.089 | 0.012 |
|       | pm17-pm22 | pm17-pm23 | pm17-pm24 | pm17-pm25 | pm17-pm26 | pm17-pm27 | pm17-pm28 | pm17-pm29 | pm17-pm30 | pm17-pm31 | pm17-pm32 | pm18-pm19 | pm18-pm20 | pm18-pm21 | pm18-pm22 | pm18-pm23 | pm18-pm24 | pm18-pm25 | pm18-pm26 | pm18-pm27 | pm18-pm28 | pm18-pm29 | pm18-pm30 | pm18-pm31 | pm18-pm32 |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 192   | 1.045     | 1.096     | 1.084     | 0.975     | -0.03     | 0.285     | 1.223     | 1.09      | 1.188     | 1.35      | -0.04     | 0.998     | 1.173     | 0.956     | 1.024     | -0.04     | 0.994     | 0.862     | 0.925     | 0.869     | -0.026    | 0.998     | 0.995     | 0.997     | 0.974     | -0.012    | 0.998     | 0.999     | 0.997     | 0.974     | -0.012    | 0.996     | 0.999     | 0.999     | 0.999     | -0.009    | 0.986     | 0.992     | 0.994     | 0.994     | -0.009    | 0.986     | 1.145     | 1.008     | 1.037     | 0.008     | 0.527     |
|   | pm18-pm33 | pm18-pm34 | pm18-pm35 | pm18-pm36 | pm18-pm37 | pm18-pm38 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 491 | 1.006   | 1.004     | 0.986     | 1.013     | 0.004     | 0.684     |
| 492 | 1.022   | 1.048     | 1.008     | 0.976     | 0.011     | 0.314     |
| 493 | 0.999   | 1.008     | 0.992     | 0.995     | -0.005    | 0.935     |
| 494 | 0.99    | 0.981     | 0.98      | 0.996     | -0.011    | 0.319     |
| 495 | 1.021   | 0.989     | 1.015     | 1.009     | 0.008     | 0.468     |
| 496 | 0.993   | 1.014     | 0.982     | 0.982     | -0.009    | 0.464     |
| 497 | 1.112   | 1.289     | 1.366     | 0.994     | -0.069    | 0.026     |
| 498 | 1.047   | 1.175     | 1.105     | 1.049     | 0.016     | 0.361     |
| 499 | 1.07    | 1.216     | 1.102     | 1.049     | -0.012    | 0.34      |
| 500 | 0.977   | 1.04      | 1.002     | 0.982     | -0.002    | 0.827     |
| 501 | 0.987   | 0.999     | 0.991     | 1.002     | -0.004    | 0.758     |
| 502 | 0.981   | 0.989     | 1.011     | 0.984     | -0.007    | 0.497     |
| 503 | 1.034   | 0.985     | 1.042     | 1.028     | 0.002     | 0.986     |
| 504 | 1.229   | 1.065     | 1.119     | 1.32      | -0.071    | 0.019     |
| 505 | 1.026   | 1.234     | 1.056     | 1.054     | 0.017     | 0.342     |
| 506 | 0.932   | 0.88      | 0.937     | 0.882     | -0.004    | 0.962     |
| 507 | 1.017   | 1.033     | 1.059     | 1.005     | 0.006     | 0.438     |
| 508 | 0.978   | 1.117     | 0.992     | 1.021     | -0.009    | 0.498     |
| 509 | 0.983   | 1.012     | 1         | 0.981     | -0.005    | 0.966     |
| 510 | 0.988   | 1.04      | 1.014     | 0.986     | 0.004     | 0.696     |
| 511 | 1.016   | 1.043     | 0.988     | 0.99      | 0.005     | 0.424     |
| 512 | 0.988   | 0.981     | 1.014     | 0.996     | -0.003    | 0.828     |
| 513 | 1.01    | 0.993     | 1.022     | 1.011     | 0.008     | 0.44      |
| 514 | 1.113   | 1.219     | 1.417     | 1.008     | -0.073    | 0.017     |
| 515 | 1.063   | 1.156     | 1.077     | 0.996     | -0.008    | 0.53      |
| 516 | 1.07    | 1.255     | 1.107     | 1.038     | -0.007    | 0.495     |
| 517 | 1.006   | 1.017     | 0.976     | 0.99      | -0.008    | 0.437     |
| 518 | 0.99    | 0.991     | 0.985     | 0.996     | -0.011    | 0.335     |
| 519 | 1.013   | 0.995     | 1.016     | 0.993     | 0.003     | 0.672     |
| 520 | 1.019   | 1.07      | 1.016     | 1.021     | 0.008     | 0.593     |
|      | pm20-pm28 | pm20-pm29 | pm20-pm30 | pm20-pm31 | pm20-pm32 | pm20-pm33 |
|------|-----------|-----------|-----------|-----------|-----------|-----------|
| pm20-pm34 | 1.003     | 1.063     | 1.011     | 0.976     | -0.007    | 0.4       |
| pm20-pm35 | 0.999     | 1.023     | 0.972     | 0.998     | -0.009    | 0.571     |
| pm20-pm36 | 0.984     | 1.003     | 1.009     | 1.009     | 0.001     | 0.699     |
| pm21-pm22 | 1.19      | 1.403     | 1.445     | 1.059     | -0.065    | 0.025     |
| pm21-pm23 | 1.209     | 1.533     | 1.539     | 1.063     | -0.046    | 0.167     |
| pm21-pm24 | 1.11      | 1.311     | 1.388     | 1.03      | -0.054    | 0.028     |
| pm21-pm25 | 1.111     | 1.282     | 1.381     | 1.027     | -0.06     | 0.025     |
| pm21-pm26 | 1.109     | 1.28      | 1.365     | 1.018     | -0.067    | 0.036     |
| pm21-pm27 | 1.083     | 1.272     | 1.357     | 1.062     | -0.088    | 0.017     |
| pm21-pm28 | 1.354     | 1.35      | 1.529     | 1.351     | -0.12     | 0.008     |
| pm21-pm29 | 1.105     | 1.513     | 1.397     | 1.08      | -0.063    | 0.036     |
| pm21-pm30 | 1.019     | 1.174     | 1.368     | 0.904     | -0.057    | 0.033     |
| pm21-pm31 | 1.141     | 1.343     | 1.35      | 1.05      | -0.063    | 0.025     |
| pm21-pm32 | 1.124     | 1.467     | 1.387     | 1.045     | -0.042    | 0.193     |
| pm21-pm33 | 1.146     | 1.278     | 1.381     | 1.021     | -0.054    | 0.04      |
| pm21-pm34 | 1.121     | 1.303     | 1.359     | 0.988     | -0.072    | 0.019     |
| pm21-pm35 | 1.125     | 1.267     | 1.382     | 1.046     | -0.06     | 0.02      |
| pm21-pm36 | 1.12      | 1.306     | 1.384     | 1.027     | -0.05     | 0.156     |
| pm21-pm37 | 1.142     | 1.306     | 1.355     | 1.02      | -0.057    | 0.025     |
| pm22-pm23 | 1.353     | 1.527     | 1.429     | 1.048     | 0.138     | 0.008     |
| pm22-pm24 | 1.055     | 1.218     | 1.077     | 1.033     | 0.014     | 0.347     |
| pm22-pm25 | 1.058     | 1.104     | 1.118     | 1.013     | -0.005    | 0.962     |
| pm22-pm26 | 1.036     | 1.178     | 1.093     | 1.039     | 0.008     | 0.537     |
|    | pm22-pm27 | pm22-pm28 | pm22-pm29 | pm22-pm30 | pm22-pm31 | pm22-pm32 |
|----|-----------|-----------|-----------|-----------|-----------|-----------|
| 551| 1.066     | 1.196     | 1.142     | 1.005     | 0.002     | 0.872     |
| 552| 1.305     | 1.273     | 1.295     | 1.432     | -0.008    | 0.44      |
| 553| 1.111     | 1.291     | 1.078     | 1.076     | -0.016    | 0.39      |
| 554| 0.928     | 1.014     | 1.052     | 0.93      | -0.01     | 0.325     |
| 555| 1.07      | 1.201     | 1.076     | 1.03      | -0.008    | 0.431     |
| 556| 1.072     | 1.279     | 1.066     | 1.068     | 0.005     | 0.564     |
| 557| 1.025     | 1.134     | 1.094     | 1.018     | -0.01     | 0.309     |
| 558| 1.04      | 1.138     | 1.073     | 1.039     | -0.01     | 0.527     |
| 559| 1.05      | 1.099     | 1.088     | 1.015     | -0.021    | 0.271     |
| 560| 1.043     | 1.142     | 1.116     | 1.034     | 0.006     | 0.497     |
| 561| 1.063     | 1.155     | 1.121     | 1.026     | 0.011     | 0.36      |
| 562| 1.139     | 1.238     | 1.116     | 1.06      | 0.013     | 0.399     |
| 563| 1.042     | 1.269     | 1.096     | 1.02      | -0.015    | 0.357     |
| 564| 1.093     | 1.262     | 1.107     | 1.036     | 0.003     | 0.672     |
| 565| 1.122     | 1.272     | 1.122     | 1.024     | -0.008    | 0.578     |
| 566| 1.37      | 1.392     | 1.245     | 1.388     | -0.028    | 0.262     |
| 567| 1.072     | 1.419     | 1.06      | 1.088     | -0.039    | 0.201     |
| 568| 0.989     | 1.115     | 1.063     | 0.94      | -0.008    | 0.524     |
| 569| 1.107     | 1.29      | 1.123     | 1.044     | -0.004    | 0.982     |
| 570| 1.084     | 1.413     | 1.115     | 1.093     | 0.017     | 0.397     |
| 571| 1.078     | 1.269     | 1.112     | 1.028     | 0         | 0.976     |
| 572| 1.078     | 1.246     | 1.082     | 1.019     | -0.019    | 0.322     |
| 573| 1.059     | 1.242     | 1.106     | 1.013     | -0.022    | 0.222     |
| 574| 1.089     | 1.203     | 1.111     | 1.04      | -0.01     | 0.498     |
| 575| 1.062     | 1.281     | 1.104     | 1.048     | 0         | 0.955     |
| 576| 0.994     | 0.978     | 1.005     | 1.017     | -0.004    | 0.688     |
| 577| 0.988     | 1.042     | 0.986     | 0.981     | -0.004    | 0.614     |
| 578| 1.004     | 1.113     | 1.041     | 1.014     | 0.018     | 0.339     |
| 579| 1.268     | 1.12      | 1.181     | 1.349     | -0.029    | 0.271     |
| 580| 0.977     | 1.164     | 1.023     | 1.03      | -0.032    | 0.252     |
|      |          |      |      |      |      |     |
|------|----------|------|------|------|------|-----|
| 581  | pm24-pm30| 0.885| 0.922| 0.94 | 0.915| -0.001|
| 582  | pm24-pm31| 1.02 | 1.076| 1.022| 1.022| 0.009|
| 583  | pm24-pm32| 1.007| 1.141| 1.02 | 1.034| 0.01 |
| 584  | pm24-pm33| 0.981| 0.991| 0.991| 0.987| -0.015|
| 585  | pm24-pm34| 1.018| 1.042| 0.991| 0.981| 0.001|
| 586  | pm24-pm35| 1.002| 0.979| 1.02 | 0.996| -0.009|
| 587  | pm24-pm36| 0.993| 1.01 | 1.019| 0.995| 0.002|
| 588  | pm24-pm37| 0.998| 1.007| 1.003| 1.005| -0.002|
| 589  | pm25-pm26| 1.01 | 0.997| 1.005| 0.982| 0   |
| 590  | pm25-pm27| 1.018| 1.03 | 1.016| 1.027| 0.002|
| 591  | pm25-pm28| 1.246| 1.044| 1.142| 1.342| -0.062|
| 592  | pm25-pm29| 0.999| 1.148| 1.005| 1.026| -0.032|
| 593  | pm25-pm30| 0.931| 0.896| 0.968| 0.907| 0.013|
| 594  | pm25-pm31| 1.028| 1.045| 1.047| 0.985| 0.003|
| 595  | pm25-pm32| 0.992| 1.108| 1.007| 1.039| -0.001|
| 596  | pm25-pm33| 1.014| 0.982| 1.01 | 0.999| 0.002|
| 597  | pm25-pm34| 1.006| 1.029| 0.986| 1.014| 0.006|
| 598  | pm25-pm35| 0.982| 0.988| 0.989| 0.96 | -0.025|
| 599  | pm25-pm36| 0.993| 1.016| 1.014| 1.017| 0.012|
| 600  | pm25-pm37| 1.014| 0.99 | 1.008| 1.024| 0.008|
| 601  | pm26-pm27| 1.02 | 1.033| 1.032| 0.987| -0.003|
| 602  | pm26-pm28| 1.223| 1.062| 1.1  | 1.38 | -0.063|
| 603  | pm26-pm29| 0.99 | 1.146| 0.983| 1.086| -0.025|
| 604  | pm26-pm30| 0.935| 0.913| 0.942| 0.889| 0.007|
| 605  | pm26-pm31| 0.999| 1.055| 1.017| 1.018| 0   |
| 606  | pm26-pm32| 0.987| 1.091| 1.009| 1.016| -0.011|
| 607  | pm26-pm33| 0.981| 1.006| 0.995| 0.987| -0.007|
| 608  | pm26-pm34| 1.006| 1.024| 1.015| 0.997| 0.007|
| 609  | pm26-pm35| 1.007| 1.077| 0.977| 0.987| 0.008|
| 610  | pm26-pm36| 1.004| 0.979| 1.007| 1.006| 0.001|
|   | pm26-pm37 | pm27-pm28 | pm27-pm29 | pm27-pm30 | pm27-pm31 | pm27-pm32 | pm27-pm33 | pm27-pm34 | pm27-pm35 | pm27-pm36 | pm27-pm37 | pm28-pm29 | pm28-pm30 | pm28-pm31 | pm28-pm32 | pm28-pm33 | pm28-pm34 | pm28-pm35 | pm28-pm36 | pm28-pm37 | pm29-pm30 | pm29-pm31 | pm29-pm32 | pm29-pm33 | pm29-pm34 | pm29-pm35 | pm29-pm36 | pm29-pm37 | pm30-pm31 | pm30-pm32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 611 | 0.992 | 1.016 | 1.008 | 1.02 | 0.007 | 0.509 |
| 612 | 1.221 | 1.129 | 1.148 | 1.374 | -0.058 | 0.043 |
| 613 | 1.04 | 1.239 | 0.998 | 1.036 | -0.02 | 0.366 |
| 614 | 0.936 | 0.93 | 0.969 | 0.893 | -0.002 | 0.708 |
| 615 | 1.004 | 1.107 | 1.073 | 0.991 | -0.001 | 0.831 |
| 616 | 0.999 | 1.164 | 1.026 | 1.053 | 0.002 | 0.722 |
| 617 | 0.992 | 1.019 | 0.997 | 1.003 | -0.018 | 0.322 |
| 618 | 1.046 | 1.058 | 1.049 | 0.984 | 0.01 | 0.442 |
| 619 | 1.014 | 1.092 | 1.022 | 1.02 | 0.011 | 0.324 |
| 620 | 1.03 | 1.072 | 1.012 | 1.009 | 0.011 | 0.343 |
| 621 | 1.029 | 1.034 | 1.012 | 1.026 | 0.003 | 0.65 |
| 622 | 1.332 | 1.212 | 1.095 | 1.479 | -0.052 | 0.042 |
| 623 | 1.151 | 0.968 | 1.089 | 1.238 | -0.057 | 0.024 |
| 624 | 1.278 | 1.108 | 1.152 | 1.379 | -0.049 | 0.157 |
| 625 | 1.226 | 1.182 | 1.156 | 1.4 | -0.052 | 0.042 |
| 626 | 1.206 | 1.018 | 1.11 | 1.354 | -0.083 | 0.016 |
| 627 | 1.249 | 1.114 | 1.148 | 1.384 | -0.035 | 0.259 |
| 628 | 1.238 | 1.083 | 1.13 | 1.321 | -0.067 | 0.043 |
| 629 | 1.198 | 1.091 | 1.122 | 1.296 | -0.077 | 0.014 |
| 630 | 1.21 | 1.049 | 1.121 | 1.348 | -0.075 | 0.01 |
| 631 | 0.918 | 1.291 | 0.787 | 1.132 | 0.043 | 0.177 |
| 632 | 1.025 | 1.238 | 1.011 | 1.104 | -0.005 | 0.452 |
| 633 | 1.039 | 1.31 | 0.991 | 1.085 | -0.008 | 0.424 |
| 634 | 0.969 | 1.158 | 0.992 | 1.048 | -0.035 | 0.281 |
| 635 | 1.011 | 1.154 | 0.981 | 1.01 | -0.041 | 0.154 |
| 636 | 1.015 | 1.119 | 0.981 | 1.066 | -0.036 | 0.258 |
| 637 | 1.002 | 1.163 | 1.021 | 1.082 | -0.009 | 0.578 |
| 638 | 1.011 | 1.192 | 1.002 | 1.056 | -0.013 | 0.309 |
| 639 | 0.935 | 0.971 | 0.997 | 0.877 | 0.009 | 0.519 |
| 640 | 0.93 | 0.975 | 0.984 | 0.936 | 0.006 | 0.586 |
|   | pm30-pm33 |   | pm30-pm34 |   | pm30-pm35 |   | pm30-pm36 |   | pm30-pm37 |   | pm31-pm32 |   | pm31-pm33 |   | pm31-pm34 |   | pm31-pm35 |   | pm31-pm36 |   | pm31-pm37 |   | pm32-pm33 |   | pm32-pm34 |   | pm32-pm35 |   | pm32-pm36 |   | pm32-pm37 |   | pm33-pm34 |   | pm33-pm35 |   | pm33-pm36 |   | pm33-pm37 |   | pm34-pm35 |   | pm34-pm36 |   | pm34-pm37 |   | pm35-pm36 |   | pm35-pm37 |   | pm36-pm37 |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 641 | 0.941 | 0.91 | 0.969 | 0.93 | 0.025 | 0.288 |
| 642 | 0.895 | 0.894 | 0.975 | 0.886 | -0.004 | 0.924 |
| 643 | 0.942 | 0.905 | 0.971 | 0.894 | 0.01 | 0.376 |
| 644 | 0.957 | 0.895 | 0.939 | 0.922 | 0.017 | 0.383 |
| 645 | 0.95 | 0.872 | 0.921 | 0.935 | 0.005 | 0.571 |
| 646 | 0.995 | 1.178 | 1.025 | 1.042 | -0.001 | 0.802 |
| 647 | 1.031 | 0.998 | 1.034 | 1.016 | -0.003 | 0.72 |
| 648 | 1.001 | 1.063 | 1.035 | 1.015 | 0.002 | 0.962 |
| 649 | 1.01 | 1.056 | 1.037 | 0.997 | -0.003 | 0.879 |
| 650 | 1.008 | 1.047 | 1.05 | 1.027 | 0.011 | 0.361 |
| 651 | 1.015 | 1.066 | 1.035 | 1.03 | 0.012 | 0.366 |
| 652 | 0.982 | 1.151 | 1.032 | 1.015 | 0.008 | 0.494 |
| 653 | 1.013 | 1.187 | 1.005 | 1.01 | 0.013 | 0.386 |
| 654 | 1.021 | 1.101 | 0.993 | 1.046 | -0.002 | 0.716 |
| 655 | 1.006 | 1.148 | 0.987 | 1.014 | 0.002 | 0.722 |
| 656 | 0.987 | 1.161 | 1.01 | 1.016 | 0.004 | 0.958 |
| 657 | 0.987 | 1.163 | 1.006 | 0.985 | 0.032 | 0.276 |
| 658 | 1.001 | 1.037 | 0.993 | 0.996 | 0.002 | 0.67 |
| 659 | 1.002 | 0.99 | 0.995 | 1.014 | 0.002 | 0.975 |
| 660 | 1.012 | 1.014 | 0.99 | 1.023 | 0.008 | 0.432 |
| 661 | 1.035 | 0.996 | 1.017 | 0.973 | -0.003 | 0.646 |
| 662 | 1.026 | 1.026 | 1.034 | 1.003 | 0.019 | 0.337 |
| 663 | 1.018 | 1.031 | 1.002 | 1.014 | 0.011 | 0.383 |
| 664 | 1.025 | 1.054 | 0.968 | 0.996 | 0.007 | 0.503 |
| 665 | 0.988 | 0.999 | 1.002 | 0.997 | -0.01 | 0.339 |
| 666 | 0.985 | 1.007 | 1.005 | 0.995 | -0.003 | 0.89 |
3c) Result of two-distribution perturbation analysis for apoptosis when each response function was separately applied (100 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin   | Hill | Sat   | Acc   | Synergistic effect | p-value |
|-----|------------------------------------------|-------|------|-------|-------|-------------------|---------|
| 1   | pm1-pm2                                  | 1.03  | 1.057| 1.034 | 1.045 | 0.028             | 0.23    |
| 2   | pm1-pm3                                  | 1.034 | 1.069| 1.058 | 1.055 | 0.032             | 0.273   |
| 3   | pm1-pm4                                  | 1.031 | 1.062| 1.011 | 1.005 | -0.014            | 0.397   |
| 4   | pm1-pm5                                  | 1.019 | 0.996| 1.026 | 1.014 | 0.022             | 0.939   |
| 5   | pm1-pm6                                  | 1.055 | 1.029| 1.155 | 1.056 | 0.022             | 0.231   |
| 6   | pm1-pm7                                  | 1.944 | 1.612| 2.075 | 1.613 | -0.109            | 0.008   |
| 7   | pm1-pm8                                  | 1.013 | 1.033| 1.022 | 1.002 | 0.005             | 0.835   |
| 8   | pm1-pm9                                  | 1.06  | 1.124| 1.066 | 1.059 | 0.027             | 0.208   |
| 9   | pm1-pm10                                 | 2.265 | 1.896| 2.043 | 2.238 | 0.076             | 0.018   |
| 10  | pm1-pm11                                 | 1.025 | 1.087| 0.99  | 1.029 | 0.012             | 0.371   |
| 11  | pm1-pm12                                 | 1.152 | 1.215| 1.056 | 1.267 | -0.026            | 0.256   |
| 12  | pm1-pm13                                 | 0.972 | 1.051| 0.993 | 0.975 | -0.026            | 0.282   |
| 13  | pm1-pm14                                 | 1.012 | 1.071| 0.993 | 1.046 | 0.012             | 0.361   |
| 14  | pm1-pm15                                 | 1.052 | 1.078| 1.067 | 1.013 | 0.031             | 0.23    |
| 15  | pm1-pm16                                 | 0.996 | 1.077| 1.048 | 1.019 | 0.019             | 0.335   |
| 16  | pm1-pm17                                 | 1.002 | 1.045| 1.028 | 0.988 | -0.001            | 0.759   |
| 17  | pm1-pm18                                 | 0.998 | 0.995| 1.033 | 1.004 | -0.007            | 0.483   |
| 18  | pm1-pm19                                 | 1.001 | 1.031| 1.014 | 1.037 | 0.006             | 0.535   |
| 19  | pm1-pm20                                 | 1.012 | 1.032| 1.01  | 1.033 | 0.004             | 0.634   |
| 20  | pm1-pm21                                 | 1.163 | 1.285| 1.412 | 1.066 | -0.045            | 0.156   |
| 21  | pm1-pm22                                 | 1.088 | 1.197| 1.119 | 1.072 | 0.025             | 0.243   |
| 22  | pm1-pm23                                 | 1.119 | 1.245| 1.15  | 1.087 | 0.013             | 0.38    |
| 23  | pm1-pm24                                 | 1.017 | 1.068| 1.01  | 1.027 | 0.012             | 0.36    |
| 24  | pm1-pm25                                 | 1.043 | 1.034| 0.994 | 1.04  | 0.013             | 0.382   |
|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 25 | pm1-pm26 | 1.024 | 1.016 | 1.012 | 1.02 | 0.003 | 0.88 |
| 26 | pm1-pm27 | 1.028 | 1.085 | 1.03 | 1.047 | 0.011 | 0.367 |
| 27 | pm1-pm28 | 1.262 | 1.112 | 1.149 | 1.382 | -0.045 | 0.156 |
| 28 | pm1-pm29 | 0.988 | 1.233 | 1.012 | 1.097 | -0.01 | 0.468 |
| 29 | pm1-pm30 | 0.925 | 0.951 | 0.951 | 0.926 | 0.01 | 0.418 |
| 30 | pm1-pm31 | 1.01 | 1.058 | 1.043 | 1.018 | -0.007 | 0.529 |
| 31 | pm1-pm32 | 1.022 | 1.187 | 1.033 | 1.066 | 0.024 | 0.23 |
| 32 | pm1-pm33 | 1.02 | 1.059 | 1.033 | 1.031 | 0.02 | 0.24 |
| 33 | pm1-pm34 | 1.038 | 1.109 | 1.03 | 0.992 | 0.023 | 0.211 |
| 34 | pm1-pm35 | 1.019 | 1.107 | 1.02 | 1.019 | 0.021 | 0.23 |
| 35 | pm1-pm36 | 1.028 | 1.041 | 1.003 | 1.032 | 0.012 | 0.369 |
| 36 | pm1-pm37 | 1.009 | 1.058 | 1.021 | 1.013 | 0.008 | 0.417 |
| 37 | pm2-pm3 | 1.01 | 1.039 | 1.01 | 0.999 | 0.011 | 0.367 |
| 38 | pm2-pm4 | 0.991 | 1.061 | 1.026 | 0.975 | -0.011 | 0.306 |
| 39 | pm2-pm5 | 1.004 | 0.985 | 0.974 | 1.018 | -0.001 | 0.877 |
| 40 | pm2-pm6 | 1.014 | 1 | 1.109 | 1.027 | 0.003 | 0.907 |
| 41 | pm2-pm7 | 1.967 | 1.565 | 2.081 | 1.61 | -0.096 | 0.013 |
| 42 | pm2-pm8 | 0.98 | 0.991 | 0.986 | 1.015 | -0.002 | 0.72 |
| 43 | pm2-pm9 | 1.05 | 1.077 | 1.01 | 1.011 | 0.005 | 0.975 |
| 44 | pm2-pm10 | 2.281 | 1.887 | 2.153 | 2.303 | 0.139 | 0.009 |
| 45 | pm2-pm11 | 0.983 | 1.003 | 0.995 | 1.015 | -0.004 | 0.62 |
| 46 | pm2-pm12 | 1.119 | 1.157 | 1.041 | 1.176 | -0.058 | 0.04 |
| 47 | pm2-pm13 | 0.975 | 1.069 | 1.005 | 1.002 | 0.007 | 0.418 |
| 48 | pm2-pm14 | 0.964 | 1.034 | 1.026 | 0.982 | 0.001 | 0.923 |
| 49 | pm2-pm15 | 1.023 | 1.03 | 1.023 | 0.99 | 0.013 | 0.384 |
| 50 | pm2-pm16 | 1.03 | 1.026 | 1.001 | 1.02 | 0.021 | 0.266 |
| 51 | pm2-pm17 | 1.004 | 1.009 | 0.99 | 0.954 | -0.01 | 0.485 |
| 52 | pm2-pm18 | 0.978 | 1 | 0.987 | 1.009 | -0.003 | 0.853 |
| 53 | pm2-pm19 | 1.006 | 1.014 | 1.004 | 1.017 | 0.013 | 0.36 |
| 54 | pm2-pm20 | 0.993 | 1.035 | 0.994 | 0.985 | 0.002 | 0.717 |
|   | pm2-pm21 | pm2-pm22 | pm2-pm23 | pm2-pm24 | pm2-pm25 | pm2-pm26 |
|---|---------|---------|---------|---------|---------|---------|
| 55| 1.097   | 1.275   | 1.378   | 1.013   | -0.068  | 0.024   |
| 56| 1.044   | 1.151   | 1.081   | 1.037   | 0.002   | 0.81    |
| 57| 1.06    | 1.228   | 1.109   | 1.06    | -0.005  | 0.534   |
| 58| 0.964   | 1.039   | 1.006   | 0.986   | -0.003  | 0.805   |
| 59| 0.978   | 0.976   | 0.986   | 0.992   | -0.014  | 0.368   |
| 60| 0.976   | 0.99    | 1.012   | 0.989   | -0.005  | 0.429   |
| 61| 1.025   | 1.015   | 1.045   | 1.015   | 0.006   | 0.505   |
| 62| 1.233   | 1.074   | 1.095   | 1.356   | -0.064  | 0.04    |
| 63| 1.033   | 1.237   | 1.009   | 1.048   | 0.007   | 0.501   |
| 64| 0.92    | 0.919   | 0.971   | 0.895   | 0.016   | 0.379   |
| 65| 1.01    | 1.029   | 1.016   | 0.994   | -0.009  | 0.481   |
| 66| 0.981   | 1.134   | 1.008   | 1.015   | -0.001  | 0.716   |
| 67| 1.0     | 0.995   | 0.993   | 1.007   | 0.001   | 0.604   |
| 68| 0.959   | 1.022   | 1.028   | 0.999   | 0       | 0.959   |
| 69| 0.996   | 1.012   | 0.993   | 1.001   | -0.002  | 0.71    |
| 70| 0.996   | 1       | 1.007   | 0.991   | 0.002   | 0.867   |
| 71| 0.982   | 1.01    | 1.001   | 1.003   | -0.001  | 0.963   |
| 72| 0.988   | 1.036   | 0.999   | 1.019   | -0.021  | 0.242   |
| 73| 0.991   | 1.021   | 1.017   | 1.039   | 0.013   | 0.37    |
| 74| 1.061   | 1.016   | 1.073   | 1.02    | 0.001   | 0.938   |
| 75| 1.943   | 1.587   | 2.099   | 1.612   | -0.099  | 0.016   |
| 76| 1.005   | 1.025   | 1.029   | 1.001   | 0.012   | 0.361   |
| 77| 1.035   | 1.024   | 1.061   | 1       | -0.01   | 0.352   |
| 78| 2.291   | 1.948   | 2.459   | 2.025   | 0.156   | 0.004   |
| 79| 1.01    | 1.01    | 1.024   | 0.996   | 0       | 0.663   |
| 80| 1.098   | 1.192   | 1.016   | 1.192   | -0.064  | 0.04    |
| 81| 0.995   | 1.05    | 0.993   | 0.967   | -0.012  | 0.32    |
| 82| 1.007   | 1.051   | 0.999   | 1.002   | 0.007   | 0.531   |
| 83| 0.993   | 1.035   | 0.982   | 1.013   | -0.006  | 0.403   |
| 84| 0.97    | 0.997   | 1.014   | 0.997   | -0.011  | 0.38    |
|   | pm3-pm17 | pm3-pm18 | pm3-pm19 | pm3-pm20 | pm3-pm21 | pm3-pm22 | pm3-pm23 | pm3-pm24 | pm3-pm25 | pm3-pm26 | pm3-pm27 | pm3-pm28 | pm3-pm29 | pm3-pm30 | pm3-pm31 | pm3-pm32 | pm3-pm33 | pm3-pm34 | pm3-pm35 | pm3-pm36 | pm3-pm37 | pm3-pm38 | pm3-pm39 | pm3-pm40 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 85| pm3-pm17 | 0.98    | 0.99    | 1.014   | 0.977   | -0.017  | 0.353   |
| 86| pm3-pm18 | 1.021   | 0.995   | 1.008   | 1.012   | 0.004   | 0.753   |
| 87| pm3-pm19 | 0.982   | 1.019   | 1.015   | 1.008   | 0.001   | 0.645   |
| 88| pm3-pm20 | 0.994   | 1.031   | 1.016   | 0.999   | 0.002   | 0.817   |
| 89| pm3-pm21 | 1.124   | 1.287   | 1.337   | 1.005   | -0.078  | 0.016   |
| 90| pm3-pm22 | 1.069   | 1.163   | 1.064   | 1.034   | -0.002  | 0.713   |
| 91| pm3-pm23 | 1.073   | 1.221   | 1.146   | 1.054   | -0.004  | 0.641   |
| 92| pm3-pm24 | 1.016   | 1.028   | 1.027   | 1.014   | 0.012   | 0.327   |
| 93| pm3-pm25 | 0.998   | 1.014   | 0.997   | -0.003  | 0.92    |
| 94| pm3-pm26 | 0.992   | 1.016   | 1.027   | 1.017   | 0.008   | 0.522   |
| 95| pm3-pm27 | 1.008   | 1.04    | 1.038   | 1.031   | 0.003   | 0.67    |
| 96| pm3-pm28 | 1.232   | 1.053   | 1.146   | 1.357   | -0.064  | 0.021   |
| 97| pm3-pm29 | 0.995   | 1.194   | 1.001   | 1.041   | -0.025  | 0.239   |
| 98| pm3-pm30 | 0.899   | 0.892   | 0.972   | 0.895   | -0.004  | 0.911   |
| 99| pm3-pm31 | 1.018   | 1.055   | 1.04    | 1.01    | 0.002   | 0.716   |
| 100| pm3-pm32 | 0.99    | 1.144   | 1.037   | 1.047   | 0.011   | 0.395   |
| 101| pm3-pm33 | 1.008   | 1.008   | 1.026   | 1.016   | 0.009   | 0.594   |
| 102| pm3-pm34 | 1.044   | 1.079   | 1       | 0.98    | 0.016   | 0.395   |
| 103| pm3-pm35 | 1.015   | 1.023   | 1.022   | 0.988   | 0.002   | 0.67    |
| 104| pm3-pm36 | 0.987   | 0.983   | 1.021   | 1.026   | -0.001  | 0.825   |
| 105| pm3-pm37 | 1.026   | 0.984   | 1.015   | 1.031   | 0.007   | 0.523   |
| 106| pm4-pm5  | 1.015   | 1.053   | 0.994   | 1.026   | -0.002  | 0.801   |
| 107| pm4-pm6  | 0.986   | 1.012   | 1.076   | 0.986   | -0.047  | 0.152   |
| 108| pm4-pm7  | 1.921   | 1.625   | 2.073   | 1.588   | -0.128  | 0.009   |
| 109| pm4-pm8  | 1.022   | 1.04    | 1       | 0.987   | -0.011  | 0.347   |
| 110| pm4-pm9  | 1.027   | 1.108   | 1.056   | 1.04    | -0.002  | 0.771   |
| 111| pm4-pm10 | 2.095   | 1.882   | 2.002   | 2.149   | -0.013  | 0.34    |
| 112| pm4-pm11 | 1.02    | 1.05    | 1.019   | 0.999   | -0.009  | 0.452   |
| 113| pm4-pm12 | 1.128   | 1.233   | 1.066   | 1.205   | -0.051  | 0.03    |
| 114| pm4-pm13 | 0.983   | 1.053   | 1.024   | 0.97    | -0.026  | 0.286   |
|   | pm4/pm14 | pm4/pm15 | pm4/pm16 | pm4/pm17 | pm4/pm18 | pm4/pm19 | pm4/pm20 | pm4/pm21 | pm4/pm22 | pm4/pm23 | pm4/pm24 | pm4/pm25 | pm4/pm26 | pm4/pm27 | pm4/pm28 | pm4/pm29 | pm4/pm30 | pm4/pm31 | pm4/pm32 | pm4/pm33 | pm4/pm34 | pm4/pm35 | pm4/pm36 | pm4/pm37 | pm5/pm6 | pm5/pm7 | pm5/pm8 | pm5/pm9 | pm5/pm10 | pm5/pm11 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 115 | 1.009 | 1.062 | 1.031 | 0.997 | -0.003 | 0.815 |
| 116 | 1.008 | 1.077 | 1.041 | 0.979 | -0.005 | 0.86 |
| 117 | 1.018 | 1.089 | 1.004 | 0.963 | -0.007 | 0.545 |
| 118 | 1.016 | 1.082 | 1.016 | 0.996 | 0 | 0.675 |
| 119 | 1.014 | 1.021 | 1.01 | 0.974 | -0.02 | 0.213 |
| 120 | 1.021 | 1.022 | 1.014 | 1.004 | -0.01 | 0.589 |
| 121 | 1.021 | 1.075 | 1.005 | 1.002 | -0.002 | 0.798 |
| 122 | 1.144 | 1.294 | 1.429 | 1.004 | -0.069 | 0.045 |
| 123 | 1.066 | 1.243 | 1.16 | 1.058 | 0.027 | 0.25 |
| 124 | 1.132 | 1.404 | 1.125 | 1.65 | 0.034 | 0.23 |
| 125 | 1.014 | 1.049 | 1.04 | 0.999 | -0.004 | 0.986 |
| 126 | 1.085 | 1.06 | 0.995 | 1.01 | -0.008 | 0.494 |
| 127 | 1.028 | 1.072 | 0.994 | 0.976 | -0.008 | 0.403 |
| 128 | 1.025 | 1.053 | 1.026 | 1.024 | -0.015 | 0.339 |
| 129 | 1.235 | 1.16 | 1.17 | 1.334 | -0.056 | 0.022 |
| 130 | 1.04 | 1.314 | 0.993 | 1.108 | 0.011 | 0.395 |
| 131 | 0.931 | 0.97 | 0.972 | 0.881 | 0 | 0.838 |
| 132 | 0.99 | 1.073 | 1.045 | 1.042 | -0.011 | 0.305 |
| 133 | 0.993 | 1.145 | 1.025 | 1.007 | -0.021 | 0.258 |
| 134 | 1.01 | 1.054 | 1.024 | 1.015 | 0 | 0.998 |
| 135 | 0.976 | 1.121 | 1.055 | 0.998 | 0.008 | 0.474 |
| 136 | 0.994 | 1.077 | 0.983 | 0.978 | -0.023 | 0.213 |
| 137 | 1.016 | 1.053 | 1.02 | 1.03 | 0.005 | 0.852 |
| 138 | 1.022 | 1.062 | 1.01 | 1.013 | -0.001 | 0.647 |
| 139 | 1.053 | 0.963 | 1.108 | 0.989 | -0.006 | 0.437 |
| 140 | 1.968 | 1.591 | 2.08 | 1.585 | -0.096 | 0.013 |
| 141 | 0.982 | 1.011 | 1.007 | 0.97 | -0.003 | 0.882 |
| 142 | 0.996 | 1.026 | 1.023 | 1.038 | -0.012 | 0.382 |
| 143 | 2.128 | 1.711 | 1.973 | 2.205 | -0.013 | 0.339 |
| 144 | 1.016 | 0.975 | 1.002 | 0.989 | -0.007 | 0.409 |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
|   | pm5-pm12 | 1.125 | 1.174 | 1.016 | 1.218 | -0.048 | 0.171 |
| 146 | pm5-pm13 | 0.977 | 0.989 | 0.972 | 0.97 | -0.029 | 0.202 |
| 147 | pm5-pm14 | 1.019 | 1.024 | 1.026 | 0.993 | 0.015 | 0.333 |
| 148 | pm5-pm15 | 0.987 | 1.003 | 1.004 | 1.018 | -0.001 | 0.965 |
| 149 | pm5-pm16 | 1.013 | 0.998 | 1.016 | 0.976 | 0.003 | 0.792 |
| 150 | pm5-pm17 | 1.015 | 0.988 | 1.002 | 0.978 | -0.003 | 0.75 |
| 151 | pm5-pm18 | 0.998 | 0.985 | 0.994 | 0.986 | -0.006 | 0.406 |
| 152 | pm5-pm19 | 0.986 | 1.003 | 1.007 | 1.024 | 0.007 | 0.448 |
| 153 | pm5-pm20 | 0.983 | 0.973 | 0.983 | 0.99 | -0.018 | 0.383 |
| 154 | pm5-pm21 | 1.113 | 1.277 | 1.361 | 1.025 | -0.065 | 0.038 |
| 155 | pm5-pm22 | 1.083 | 1.136 | 1.069 | 1.009 | -0.002 | 0.677 |
| 156 | pm5-pm23 | 1.086 | 1.208 | 1.106 | 1.043 | -0.009 | 0.426 |
| 157 | pm5-pm24 | 0.999 | 0.993 | 0.988 | 0.995 | -0.008 | 0.597 |
| 158 | pm5-pm25 | 1.008 | 0.963 | 0.991 | 0.986 | -0.011 | 0.342 |
| 159 | pm5-pm26 | 1.011 | 0.981 | 1.016 | 0.993 | 0.003 | 0.989 |
| 160 | pm5-pm27 | 0.995 | 0.996 | 1.042 | 1.012 | -0.008 | 0.583 |
| 161 | pm5-pm28 | 1.211 | 1.031 | 1.141 | 1.375 | -0.064 | 0.037 |
| 162 | pm5-pm29 | 0.99 | 1.147 | 0.953 | 1.102 | -0.027 | 0.218 |
| 163 | pm5-pm30 | 0.909 | 0.888 | 0.983 | 0.864 | 0 | 0.92 |
| 164 | pm5-pm31 | 1.021 | 1.03 | 1.056 | 1.038 | 0.015 | 0.302 |
| 165 | pm5-pm32 | 1.001 | 1.145 | 1.02 | 1.022 | 0.011 | 0.314 |
| 166 | pm5-pm33 | 1.014 | 0.964 | 1.009 | 0.995 | -0.003 | 0.61 |
| 167 | pm5-pm34 | 1.024 | 1.025 | 1.026 | 1.005 | 0.018 | 0.378 |
| 168 | pm5-pm35 | 0.989 | 0.992 | 1.016 | 1.004 | -0.003 | 0.624 |
| 169 | pm5-pm36 | 0.998 | 1.02 | 1.004 | 1.022 | 0.014 | 0.308 |
| 170 | pm5-pm37 | 1.004 | 1.02 | 0.986 | 0.994 | 0.001 | 0.731 |
| 171 | pm6-pm7 | 1.996 | 1.567 | 2.252 | 1.633 | -0.078 | 0.018 |
| 172 | pm6-pm8 | 1.048 | 1.02 | 1.092 | 1.017 | 0.01 | 0.328 |
| 173 | pm6-pm9 | 1.039 | 1.03 | 1.146 | 1.011 | -0.014 | 0.356 |
| 174 | pm6-pm10 | 2.271 | 1.961 | 2.317 | 2.353 | 0.17 | 0.005 |
|    | pm6-pm11 | pm6-pm12 | pm6-pm13 | pm6-pm14 | pm6-pm15 | pm6-pm16 | pm6-pm17 | pm6-pm18 | pm6-pm19 | pm6-pm20 | pm6-pm21 | pm6-pm22 | pm6-pm23 | pm6-pm24 | pm6-pm25 | pm6-pm26 | pm6-pm27 | pm6-pm28 | pm6-pm29 | pm6-pm30 | pm6-pm31 | pm6-pm32 | pm6-pm33 | pm6-pm34 | pm6-pm35 | pm6-pm36 | pm6-pm37 | pm6-pm38 | pm7-pm8 | pm7-pm9 | pm7-pm10 |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 175| 1.041    | 1.141    | 1.006    | 1.045    | 1.031    | 1.022    | 1.04     | 1.026    | 1.014    | 1.04     | 1.107    | 1.086    | 1.084    | 1.023    | 1.044    | 1.026    | 1.048    | 1.293    | 1.033    | 0.92     | 1.059    | 1.039    | 1.061    | 1.045    | 1.003    | 1.048    | 1.036    | 4.003    |       |
| 176| 1.013    | 1.179    | 1.035    | 1.079    | 0.994    | 1.03    | 1.014    | 1.014    | 1.13     | 1.238    | 1.318    | 1.139    | 1.238    | 1.035    | 1.004    | 0.99     | 1.06     | 1.1     | 1.15     | 1.11     | 1.05     | 1.054    | 1.159    | 1.004    | 1.007    | 1.016    | 1.622    | 2.022    | 4.003    | 2.584    |       |
| 177| 1.104    | 1.126    | 1.087    | 1.11     | 1.109    | 1.105    | 1.098    | 1.116    | 1.09     | 1.235    | 1.532    | 1.155    | 1.101    | 1.101    | 1.1     | 1.139    | 1.082    | 1.217    | 1.113    | 1.103    | 1.064    | 1.118    | 1.121    | 1.111    | 2.083    | 2.121    | 3.865    |       |
| 178| 1.045    | 1.241    | 1.012    | 1.027    | 1.029    | 1.022    | 0.999    | 1.009    | 1.046    | 1.042    | 1.02    | 1.027    | 1.019    | 1.019    | 1.012    | 1.02    | 1.016    | 1.31    | 1.12     | 1.113    | 1.03     | 1.084    | 1.108    | 1.121    | 0.988    | 1.018    | 1.106    | 3.347    |       |
| 179| 0.009    | -0.048   | -0.009   | 0.027    | -0.001   | 0.008    | 0.001    | 0.006    | 0.011    | -0.047   | 0.17     | -0.013   | 0.008    | 0.005    | 0.005    | 0.004    | -0.006   | -0.061   | -0.012   | 0.012    | -0.003   | 0.015    | 0.015    | 0.002    | 0.009    | 0.009    | 0.527    |       |
| 180| 0.441    | 0.158    | 0.47     | 0.27     | 0.717    | 0.533    | 0.994    | 0.557    | 0.331    | 0.461    | 0.17     | 0.37     | 0.414    | 0.811    | 0.979    | 0.498    | 0.548    | 0.042    | 0.343    | 0.331    | 0.968    | 0.361    | 0.368    | 0.933    | 0.555    | 0.551    |       |
| 181| 1.014    | 1.017    | 1.104    | 1.03    | 1.41     | 1.109    | 0.441    | 1.41     | 1.41     | 1.41     | 0.441    | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     | 1.41     |       |
| pm7-pm11 | 1.919 | 1.627 | 2.097 | 1.656 | -0.084 | 0.011 |
|---------|-------|-------|-------|-------|--------|-------|
| pm7-pm12 | 2.142 | 1.777 | 2.156 | 1.945 | -0.082 | 0.018 |
| pm7-pm13 | 1.928 | 1.578 | 2.067 | 1.581 | -0.124 | 0.008 |
| pm7-pm14 | 2.014 | 1.541 | 2.132 | 1.578 | -0.09 | 0.015 |
| pm7-pm15 | 1.952 | 1.607 | 2.067 | 1.584 | -0.107 | 0.01 |
| pm7-pm16 | 1.975 | 1.586 | 2.083 | 1.595 | -0.094 | 0.017 |
| pm7-pm17 | 2.018 | 1.536 | 2.117 | 1.625 | -0.081 | 0.013 |
| pm7-pm18 | 1.948 | 1.515 | 2.021 | 1.554 | -0.143 | 0.008 |
| pm7-pm19 | 1.947 | 1.51 | 2.107 | 1.587 | -0.116 | 0.006 |
| pm7-pm20 | 2.004 | 1.584 | 2.069 | 1.584 | -0.096 | 0.011 |
| pm7-pm21 | 2.153 | 1.921 | 2.781 | 1.63 | -0.043 | 0.197 |
| pm7-pm22 | 2.1 | 1.701 | 2.243 | 1.663 | -0.056 | 0.023 |
| pm7-pm23 | 2.042 | 1.813 | 2.22 | 1.677 | -0.088 | 0.02 |
| pm7-pm24 | 1.966 | 1.601 | 2.12 | 1.574 | -0.092 | 0.016 |
| pm7-pm25 | 1.974 | 1.529 | 2.12 | 1.59 | -1 | 0.01 |
| pm7-pm26 | 1.992 | 1.594 | 2.098 | 1.6 | -0.083 | 0.019 |
| pm7-pm27 | 1.983 | 1.562 | 2.125 | 1.628 | -0.101 | 0.007 |
| pm7-pm28 | 2.464 | 1.624 | 2.308 | 2.199 | -0.011 | 0.387 |
| pm7-pm29 | 2.08 | 1.834 | 2.031 | 1.686 | -0.073 | 0.01 |
| pm7-pm30 | 2.082 | 1.728 | 2.372 | 1.448 | 0.091 | 0.012 |
| pm7-pm31 | 1.994 | 1.703 | 2.127 | 1.622 | -0.066 | 0.042 |
| pm7-pm32 | 1.934 | 1.597 | 2.054 | 1.636 | -0.136 | 0.009 |
| pm7-pm33 | 1.961 | 1.551 | 2.094 | 1.593 | -0.105 | 0.006 |
| pm7-pm34 | 1.957 | 1.576 | 2.068 | 1.6 | -0.103 | 0.008 |
| pm7-pm35 | 1.985 | 1.532 | 2.08 | 1.585 | -0.114 | 0.006 |
| pm7-pm36 | 1.959 | 1.534 | 2.077 | 1.583 | -0.114 | 0.005 |
| pm7-pm37 | 1.955 | 1.544 | 2.103 | 1.584 | -0.109 | 0.009 |
| pm8-pm9 | 1.012 | 1.069 | 1.036 | 1.023 | 0.003 | 0.647 |
| pm8-pm10 | 2.273 | 1.981 | 2.143 | 2.024 | 0.089 | 0.014 |
| pm8-pm11 | 1.018 | 0.997 | 0.994 | 1.012 | 0.003 | 0.889 |
|    | pm8-pm12 | pm8-pm13 | pm8-pm14 | pm8-pm15 | pm8-pm16 | pm8-pm17 | pm8-pm18 | pm8-pm19 | pm8-pm20 | pm8-pm21 | pm8-pm22 | pm8-pm23 | pm8-pm24 | pm8-pm25 | pm8-pm26 | pm8-pm27 | pm8-pm28 | pm8-pm29 | pm8-pm30 | pm8-pm31 | pm8-pm32 | pm8-pm33 | pm8-pm34 | pm8-pm35 | pm8-pm36 | pm8-pm37 | pm9-pm10 | pm9-pm11 | pm9-pm12 | pm9-pm13 |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 235| 1.078    | 1.149    | 1.034    | 1.185    | -0.069   | 0.024    |
| 236| 0.98     | 1.018    | 0.992    | 0.951    | -0.02    | 0.394    |
| 237| 0.995    | 1.065    | 0.986    | 0.987    | 0.008    | 0.458    |
| 238| 1.023    | 0.983    | 1.012    | 1.017    | 0.006    | 0.493    |
| 239| 0.99     | 1.036    | 1.005    | 0.989    | 0.008    | 0.4      |
| 240| 0.99     | 0.994    | 0.996    | 0.995    | -0.004   | 0.664    |
| 241| 1.004    | 0.982    | 0.985    | 1.0      | -0.001   | 0.997    |
| 242| 1.004    | 0.973    | 0.995    | 0.99     | -0.006   | 0.501    |
| 243| 0.982    | 1.018    | 1.003    | 0.998    | 0.001    | 0.823    |
| 244| 1.118    | 1.284    | 1.377    | 1.004    | -0.062   | 0.023    |
| 245| 1.096    | 1.138    | 1.09     | 1.009    | 0.007    | 0.458    |
| 246| 1.054    | 1.265    | 1.094    | 1.053    | -0.003   | 0.922    |
| 247| 0.966    | 0.992    | 1.01     | 0.995    | -0.01    | 0.335    |
| 248| 1.005    | 0.992    | 1.001    | 0.98     | -0.002   | 0.915    |
| 249| 0.999    | 1.011    | 1.004    | 1.001    | 0.007    | 0.428    |
| 250| 1.007    | 1.012    | 1.037    | 0.995    | -0.006   | 0.45     |
| 251| 1.221    | 1.072    | 1.112    | 1.338    | -0.067   | 0.031    |
| 252| 1.038    | 1.172    | 0.996    | 1.106    | 0.004    | 0.977    |
| 253| 0.948    | 0.895    | 0.947    | 0.923    | 0.018    | 0.351    |
| 254| 1.01     | 1.034    | 1.046    | 1.015    | 0.006    | 0.412    |
| 255| 1.01     | 1.125    | 1.013    | 1.023    | 0.008    | 0.563    |
| 256| 0.997    | 0.992    | 0.976    | 1.018    | -0.001   | 0.983    |
| 257| 0.991    | 1.03     | 1.017    | 0.995    | 0.007    | 0.596    |
| 258| 0.998    | 1.058    | 0.974    | 1.012    | 0.008    | 0.548    |
| 259| 0.994    | 1.013    | 0.99     | 0.969    | -0.005   | 0.722    |
| 260| 1.012    | 0.994    | 0.994    | 0.993    | -0.001   | 0.844    |
| 261| 2.297    | 2.032    | 2.213    | 2.069    | 0.1      | 0.016    |
| 262| 1.012    | 1.023    | 1.028    | 1.023    | -0.018   | 0.364    |
| 263| 1.174    | 1.159    | 1.064    | 1.273    | -0.05    | 0.175    |
| 264| 1.014    | 1.038    | 1.031    | 0.998    | -0.022   | 0.272    |
|   | pm9-pm14 | pm9-pm15 | pm9-pm16 | pm9-pm17 | pm9-pm18 | pm9-pm19 | pm9-pm20 | pm9-pm21 | pm9-pm22 | pm9-pm23 | pm9-pm24 | pm9-pm25 | pm9-pm26 | pm9-pm27 | pm9-pm28 | pm9-pm29 | pm9-pm30 | pm9-pm31 | pm9-pm32 | pm9-pm33 | pm9-pm34 | pm9-pm35 | pm9-pm36 | pm9-pm37 | pm10-pm11 | pm10-pm12 | pm10-pm13 | pm10-pm14 | pm10-pm15 | pm10-pm16 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 265| 1.043   | 1.076   | 1.062   | 1.022   | 0.014   | 0.319   |
| 266| 1.023   | 1.046   | 1.078   | 1.009   | -0.001  | 0.841   |
| 267| 1.069   | 1.056   | 1.012   | 1.042   | 0.01    | 0.34    |
| 268| 1.022   | 1.054   | 1.066   | 1.018   | 0.005   | 0.978   |
| 269| 1.031   | 0.996   | 1.026   | 1.024   | -0.014  | 0.395   |
| 270| 1.013   | 1.031   | 1.008   | 1.045   | -0.009  | 0.422   |
| 271| 1.007   | 1.023   | 1.055   | 1.051   | -0.002  | 0.888   |
| 272| 1.141   | 1.328   | 1.424   | 1.053   | -0.058  | 0.027   |
| 273| 1.121   | 1.221   | 1.125   | 1.028   | 0.011   | 0.312   |
| 274| 1.104   | 1.288   | 1.142   | 1.066   | -0.006  | 0.588   |
| 275| 1.053   | 1.071   | 1.021   | 1.01    | 0.001   | 0.725   |
| 276| 1.051   | 1.034   | 1.022   | 1.018   | -0.003  | 0.705   |
| 277| 1.008   | 1.055   | 1.029   | 1.041   | 0       | 0.813   |
| 278| 1.02    | 1.057   | 1.053   | 1.019   | -0.018  | 0.305   |
| 279| 1.274   | 1.122   | 1.144   | 1.382   | -0.059  | 0.029   |
| 280| 1.038   | 1.17    | 1.014   | 1.083   | -0.035  | 0.234   |
| 281| 0.955   | 0.931   | 0.999   | 0.892   | -0.003  | 0.723   |
| 282| 1.04    | 1.121   | 1.08    | 1.025   | 0.009   | 0.494   |
| 283| 1.027   | 1.163   | 1.025   | 1.063   | -0.002  | 0.947   |
| 284| 1.026   | 1.075   | 1.04    | 1.021   | 0.007   | 0.576   |
| 285| 1.06    | 1.077   | 1.02    | 1.019   | 0.006   | 0.47    |
| 286| 1.045   | 1.071   | 1.044   | 0.992   | -0.001  | 0.732   |
| 287| 1.039   | 1.04    | 1.035   | 1.02    | 0.001   | 0.925   |
| 288| 1.01    | 1.067   | 1.023   | 1.031   | -0.003  | 0.666   |
| 289| 2.315   | 1.934   | 2.162   | 2.112   | 0.107   | 0.007   |
| 290| 2.2     | 1.968   | 1.937   | 2.464   | -0.06   | 0.02    |
| 291| 2.293   | 2.014   | 2.133   | 2.04    | 0.093   | 0.013   |
| 292| 2.243   | 1.852   | 2.046   | 2.221   | 0.069   | 0.03    |
| 293| 2.108   | 1.905   | 2.100   | 2.246   | 0.065   | 0.040   |
| 294| 2.022   | 1.781   | 1.859   | 2.023   | -0.098  | 0.012   |
|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| 295 | pm10-pm17 | 2.298 | 1.953 | 2.101 | 2.045 | 0.079 | 0.011 |
| 296 | pm10-pm18 | 2.012 | 1.724 | 1.899 | 2.087 | -0.087 | 0.014 |
| 297 | pm10-pm19 | 2.151 | 1.914 | 2.082 | 2.266 | 0.085 | 0.011 |
| 298 | pm10-pm20 | 2.323 | 1.993 | 2.175 | 2.055 | 0.115 | 0.005 |
| 299 | pm10-pm21 | 2.201 | 2.144 | 2.567 | 2.067 | -0.035 | 0.261 |
| 300 | pm10-pm22 | 2.065 | 1.889 | 1.939 | 2.106 | -0.098 | 0.019 |
| 301 | pm10-pm23 | 2.127 | 1.941 | 2.043 | 2.117 | -0.084 | 0.014 |
| 302 | pm10-pm24 | 2.077 | 1.823 | 1.986 | 2.122 | -0.021 | 0.26 |
| 303 | pm10-pm25 | 2.119 | 1.741 | 2.001 | 2.133 | -0.02 | 0.287 |
| 304 | pm10-pm26 | 2.307 | 1.922 | 2.186 | 2.078 | 0.105 | 0.008 |
| 305 | pm10-pm27 | 2.057 | 1.745 | 1.891 | 2.093 | -0.094 | 0.016 |
| 306 | pm10-pm28 | 2.399 | 1.709 | 2.073 | 2.727 | -0.047 | 0.162 |
| 307 | pm10-pm29 | 2.008 | 1.935 | 1.889 | 2.209 | -0.085 | 0.016 |
| 308 | pm10-pm30 | 2.115 | 1.846 | 2.079 | 2.062 | 0.094 | 0.018 |
| 309 | pm10-pm31 | 2.046 | 1.724 | 1.889 | 2.11 | -0.1 | 0.013 |
| 310 | pm10-pm32 | 2.187 | 1.947 | 2.077 | 2.333 | 0.08 | 0.02 |
| 311 | pm10-pm33 | 2.265 | 1.941 | 2.167 | 2 | 0.074 | 0.015 |
| 312 | pm10-pm34 | 2.29 | 2.01 | 2.134 | 2.042 | 0.096 | 0.011 |
| 313 | pm10-pm35 | 2.304 | 1.974 | 2.12 | 2.038 | 0.085 | 0.016 |
| 314 | pm10-pm36 | 2.258 | 2.018 | 2.144 | 2.043 | 0.098 | 0.012 |
| 315 | pm10-pm37 | 2.294 | 1.979 | 2.161 | 1.995 | 0.086 | 0.019 |
| 316 | pm11-pm12 | 1.103 | 1.176 | 1.028 | 1.284 | -0.04 | 0.188 |
| 317 | pm11-pm13 | 0.99 | 1.039 | 1.013 | 0.985 | -0.006 | 0.564 |
| 318 | pm11-pm14 | 1.045 | 1.056 | 1.008 | 1.003 | 0.021 | 0.274 |
| 319 | pm11-pm15 | 1.02 | 1.042 | 1.001 | 1.023 | 0.011 | 0.304 |
| 320 | pm11-pm16 | 1.004 | 1.068 | 1.023 | 1.032 | 0.027 | 0.214 |
| 321 | pm11-pm17 | 0.963 | 0.987 | 1.004 | 0.959 | -0.028 | 0.285 |
| 322 | pm11-pm18 | 0.982 | 0.968 | 0.999 | 1.018 | -0.012 | 0.346 |
| 323 | pm11-pm19 | 0.984 | 1.001 | 1.007 | 0.983 | -0.01 | 0.389 |
| 324 | pm11-pm20 | 0.998 | 1.029 | 0.996 | 0.995 | -0.002 | 0.653 |
|       | pm11-pm21 | pm11-pm22 | pm11-pm23 | pm11-pm24 | pm11-pm25 | pm11-pm26 |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 325   | 1.116     | 1.274     | 1.339     | 1.033     | -0.075    | 0.019     |
| 326   | 1.045     | 1.191     | 1.072     | 1.04      | 0.003     | 0.824     |
| 327   | 1.066     | 1.242     | 1.115     | 1.09      | 0.002     | 0.985     |
| 328   | 0.997     | 1.045     | 1.007     | 0.99      | 0.001     | 0.731     |
| 329   | 0.992     | 1.028     | 1.003     | 1.015     | 0.005     | 0.592     |
| 330   | 0.966     | 1         | 0.991     | 1.009     | -0.013    | 0.304     |
| 331   | 1.011     | 1.052     | 1.03      | 1.014     | 0.001     | 0.821     |
| 332   | 1.248     | 1.057     | 1.11      | 1.367     | -0.065    | 0.042     |
| 333   | 0.997     | 1.196     | 0.976     | 1.065     | -0.023    | 0.245     |
| 334   | 0.942     | 0.879     | 0.96      | 0.928     | 0.009     | 0.57      |
| 335   | 1.043     | 1.028     | 1.014     | 1.037     | 0.002     | 0.934     |
| 336   | 1.003     | 1.114     | 1.014     | 1.059     | 0.005     | 0.525     |
| 337   | 1.018     | 1.005     | 0.998     | 1.006     | 0.002     | 0.916     |
| 338   | 0.997     | 1.064     | 0.992     | 1         | 0.005     | 0.818     |
| 339   | 0.975     | 1.015     | 1.014     | 0.989     | -0.011    | 0.309     |
| 340   | 1.005     | 0.975     | 1.004     | 1.005     | -0.007    | 0.525     |
| 341   | 1.008     | 0.978     | 0.985     | 1.039     | -0.005    | 0.71      |
| 342   | 1.081     | 1.177     | 0.997     | 1.25      | -0.065    | 0.022     |
| 343   | 1.068     | 1.2       | 1.056     | 1.209     | -0.052    | 0.032     |
| 344   | 1.115     | 1.135     | 1.031     | 1.274     | -0.05     | 0.175     |
| 345   | 1.113     | 1.201     | 1.05      | 1.256     | -0.028    | 0.287     |
| 346   | 1.083     | 1.229     | 1.019     | 1.209     | -0.049    | 0.161     |
| 347   | 1.1       | 1.193     | 1.019     | 1.217     | -0.05     | 0.188     |
| 348   | 1.078     | 1.164     | 1.015     | 1.214     | -0.064    | 0.024     |
| 349   | 1.12      | 1.134     | 1.018     | 1.211     | -0.064    | 0.032     |
| 350   | 1.267     | 1.538     | 1.424     | 1.262     | -0.071    | 0.018     |
| 351   | 1.156     | 1.347     | 1.128     | 1.259     | -0.039    | 0.204     |
| 352   | 1.203     | 1.423     | 1.147     | 1.296     | -0.038    | 0.295     |
| 353   | 1.073     | 1.161     | 1.047     | 1.222     | -0.061    | 0.023     |
| 354   | 1.086     | 1.179     | 1.056     | 1.225     | -0.046    | 0.156     |
| 355  | pm12-pm26 | 1.107 | 1.153 | 1.047 | 1.217 | -0.052 | 0.04 |
| 356  | pm12-pm27 | 1.112 | 1.18 | 1.058 | 1.252 | -0.054 | 0.027 |
| 357  | pm12-pm28 | 1.37 | 1.226 | 1.162 | 1.627 | -0.092 | 0.019 |
| 358  | pm12-pm29 | 1.131 | 1.428 | 1.076 | 1.303 | -0.026 | 0.271 |
| 359  | pm12-pm30 | 1.062 | 1.043 | 0.939 | 1.139 | -0.05 | 0.036 |
| 360  | pm12-pm31 | 1.135 | 1.218 | 1.062 | 1.241 | -0.042 | 0.175 |
| 361  | pm12-pm32 | 1.114 | 1.311 | 1.005 | 1.279 | -0.043 | 0.197 |
| 362  | pm12-pm33 | 1.098 | 1.13 | 1.029 | 1.2 | -0.069 | 0.025 |
| 363  | pm12-pm34 | 1.122 | 1.204 | 1.058 | 1.173 | -0.048 | 0.174 |
| 364  | pm12-pm35 | 1.097 | 1.213 | 1.032 | 1.193 | -0.055 | 0.035 |
| 365  | pm12-pm36 | 1.107 | 1.175 | 1.027 | 1.206 | -0.053 | 0.039 |
| 366  | pm12-pm37 | 1.093 | 1.175 | 1.022 | 1.224 | -0.056 | 0.023 |
| 367  | pm13-pm14 | 0.991 | 1.019 | 1.007 | 1.008 | -0.004 | 0.953 |
| 368  | pm13-pm15 | 1.01 | 0.982 | 0.999 | 0.977 | -0.021 | 0.203 |
| 369  | pm13-pm16 | 0.981 | 0.993 | 1.028 | 1.006 | -0.006 | 0.476 |
| 370  | pm13-pm17 | 0.968 | 0.998 | 1.002 | 0.972 | -0.024 | 0.238 |
| 371  | pm13-pm18 | 1.017 | 1.037 | 0.967 | 0.984 | -0.005 | 0.467 |
| 372  | pm13-pm19 | 0.996 | 1.037 | 1 | 0.952 | -0.011 | 0.355 |
| 373  | pm13-pm20 | 0.991 | 1.026 | 1.009 | 1.022 | 0.002 | 0.935 |
| 374  | pm13-pm21 | 1.078 | 1.317 | 1.386 | 1.001 | -0.073 | 0.018 |
| 375  | pm13-pm22 | 1.035 | 1.157 | 1.07 | 0.997 | -0.022 | 0.284 |
| 376  | pm13-pm23 | 1.071 | 1.23 | 1.132 | 1.042 | -0.011 | 0.393 |
| 377  | pm13-pm24 | 0.973 | 1.035 | 0.989 | 0.988 | -0.015 | 0.365 |
| 378  | pm13-pm25 | 0.957 | 1.037 | 1.001 | 1.016 | -0.005 | 0.686 |
| 379  | pm13-pm26 | 0.987 | 1.037 | 0.996 | 0.966 | -0.011 | 0.334 |
| 380  | pm13-pm27 | 0.97 | 1.076 | 1.009 | 1.014 | -0.012 | 0.365 |
| 381  | pm13-pm28 | 1.241 | 1.118 | 1.157 | 1.358 | -0.045 | 0.196 |
| 382  | pm13-pm29 | 0.989 | 1.131 | 0.97 | 1.053 | -0.049 | 0.157 |
| 383  | pm13-pm30 | 0.903 | 0.877 | 0.924 | 0.894 | -0.021 | 0.226 |
| 384  | pm13-pm31 | 1.017 | 1.044 | 1.032 | 1.015 | -0.004 | 0.946 |
|   |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|
| 385| pm13-pm32 | 0.975 | 1.14  | 1.012 | 1.02  | -0.008 | 0.583 |
| 386| pm13-pm33 | 1.03  | 1.046 | 1     | 1.008 | 0.013  | 0.34  |
| 387| pm13-pm34 | 0.989 | 1.027 | 0.985 | 0.989 | -0.014 | 0.338 |
| 388| pm13-pm35 | 0.943 | 1.04  | 0.989 | 0.944 | -0.034 | 0.272 |
| 389| pm13-pm36 | 0.999 | 1.035 | 0.993 | 0.985 | -0.004 | 0.889 |
| 390| pm13-pm37 | 0.991 | 1.059 | 1     | 0.979 | -0.003 | 0.975 |
| 391| pm14-pm15 | 1.022 | 0.979 | 1     | 0.954 | -0.019 | 0.392 |
| 392| pm14-pm16 | 0.987 | 0.998 | 0.999 | 0.975 | -0.013 | 0.356 |
| 393| pm14-pm17 | 1.002 | 0.998 | 0.987 | 0.937 | -0.022 | 0.212 |
| 394| pm14-pm18 | 1.014 | 1.06  | 1.032 | 0.992 | 0.023  | 0.296 |
| 395| pm14-pm19 | 1.01  | 1.028 | 1.018 | 0.975 | 0.006  | 0.468 |
| 396| pm14-pm20 | 0.994 | 1.036 | 1.009 | 0.979 | 0     | 0.681 |
| 397| pm14-pm21 | 1.086 | 1.315 | 1.398 | 1.03  | -0.055 | 0.026 |
| 398| pm14-pm22 | 1.069 | 1.128 | 1.109 | 0.999 | -0.005 | 0.838 |
| 399| pm14-pm23 | 1.075 | 1.176 | 1.093 | 1.019 | -0.034 | 0.221 |
| 400| pm14-pm24 | 0.98  | 1.019 | 0.995 | 1     | -0.007 | 0.512 |
| 401| pm14-pm25 | 1.021 | 1.027 | 0.995 | 0.998 | 0.008  | 0.585 |
| 402| pm14-pm26 | 1.011 | 1.007 | 1.023 | 1.011 | 0.011  | 0.353 |
| 403| pm14-pm27 | 1.034 | 1.025 | 1.044 | 1.018 | 0.007  | 0.439 |
| 404| pm14-pm28 | 1.257 | 1.138 | 1.106 | 1.314 | -0.054 | 0.033 |
| 405| pm14-pm29 | 0.991 | 1.138 | 0.977 | 1.03  | -0.045 | 0.194 |
| 406| pm14-pm30 | 0.897 | 0.889 | 0.946 | 0.898 | -0.007 | 0.441 |
| 407| pm14-pm31 | 1.021 | 1.089 | 1.043 | 1.035 | 0.021  | 0.211 |
| 408| pm14-pm32 | 0.998 | 1.174 | 0.992 | 1.031 | 0.009  | 0.586 |
| 409| pm14-pm33 | 1.018 | 1.041 | 1.01  | 1     | 0.015  | 0.348 |
| 410| pm14-pm34 | 0.996 | 1.035 | 0.991 | 0.965 | -0.009 | 0.403 |
| 411| pm14-pm35 | 1.008 | 1.006 | 1.015 | 0.985 | -0.004 | 0.686 |
| 412| pm14-pm36 | 1.019 | 1.004 | 0.993 | 0.987 | 0     | 0.798 |
| 413| pm14-pm37 | 0.99  | 0.99  | 1.024 | 0.99  | -0.005 | 0.401 |
| 414| pm15-pm16 | 1.037 | 1.006 | 1.005 | 1.009 | 0.009  | 0.59  |
|     | pm15-pm17 | pm15-pm18 | pm15-pm19 | pm15-pm20 | pm15-pm21 | pm15-pm22 | pm15-pm23 | pm15-pm24 | pm15-pm25 | pm15-pm26 | pm15-pm27 | pm15-pm28 | pm15-pm29 | pm15-pm30 | pm15-pm31 | pm15-pm32 | pm15-pm33 | pm15-pm34 | pm15-pm35 | pm15-pm36 | pm15-pm37 | pm15-pm38 | pm15-pm39 | pm16-pm17 | pm16-pm18 | pm16-pm19 | pm16-pm20 | pm16-pm21 | pm16-pm22 | pm16-pm23 | pm16-pm24 | pm16-pm25 |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 415 | 0.978     | 0.991     | 1.019     | 0.986     | -0.013    | 0.358     |
| 416 | 0.99      | 1.011     | 1.014     | 0.961     | -0.01     | 0.321     |
| 417 | 0.983     | 1.017     | 1.044     | 1.015     | 0.01      | 0.39      |
| 418 | 1.004     | 1.045     | 1.046     | 0.961     | 0.006     | 0.459     |
| 419 | 1.114     | 1.295     | 1.389     | 1.036     | -0.057    | 0.037     |
| 420 | 1.071     | 1.136     | 1.104     | 1.024     | 0         | 0.76      |
| 421 | 1.049     | 1.23      | 1.082     | 1.005     | -0.036    | 0.233     |
| 422 | 0.979     | 1.003     | 1.019     | 1.005     | -0.007    | 0.453     |
| 423 | 1.005     | 1.033     | 1.026     | 0.995     | 0.01      | 0.416     |
| 424 | 1.014     | 1.037     | 1.033     | 1.003     | 0.017     | 0.338     |
| 425 | 1.009     | 1.076     | 1.028     | 1.028     | 0.009     | 0.439     |
| 426 | 1.251     | 1.104     | 1.213     | 1.336     | -0.035    | 0.247     |
| 427 | 1.116     | 0.992     | 1.074     | -0.037    | 0.259     |
| 428 | 1.031     | 1.064     | 1.062     | 1.022     | 0.016     | 0.32      |
| 429 | 0.959     | 1.016     | 1.031     | 1.001     | -0.004    | 0.885     |
| 430 | 1.01      | 1.01      | 1.002     | 0.981     | -0.008    | 0.444     |
| 431 | 0.973     | 0.985     | 0.995     | 0.971     | -0.03     | 0.233     |
| 432 | 1       | 1.032     | 1.01      | 0.991     | 0.004     | 1         |
| 433 | 1.048     | 1.017     | 0.992     | 0.007     | 0.591     |
| 434 | 0.971     | 1.021     | 0.996     | 0.989     | -0.007    | 0.435     |
| 435 | 1.017     | 0.977     | 1.038     | 1.008     | 0.012     | 0.328     |
| 436 | 1.026     | 1.001     | 1.037     | 0.996     | 0.016     | 0.347     |
| 437 | 1.01      | 1.032     | 1.011     | 0.966     | 0.003     | 0.946     |
| 438 | 1.102     | 1.346     | 1.39      | 1.049     | -0.039    | 0.283     |
| 439 | 1.038     | 1.159     | 1.068     | 1.024     | -0.007    | 0.447     |
| 440 | 1.081     | 1.23      | 1.109     | 1.026     | -0.01     | 0.337     |
| 441 | 1.022     | 1.058     | 1.027     | 0.973     | 0.017     | 0.351     |
| 442 | 1.011     | 1.063     | 0.799     | 0.967     | -0.039    | 0.215     |
| pm16-pm26  | 1.035 | 1.038 | 1.002 | 0.972 | 0.012 | 0.365 |
| pm16-pm27  | 1.011 | 1.082 | 1.026 | 0.993 | 0.007 | 0.524 |
| pm16-pm28  | 1.215 | 1.111 | 1.129 | 1.382 | -0.046 | 0.184 |
| pm16-pm29  | 1.038 | 1.161 | 0.972 | 1.06 | -0.019 | 0.34  |
| pm16-pm30  | 0.931 | 0.816 | 0.956 | 0.897 | -0.013 | 0.369 |
| pm16-pm31  | 1.001 | 1.093 | 1.049 | 0.996 | 0.012 | 0.311 |
| pm16-pm32  | 0.977 | 1.119 | 1.031 | 1.065 | 0.01  | 0.311 |
| pm16-pm33  | 1.009 | 1.037 | 0.978 | 0.979 | 0.001 | 0.735 |
| pm16-pm34  | 1.024 | 0.96  | 1.004 | 0.984 | -0.011 | 0.328 |
| pm16-pm35  | 0.977 | 0.984 | 1.029 | 1.013 | -0.004 | 0.867 |
| pm16-pm36  | 0.999 | 0.984 | 1.015 | 1  | 0.001 | 0.76  |
| pm16-pm37  | 1.008 | 1.019 | 1.01 | 1.024 | 0.013 | 0.357 |
| pm17-pm18  | 0.976 | 0.959 | 0.984 | 1.004 | -0.019 | 0.354 |
| pm17-pm19  | 0.98  | 1.023 | 1.017 | 1.004 | 0.006 | 0.428 |
| pm17-pm20  | 0.989 | 1.02 | 1.008 | 1.009 | 0.003 | 0.72  |
| pm17-pm21  | 1.112 | 1.258 | 1.392 | 1.005 | -0.07 | 0.029 |
| pm17-pm22  | 1.037 | 1.099 | 1.07 | 0.991 | -0.031 | 0.213 |
| pm17-pm23  | 1.058 | 1.181 | 1.114 | 1.029 | -0.027 | 0.242 |
| pm17-pm24  | 1.004 | 1.021 | 1.042 | 0.959 | 0.002 | 0.797 |
| pm17-pm25  | 1.008 | 1.031 | 0.992 | 0.998 | 0.007 | 0.56  |
| pm17-pm26  | 0.977 | 1.013 | 0.983 | 0.999 | -0.008 | 0.528 |
| pm17-pm27  | 0.984 | 0.977 | 1.004 | 0.989 | -0.034 | 0.294 |
| pm17-pm28  | 1.23  | 1.101 | 1.186 | 1.353 | -0.039 | 0.207 |
| pm17-pm29  | 0.994 | 1.199 | 0.961 | 1.006 | -0.038 | 0.232 |
| pm17-pm30  | 0.915 | 0.835 | 0.917 | 0.881 | -0.027 | 0.287 |
| pm17-pm31  | 1.01  | 1.016 | 1.021 | 1.001 | -0.012 | 0.348 |
| pm17-pm32  | 0.984 | 1.158 | 1.023 | 1.033 | 0.011 | 0.324 |
| pm17-pm33  | 1.006 | 0.993 | 1.01 | 0.967 | -0.007 | 0.436 |
| pm17-pm34  | 0.989 | 0.96 | 1.007 | 0.974 | -0.022 | 0.208 |
| pm17-pm35  | 0.986 | 0.974 | 1.02 | 1.003 | -0.01 | 0.513 |
|   | pm17-pm36 | pm17-pm37 | pm18-pm19 | pm18-pm20 | pm18-pm21 | pm18-pm22 | pm18-pm23 | pm18-pm24 | pm18-pm25 | pm18-pm26 | pm18-pm27 | pm18-pm28 | pm18-pm29 | pm18-pm30 | pm18-pm31 | pm18-pm32 | pm18-pm33 | pm18-pm34 | pm18-pm35 | pm18-pm36 | pm18-pm37 | pm19-pm20 | pm19-pm21 | pm19-pm22 | pm19-pm23 | pm19-pm24 | pm19-pm25 | pm19-pm26 | pm19-pm27 | pm19-pm28 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 475 | 1.004 | 1.01 | 0.985 | 0.949 | -0.013 | 0.305 |
| 476 | 0.996 | 1.019 | 0.991 | 0.996 | -0.002 | 0.911 |
| 477 | 0.982 | 1.001 | 0.997 | 0.999 | -0.003 | 0.865 |
| 478 | 1.007 | 0.977 | 0.995 | 1.009 | -0.004 | 0.615 |
| 479 | 1.109 | 1.251 | 1.391 | 1.011 | -0.069 | 0.035 |
| 480 | 1.067 | 1.193 | 1.1 | 0.993 | 0.011 | 0.371 |
| 481 | 1.111 | 1.241 | 1.12 | 1.053 | 0.011 | 0.358 |
| 482 | 0.992 | 1.038 | 0.988 | 1.009 | 0.005 | 0.664 |
| 483 | 0.988 | 1.008 | 1.005 | 1.004 | 0.003 | 0.698 |
| 484 | 1.004 | 0.994 | 0.987 | 1.017 | 0.002 | 0.639 |
| 485 | 1.003 | 1.054 | 1.003 | 1.015 | -0.001 | 0.89 |
| 486 | 1.222 | 1.107 | 1.13 | 1.383 | -0.044 | 0.169 |
| 487 | 1.006 | 1.219 | 0.999 | 1.04 | -0.01 | 0.555 |
| 488 | 0.947 | 0.869 | 0.942 | 0.88 | -0.002 | 0.646 |
| 489 | 1.019 | 1.019 | 1.026 | 1.014 | -0.003 | 0.693 |
| 490 | 1.008 | 1.141 | 0.992 | 1.037 | 0.008 | 0.55 |
| 491 | 1.002 | 1.011 | 0.982 | 1 | 0 | 0.849 |
| 492 | 1.036 | 1.058 | 1.008 | 0.989 | 0.02 | 0.222 |
| 493 | 0.987 | 1.009 | 0.996 | 0.99 | -0.008 | 0.54 |
| 494 | 1.004 | 1.017 | 1.004 | 0.98 | 0.004 | 0.838 |
| 495 | 1.011 | 1 | 1.019 | 1.029 | 0.014 | 0.316 |
| 496 | 0.993 | 1.01 | 1.005 | 0.984 | -0.003 | 0.669 |
| 497 | 1.125 | 1.261 | 1.351 | 1.014 | -0.072 | 0.015 |
| 498 | 1.058 | 1.182 | 1.088 | 1.029 | 0.012 | 0.305 |
| 499 | 1.067 | 1.196 | 1.087 | 1.056 | -0.019 | 0.347 |
| 500 | 0.97 | 1.023 | 0.992 | 0.997 | -0.007 | 0.539 |
| 501 | 0.983 | 0.987 | 0.996 | 0.998 | -0.008 | 0.486 |
| 502 | 1.009 | 0.982 | 0.985 | 1.013 | -0.001 | 0.746 |
| 503 | 1.008 | 1.007 | 1.023 | 1.01 | -0.008 | 0.475 |
| 504 | 1.238 | 1.078 | 1.137 | 1.336 | -0.057 | 0.043 |
|   | pm19-pm29 | pm19-pm30 | pm19-pm31 | pm19-pm32 | pm19-pm33 | pm19-pm34 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 505| 1.044     | 0.914     | 1.017     | 0.991     | 1.012     | 0.969     |
| 506| 1.208     | 0.888     | 1.028     | 1.128     | 0.984     | 1.051     |
| 507| 1.055     | 0.954     | 1.022     | 0.989     | 1.002     | 0.99     |
| 508| 1.055     | 0.885     | 1.01      | 1.04      | 0.99     | 0.997     |
| 509| 0.015     | -0.002    | -0.003    | 0.0        | -0.002    | -0.001    |
| 510| 0.33      | 0.931     | 0.989     | 0.975     | 0.681     | 0.612     |
| 511| 1.036     | 0.996     | 1.017     | 0.996     | 1.118     | 1.017     |
| 512| 1.026     | 1.006     | 1.028     | 1.038     | 1.222     | 1.051     |
| 513| 0.983     | 1.009     | 0.993     | 1.017     | 1.389     | 1.099     |
| 514| 0.985     | 1.003     | 1.034     | 1.011     | 1.101     | 0.997     |
| 515| 0.004     | 0.873     | 0.009     | -0.077    | 0.411     | 0.113     |
| 516| 0.842     | 0.513     | 0.013     | 0.411     | 0.385     | 0.938     |
| 517| 0.376     | 0.777     | 0.673     | 0.478     | 0.385     | 0.777     |
| 518| 0.002     | 0.478     | 0.002     | 0.673     | 0.385     | 0.777     |
| 519| 0.991     | 0.991     | 0.985     | 0.983     | 1.007     | 1.048     |
| 520| 1.006     | 0.987     | 1.019     | 1.011     | 1.048     | 1.078     |
| 521| 1.006     | 0.987     | 1.024     | 1.011     | 1.048     | 1.116     |
| 522| 0.002     | 0.478     | 0.002     | 0.673     | 0.385     | 0.777     |
| 523| 0.991     | 0.991     | 1.006     | 1.011     | 1.048     | 1.116     |
| 524| 0.985     | 0.983     | 0.985     | 0.991     | 1.007     | 1.009     |
| 525| 1.01     | 0.987     | 1.006     | 0.991     | 1.019     | 1.019     |
| 526| 1.006     | 0.991     | 1.024     | 0.991     | 1.007     | 1.009     |
| 527| 0.002     | 0.478     | 0.002     | 0.673     | 0.385     | 0.777     |
| 528| 0.991     | 0.991     | 1.006     | 1.006     | 1.048     | 1.116     |
| 529| 0.985     | 0.983     | 0.985     | 0.991     | 1.007     | 1.009     |
| 530| 1.006     | 0.987     | 1.024     | 0.991     | 1.007     | 1.009     |
| 531| 0.991     | 0.991     | 1.006     | 0.991     | 1.019     | 1.019     |
| 532| 0.985     | 0.983     | 0.985     | 0.991     | 1.007     | 1.009     |
| 533| 1.006     | 0.987     | 1.024     | 0.991     | 1.007     | 1.009     |
| 534| 0.991     | 0.991     | 1.006     | 0.991     | 1.019     | 1.019     |
| pm21-pm26 | 1.11 | 1.3 | 1.379 | 1.015 | -0.059 | 0.027 |
|-----------|------|-----|-------|-------|--------|-------|
| pm21-pm27 | 1.113| 1.27| 1.358 | 1.034 | -0.088 | 0.011 |
| pm21-pm28 | 1.347| 1.361| 1.501 | 1.37  | -0.121 | 0.005 |
| pm21-pm29 | 1.129| 1.496| 1.399 | 1.103 | -0.055 | 0.04  |
| pm21-pm30 | 1.014| 1.164| 1.342 | 0.9   | -0.068 | 0.028 |
| pm21-pm31 | 1.133| 1.342| 1.366 | 1.03  | -0.066 | 0.043 |
| pm21-pm32 | 1.106| 1.459| 1.353 | 1.08  | -0.049 | 0.169 |
| pm21-pm33 | 1.124| 1.265| 1.358 | 0.996 | -0.074 | 0.019 |
| pm21-pm34 | 1.137| 1.294| 1.348 | 1.027 | -0.063 | 0.037 |
| pm21-pm35 | 1.11 | 1.272| 1.383 | 1.058 | -0.06  | 0.036 |
| pm21-pm36 | 1.134| 1.274| 1.392 | 1.042 | -0.049 | 0.164 |
| pm21-pm37 | 1.121| 1.305| 1.348 | 1.01  | -0.066 | 0.045 |
| pm22-pm23 | 1.376| 1.555| 1.402 | 1.041 | 0.143  | 0.009 |
| pm22-pm24 | 1.073| 1.238| 1.104 | 1.017 | 0.026  | 0.262 |
| pm22-pm25 | 1.04 | 1.107| 1.102 | 1.016 | -0.012 | 0.331 |
| pm22-pm26 | 1.04 | 1.173| 1.116 | 1.03  | 0.012  | 0.314 |
| pm22-pm27 | 1.058| 1.191| 1.108 | 1.04  | -0.001 | 0.799 |
| pm22-pm28 | 1.291| 1.238| 1.269 | 1.414 | -0.031 | 0.239 |
| pm22-pm29 | 1.084| 1.291| 1.074 | 1.067 | -0.027 | 0.235 |
| pm22-pm30 | 0.916| 1.007| 1.036 | 0.953 | -0.013 | 0.314 |
| pm22-pm31 | 1.052| 1.206| 1.103 | 1.02  | -0.007 | 0.583 |
| pm22-pm32 | 1.047| 1.282| 1.063 | 1.053 | -0.005 | 0.942 |
| pm22-pm33 | 1.037| 1.135| 1.071 | 1.032 | -0.009 | 0.413 |
| pm22-pm34 | 1.043| 1.158| 1.059 | 1.047 | -0.005 | 0.451 |
| pm22-pm35 | 1.059| 1.09 | 1.086 | 1.032 | -0.017 | 0.4  |
| pm22-pm36 | 1.06 | 1.144| 1.079 | 1.006 | -0.005 | 0.471 |
| pm22-pm37 | 1.063| 1.154| 1.118 | 1.024 | 0.009  | 0.454 |
| pm23-pm24 | 1.124| 1.263| 1.09  | 1.043 | 0.005  | 0.416 |
| pm23-pm25 | 1.03 | 1.275| 1.088 | 1.016 | -0.019 | 0.377 |
| pm23-pm26 | 1.115| 1.259| 1.074 | 1.056 | 0.005  | 0.827 |
|   | pm23-pm27 | 1.111 | 1.277 | 1.129 | 1.034 | -0.005 | 0.462 |
|---|----------|--------|--------|--------|--------|--------|-------|
|   | pm23-pm28 | 1.371  | 1.395  | 1.245  | 1.401  | -0.024 | 0.245 |
|   | pm23-pm29 | 1.061  | 1.418  | 1.074  | 1.086  | -0.039 | 0.259 |
|   | pm23-pm30 | 0.989  | 1.119  | 1.041  | 0.907  | -0.021 | 0.246 |
|   | pm23-pm31 | 1.089  | 1.293  | 1.117  | 1.034  | -0.012 | 0.334 |
|   | pm23-pm32 | 1.07   | 1.406  | 1.106  | 1.083  | 0.007  | 0.534 |
|   | pm23-pm33 | 1.064  | 1.26   | 1.132  | 1.019  | -0.003 | 0.891 |
|   | pm23-pm34 | 1.048  | 1.255  | 1.097  | 1.032  | -0.018 | 0.343 |
|   | pm23-pm35 | 1.081  | 1.218  | 1.096  | 1.019  | -0.023 | 0.3   |
|   | pm23-pm36 | 1.08   | 1.203  | 1.13   | 1.059  | -0.003 | 0.81  |
|   | pm23-pm37 | 1.037  | 1.28   | 1.134  | 1.039  | -0.001 | 0.979 |
|   | pm24-pm25 | 0.997  | 0.986  | 1.012  | 0.984  | -0.008 | 0.429 |
|   | pm24-pm26 | 1      | 1.052  | 0.996  | 0.98   | 0.004  | 0.904 |
|   | pm24-pm27 | 0.992  | 1.087  | 1.027  | 1.015  | 0.006  | 0.533 |
|   | pm24-pm28 | 1.271  | 1.127  | 1.17   | 1.345  | -0.03  | 0.242 |
|   | pm24-pm29 | 0.992  | 1.169  | 0.997  | 1.052  | -0.028 | 0.254 |
|   | pm24-pm30 | 0.892  | 0.932  | 0.936  | 0.915  | 0.003  | 0.842 |
|   | pm24-pm31 | 0.999  | 1.041  | 1.027  | 1.009  | -0.007 | 0.445 |
|   | pm24-pm32 | 1.001  | 1.173  | 1.01   | 1.046  | 0.016  | 0.304 |
|   | pm24-pm33 | 0.978  | 1.015  | 1.021  | 0.991  | -0.002 | 0.799 |
|   | pm24-pm34 | 1.031  | 1.021  | 1.003  | 0.989  | 0.004  | 0.955 |
|   | pm24-pm35 | 1.022  | 0.998  | 1.01   | 0.985  | -0.005 | 0.839 |
|   | pm24-pm36 | 0.98   | 1.028  | 1.022  | 1.001  | 0.006  | 0.506 |
|   | pm24-pm37 | 0.992  | 1.009  | 0.988  | 0.993  | -0.009 | 0.439 |
|   | pm25-pm26 | 1.013  | 0.986  | 1.004  | 0.999  | 0.002  | 0.827 |
|   | pm25-pm27 | 1.006  | 1.007  | 1.017  | 1.027  | -0.007 | 0.467 |
|   | pm25-pm28 | 1.258  | 1.036  | 1.108  | 1.34   | -0.069 | 0.023 |
|   | pm25-pm29 | 0.986  | 1.171  | 1.008  | 1.044  | -0.024 | 0.212 |
|   | pm25-pm30 | 0.913  | 0.884  | 0.965  | 0.925  | 0.01   | 0.487 |
|   | pm25-pm31 | 1.004  | 1.046  | 1.029  | 1.012  | 0      | 0.822 |
|   | pm25-pm32 |   | pm25-pm33 |   | pm25-pm34 |   | pm25-pm35 |   | pm25-pm36 |   | pm25-pm37 |   | pm25-pm38 |   | pm25-pm39 |   | pm25-pm40 |   |
|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|
| 595 | 1.014     |   | 1.116     |   | 0.991     |   | 1.038     |   | 0.003     |   | 0.631     |   |           |   |           |   |           |   |
| 596 | 1.011     |   | 0.991     |   | 0.981     |   | 0.997     |   | -0.004    |   | 0.927     |   |           |   |           |   |           |   |
| 597 | 0.996     |   | 1.043     |   | 0.988     |   | 0.995     |   | 0.002     |   | 0.653     |   |           |   |           |   |           |   |
| 598 | 0.995     |   | 1.014     |   | 1.01      |   | 0.965     |   | -0.008    |   | 0.409     |   |           |   |           |   |           |   |
| 599 | 1.005     |   | 1.01      |   | 1.014     |   | 1.014     |   | 0.013     |   | 0.346     |   |           |   |           |   |           |   |
| 600 | 1.024     |   | 0.99      |   | 1.003     |   | 1.021     |   | 0.008     |   | 0.588     |   |           |   |           |   |           |   |
| 601 | 1.012     |   | 1.06      |   | 1.048     |   | 1.007     |   | 0.011     |   | 0.342     |   |           |   |           |   |           |   |
| 602 | 1.219     |   | 1.06      |   | 1.082     |   | 1.382     |   | -0.069    |   | 0.036     |   |           |   |           |   |           |   |
| 603 | 0.993     |   | 1.149     |   | 0.979     |   | 1.077     |   | -0.027    |   | 0.27      |   |           |   |           |   |           |   |
| 604 | 0.94      |   | 0.893     |   | 0.954     |   | 0.92      |   | 0.015     |   | 0.31      |   |           |   |           |   |           |   |
| 605 | 1.025     |   | 1.052     |   | 1.041     |   | 1.03      |   | 0.014     |   | 0.343     |   |           |   |           |   |           |   |
| 606 | 1          |   | 1.11      |   | 1.013     |   | 1.048     |   | 0.006     |   | 0.592     |   |           |   |           |   |           |   |
| 607 | 1.002     |   | 0.983     |   | 0.99      |   | 1.001     |   | -0.005    |   | 0.552     |   |           |   |           |   |           |   |
| 608 | 0.991     |   | 1.029     |   | 1.027     |   | 0.989     |   | 0.006     |   | 0.561     |   |           |   |           |   |           |   |
| 609 | 0.988     |   | 1.067     |   | 0.994     |   | 0.974     |   | 0.001     |   | 0.668     |   |           |   |           |   |           |   |
| 610 | 0.988     |   | 0.982     |   | 0.997     |   | 0.988     |   | -0.01     |   | 0.589     |   |           |   |           |   |           |   |
| 611 | 0.995     |   | 1.003     |   | 1.005     |   | 0.987     |   | -0.004    |   | 0.772     |   |           |   |           |   |           |   |
| 612 | 1.246     |   | 1.157     |   | 1.133     |   | 1.356     |   | -0.053    |   | 0.021     |   |           |   |           |   |           |   |
| 613 | 1.011     |   | 1.226     |   | 0.991     |   | 1.074     |   | -0.022    |   | 0.242     |   |           |   |           |   |           |   |
| 614 | 0.929     |   | 0.933     |   | 0.971     |   | 0.917     |   | 0.004     |   | 0.678     |   |           |   |           |   |           |   |
| 615 | 1.009     |   | 1.116     |   | 1.06      |   | 1.01      |   | 0.004     |   | 0.851     |   |           |   |           |   |           |   |
| 616 | 0.99      |   | 1.152     |   | 1.02      |   | 1.052     |   | -0.005    |   | 0.451     |   |           |   |           |   |           |   |
| 617 | 1.003     |   | 1.025     |   | 1      |   | 1.015     |   | -0.01     |   | 0.535     |   |           |   |           |   |           |   |
| 618 | 1.037     |   | 1.054     |   | 1.05     |   | 1.003     |   | 0.011     |   | 0.376     |   |           |   |           |   |           |   |
| 619 | 1.022     |   | 1.076     |   | 1.015     |   | 1.033     |   | 0.011     |   | 0.306     |   |           |   |           |   |           |   |
| 620 | 1.034     |   | 1.042     |   | 1.016     |   | 0.996     |   | 0.002     |   | 0.972     |   |           |   |           |   |           |   |
| 621 | 1.02      |   | 1.045     |   | 1.01      |   | 1.017     |   | 0     |   | 0.909     |   |           |   |           |   |           |   |
| 622 | 1.324     |   | 1.22      |   | 1.102     |   | 1.46      |   | -0.055    |   | 0.03      |   |           |   |           |   |           |   |
| 623 | 1.153     |   | 0.982     |   | 1.098     |   | 1.257     |   | -0.046    |   | 0.152     |   |           |   |           |   |           |   |
| 624 | 1.253     |   | 1.1      |   | 1.145     |   | 1.382     |   | -0.059    |   | 0.043     |   |           |   |           |   |           |   |
|   | pm28-pm32 | pm28-pm33 | pm28-pm34 | pm28-pm35 | pm28-pm36 | pm28-pm37 | pm29-pm30 | pm29-pm31 | pm29-pm32 | pm29-pm33 | pm29-pm34 | pm29-pm35 | pm29-pm36 | pm29-pm37 | pm30-pm31 | pm30-pm32 | pm30-pm33 | pm30-pm34 | pm30-pm35 | pm30-pm36 | pm30-pm37 | pm30-pm38 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 625 | 1.224     | 1.188     | 1.157     | 1.406     | -0.049    | 0.2       |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 626 | 1.204     | 1.03      | 1.127     | 1.362     | -0.074    | 0.015     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 627 | 1.238     | 1.114     | 1.155     | 1.359     | -0.043    | 0.195     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 628 | 1.242     | 1.094     | 1.142     | 1.349     | -0.054    | 0.042     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 629 | 1.223     | 1.081     | 1.148     | 1.292     | -0.068    | 0.042     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 630 | 1.211     | 1.076     | 1.137     | 1.37      | -0.059    | 0.021     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 631 | 1.013     | 1.277     | 0.784     | 0.917     | 0.008     | 0.5       |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 632 | 1.019     | 1.238     | 1.034     | 1.075     | -0.008    | 0.507     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 633 | 1.028     | 1.333     | 0.979     | 1.099     | -0.004    | 0.798     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 634 | 0.973     | 1.158     | 0.984     | 1.038     | -0.038    | 0.216     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 635 | 1.007     | 1.127     | 0.994     | 1.028     | -0.042    | 0.169     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 636 | 0.99      | 1.09      | 1         | 1.052     | -0.049    | 0.163     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 637 | 1.018     | 1.18      | 1.026     | 1.07      | -0.002    | 0.745     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 638 | 1.014     | 1.227     | 1         | 1.048     | -0.006    | 0.554     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 639 | 0.933     | 0.956     | 0.999     | 0.876     | 0.005     | 0.599     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 640 | 0.934     | 0.97      | 0.969     | 0.926     | 0         | 0.663     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 641 | 0.929     | 0.916     | 0.94      | 0.919     | 0.014     | 0.363     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 642 | 0.912     | 0.924     | 0.996     | 0.891     | 0.014     | 0.385     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 643 | 0.949     | 0.917     | 0.962     | 0.892     | 0.012     | 0.302     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 644 | 0.956     | 0.888     | 0.944     | 0.913     | 0.014     | 0.359     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 645 | 0.966     | 0.898     | 0.958     | 0.93      | 0.024     | 0.256     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 646 | 1.013     | 1.164     | 1.04      | 1.043     | 0.004     | 0.945     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 647 | 1.03      | 0.988     | 1.026     | 0.996     | -0.013    | 0.328     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 648 | 1.002     | 1.052     | 1.046     | 1.003     | -0.001    | 0.705     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 649 | 0.997     | 1.067     | 1.015     | 0.98      | -0.013    | 0.398     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 650 | 1.013     | 1.044     | 1.057     | 1.033     | 0.015     | 0.359     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 651 | 1.006     | 1.056     | 1.064     | 1.002     | 0.007     | 0.422     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 652 | 0.983     | 1.124     | 1.005     | 1.008     | -0.007    | 0.533     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 653 | 0.991     | 1.194     | 1.003     | 1.026     | 0.012     | 0.387     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 654 | 1.007     | 1.126     | 1.014     | 1.034     | 0.003     | 0.753     |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
3d) Result of two-distribution perturbation analysis for apoptosis when four different response function types were applied in a combined manner

| No | Pair of perturbed parameter distributions | 1 million parameter sets | 10 million parameter sets | 100 million parameter sets |
|----|-------------------------------------------|--------------------------|---------------------------|----------------------------|
|    |                                           | Synergistic effect | p-value | Synergistic effect | p-value | Synergistic effect | p-value |
| 1  | pm1-pm2                                   | 0.01                    | 0.396   | 0                | 0.83    | 0.022               | 0.287   |
| 2  | pm1-pm3                                   | -0.001                  | 0.772   | 0.01             | 0.309   | 0.045               | 0.161   |
| 3  | pm1-pm4                                   | 0.012                   | 0.364   | 0.044            | 0.159   | 0.026               | 0.246   |
| 4  | pm1-pm5                                   | -0.002                  | 0.781   | -0.01            | 0.49    | -0.029              | 0.274   |
| 5  | pm1-pm6                                   | -0.176                  | 0.002   | -0.18            | 0.003   | -0.165              | 0.004   |
| 6  | pm1-pm7                                   | -0.158                  | 0.002   | -0.173           | 0.004   | -0.183              | 0.003   |
| 7  | pm1-pm8                                   | 0.013                   | 0.334   | 0.01             | 0.325   | -0.021              | 0.284   |
|   | pm1-pm9  | 0.021   | 0.272   | 0.003   | 0.69   | 0.012   | 0.363   |
|---|---------|---------|---------|---------|--------|---------|---------|
| 9 | pm1-pm10 | 0.11    | 0.006   | 0.125   | 0.008  | 0.108   | 0.007   |
| 10| pm1-pm11 | 0.027   | 0.294   | 0.02    | 0.39   | -0.005  | 0.959   |
| 11| pm1-pm12 | -0.042  | 0.166   | -0.07   | 0.016  | -0.083  | 0.015   |
| 12| pm1-pm13 | -0.008  | 0.509   | -0.045  | 0.165  | -0.022  | 0.287   |
| 13| pm1-pm14 | 0.003   | 0.785   | -0.003  | 0.745  | 0       | 0.92    |
| 14| pm1-pm15 | 0.042   | 0.199   | 0.018   | 0.399  | -0.004  | 0.732   |
| 15| pm1-pm16 | -0.02   | 0.285   | 0.014   | 0.308  | -0.003  | 0.826   |
| 16| pm1-pm17 | -0.024  | 0.215   | 0.007   | 0.546  | 0.013   | 0.363   |
| 17| pm1-pm18 | 0.006   | 0.516   | -0.017  | 0.393  | 0.023   | 0.238   |
| 18| pm1-pm19 | -0.029  | 0.248   | -0.016  | 0.368  | -0.037  | 0.257   |
| 19| pm1-pm20 | 0.009   | 0.438   | 0.017   | 0.347  | 0.002   | 0.733   |
| 20| pm1-pm21 | -0.059  | 0.021   | -0.061  | 0.021  | -0.052  | 0.023   |
| 21| pm1-pm22 | -0.016  | 0.312   | -0.006  | 0.486  | 0.016   | 0.331   |
| 22| pm1-pm23 | -0.272  | <0.001  | -0.271  | <0.001 | -0.275  | <0.001  |
| 23| pm1-pm24 | 0       | 0.954   | -0.013  | 0.381  | -0.023  | 0.249   |
| 24| pm1-pm25 | 0.044   | 0.193   | 0.039   | 0.258  | 0.003   | 0.601   |
| 25| pm1-pm26 | 0.021   | 0.214   | 0.023   | 0.278  | 0.013   | 0.375   |
| 26| pm1-pm27 | -0.027  | 0.245   | 0.012   | 0.357  | -0.016  | 0.328   |
| 27| pm1-pm28 | -0.256  | <0.001  | -0.259  | <0.001 | -0.264  | <0.001  |
| 28| pm1-pm29 | -0.014  | 0.351   | -0.02   | 0.231  | -0.029  | 0.209   |
| 29| pm1-pm30 | -0.03   | 0.218   | -0.051  | 0.039  | -0.05   | 0.036   |
| 30| pm1-pm31 | 0.026   | 0.237   | 0.026   | 0.296  | -0.001  | 0.881   |
| 31| pm1-pm32 | 0.007   | 0.562   | -0.022  | 0.27   | -0.022  | 0.262   |
| 32| pm1-pm33 | -0.012  | 0.395   | -0.013  | 0.34   | -0.004  | 0.835   |
| 33| pm1-pm34 | 0.002   | 0.68    | 0.022   | 0.229  | 0.004   | 0.707   |
| 34| pm1-pm35 | 0.022   | 0.297   | 0.015   | 0.357  | 0.038   | 0.227   |
| 35| pm1-pm36 | -0.019  | 0.384   | -0.002  | 0.715  | 0.011   | 0.31    |
| 36| pm1-pm37 | -0.018  | 0.397   | 0.005   | 0.654  | -0.034  | 0.209   |
| 37| pm2-pm3  | 0.011   | 0.343   | 0.009   | 0.437  | 0.023   | 0.254   |
|   | pm2-pm4  | pm2-pm5  | pm2-pm6  | pm2-pm7  | pm2-pm8  | pm2-pm9  | pm2-pm10 | pm2-pm11 | pm2-pm12 | pm2-pm13 | pm2-pm14 | pm2-pm15 | pm2-pm16 | pm2-pm17 | pm2-pm18 | pm2-pm19 | pm2-pm20 | pm2-pm21 | pm2-pm22 | pm2-pm23 | pm2-pm24 | pm2-pm25 | pm2-pm26 | pm2-pm27 | pm2-pm28 | pm2-pm29 | pm2-pm30 | pm2-pm31 | pm2-pm32 | pm2-pm33 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|   | 0.002    | -0.016   | 0.013    | -0.017   | 0.012    | 0.039    | 0.113    | 0.007    | -0.062   | -0.035   | 0.001    | 0.036    | 0.009    | -0.013   | -0.019   | -0.019   | -0.015   | -0.123   | 0.002    | 0.009    | -0.03    | 0.007    | -0.015   | -0.494   | 0.019    | -0.03    | -0.024   | 0.006    | -0.023   | -0.226   | -0.023   |
|   | 0.686    | 0.357    | 0.351    | 0.354    | 0.302    | 0.223    | 0.099    | 0.577    | 0.038    | 0.221    | 0.659    | 0.299    | 0.492    | 0.375    | 0.394    | 0.308    | 0.368    | 0.01    | 0.724    | 0.491    | 0.252    | 0.449    | 0.038    | 0.251    | <0.001   | 0.35     | 0.283    | 0.283    | 0.575    |
|   | -0.031   | 0.008    | 0.01     | -0.048   | -0.026   | 0.041    | 0.096    | -0.024   | -0.058   | -0.039   | 0.007    | -0.003   | 0.008    | 0.005    | -0.013   | -0.008   | -0.024   | -0.081   | 0.021    | 0.003    | -0.012   | 0.021    | -0.007   | <0.001   | -0.017   | 0.004    | 0.009    | 0.004    | 0.722    |
|   | 0.249    | 0.474    | 0.403    | 0.192    | 0.258    | 0.175    | 0.017    | 0.276    | 0.038    | 0.257    | 0.523    | 0.929    | 0.436    | 0.781    | 0.31     | 0.569    | 0.277    | 0.019    | 0.214    | 0.945    | 0.28     | 0.349    | 0.038    | 0.528    | 0.001    | 0.298    | 0.567    | 0.722    |
|   | -0.027   | -0.024   | 0.01     | -0.039   | 0.015    | 0.006    | 0.117    | -0.019   | -0.04    | 0.006    | -0.03    | 0.933    | 0.04     | 0.247    | -0.004   | -0.005   | 0.019    | 0.028    | 0.028    | 0.01    | -0.023   | 0.012    | 0.295    | <0.001   | 0.003    | 0.005    | 0.432    | 0.232    | 0.314    | 0.933    |
|   | 0.208    | 0.219    | 0.302    | 0.297    | 0.308    | 0.176    | 0.010    | 0.348    | 0.157    | 0.547    | 0.291    | 0.933    | 0.247    | 0.845    | 0.432    | 0.391    | 0.729    | 0.01    | 0.252    | 0.429    | 0.714    | 0.232    | 0.314    | 0.933    | 0.232    | 0.314    | 0.933    |
|   |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|   | pm2-pm34 | pm2-pm35 | pm2-pm36 | pm2-pm37 | pm3-pm4 | pm3-pm5 | pm3-pm6 | pm3-pm7 | pm3-pm8 | pm3-pm9 | pm3-pm10 | pm3-pm11 | pm3-pm12 | pm3-pm13 | pm3-pm14 | pm3-pm15 | pm3-pm16 | pm3-pm17 | pm3-pm18 | pm3-pm19 | pm3-pm20 | pm3-pm21 | pm3-pm22 | pm3-pm23 | pm3-pm24 | pm3-pm25 | pm3-pm26 | pm3-pm27 | pm3-pm28 | pm3-pm29 |
|---|----------|----------|----------|----------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 68| -0.032   | 0.296    | -0.012   | 0.34     | -0.039  | 0.275  |
| 69| -0.01    | 0.463    | -0.008   | 0.489    | -0.004  | 0.863  |
| 70| 0.016    | 0.311    | 0.019    | 0.328    | 0.01    | 0.472  |
| 71| 0.017    | 0.351    | -0.015   | 0.339    | 0.021   | 0.289  |
| 72| -0.01    | 0.417    | -0.003   | 0.787    | 0.023   | 0.26   |
| 73| 0.022    | 0.246    | -0.018   | 0.319    | -0.004  | 0.962  |
| 74| -0.143   | 0.008    | -0.152   | 0.005    | -0.149  | 0.006  |
| 75| -0.128   | 0.009    | -0.167   | 0.004    | -0.152  | 0.003  |
| 76| 0.004    | 0.843    | 0.1      | 0.508    | 0.026   | 0.236  |
| 77| -0.457   | <0.001   | -0.452   | <0.001   | -0.452  | <0.001 |
| 78| 0.101    | 0.006    | 0.103    | 0.008    | 0.111   | 0.009  |
| 79| 0        | 0.958    | 0.03     | 0.229    | 0.029   | 0.233  |
| 80| -0.082   | 0.012    | -0.073   | 0.012    | -0.086  | 0.019  |
| 81| -0.001   | 0.723    | 0.006    | 0.434    | -0.041  | 0.177  |
| 82| 0        | 0.674    | 0.017    | 0.353    | -0.022  | 0.254  |
| 83| -0.01    | 0.387    | 0.02     | 0.307    | -0.013  | 0.315  |
| 84| -0.018   | 0.347    | 0        | 0.651    | 0.019   | 0.396  |
| 85| -0.025   | 0.26     | -0.012   | 0.327    | 0.001   | 0.867  |
| 86| -0.009   | 0.438    | -0.003   | 0.832    | 0.004   | 0.89   |
| 87| -0.007   | 0.426    | 0.013    | 0.348    | -0.012  | 0.315  |
| 88| 0.023    | 0.254    | -0.003   | 0.656    | -0.012  | 0.384  |
| 89| -0.085   | 0.018    | -0.09    | 0.014    | -0.077  | 0.016  |
| 90| -0.164   | 0.005    | -0.136   | 0.006    | -0.138  | 0.009  |
| 91| 0.026    | 0.263    | 0.042    | 0.198    | 0.004   | 0.849  |
| 92| 0.026    | 0.2      | -0.012   | 0.329    | -0.009  | 0.437  |
| 93| 0.004    | 0.697    | -0.01    | 0.501    | 0.02    | 0.32   |
| 94| 0.039    | 0.285    | -0.001   | 0.7      | 0.009   | 0.42   |
| 95| -0.009   | 0.508    | 0.013    | 0.315    | -0.011  | 0.398  |
| 96| -0.48    | <0.001   | -0.49    | <0.001   | -0.485  | <0.001 |
| 97| -0.054   | 0.035    | -0.06    | 0.022    | -0.039  | 0.258  |
|   | pm3-pm30 | -0.002 | 0.843 | -0.042 | 0.185 | -0.01 | 0.357 |
|---|----------|--------|-------|--------|-------|--------|-------|
| 99| pm3-pm31 | -0.473 | <0.001| -0.497 | <0.001| -0.491 | <0.001|
|100| pm3-pm32 | -0.003 | 0.711 | 0.004  | 0.655 | -0.004 | 0.716 |
|101| pm3-pm33 | 0.026  | 0.262 | -0.005 | 0.643 | 0.034  | 0.256 |
|102| pm3-pm34 | -0.108 | 0.007 | -0.076 | 0.016 | -0.118 | 0.007 |
|103| pm3-pm35 | -0.003 | 0.849 | 0.005  | 0.665 | -0.011 | 0.397 |
|104| pm3-pm36 | 0.003  | 0.674 | -0.002 | 0.761 | 0.001  | 0.669 |
|105| pm3-pm37 | -0.001 | 0.892 | 0.015  | 0.397 | 0.026  | 0.213 |
|106| pm3-pm38 | 0.021  | 0.213 | 0.012  | 0.394 | 0.012  | 0.347 |
|107| pm3-pm39 | -0.018 | 0.309 | -0.012 | 0.325 | -0.017 | 0.305 |
|108| pm3-pm40 | -0.092 | 0.018 | -0.103 | 0.009 | -0.079 | 0.013 |
|109| pm3-pm41 | -0.019 | 0.355 | -0.015 | 0.334 | 0.002  | 0.614 |
|110| pm3-pm42 | 0      | 0.915 | 0.021  | 0.225 | -0.009 | 0.486 |
|111| pm3-pm43 | 0.043  | 0.177 | -0.002 | 0.633 | 0.004  | 0.686 |
|112| pm3-pm44 | -0.001 | 0.905 | 0.009  | 0.441 | 0.013  | 0.307 |
|113| pm3-pm45 | -0.056 | 0.023 | -0.095 | 0.012 | -0.081 | 0.011 |
|114| pm3-pm46 | -0.009 | 0.491 | 0.001  | 0.968 | -0.01  | 0.304 |
|115| pm3-pm47 | 0.029  | 0.276 | -0.012 | 0.363 | 0.007  | 0.453 |
|116| pm3-pm48 | 0.028  | 0.283 | -0.007 | 0.566 | 0.003  | 0.621 |
|117| pm3-pm49 | 0.038  | 0.27  | 0.021  | 0.224 | 0.017  | 0.341 |
|118| pm3-pm50 | -0.023 | 0.29  | 0.003  | 0.917 | -0.003 | 0.766 |
|119| pm3-pm51 | -0.004 | 0.937 | 0.005  | 0.658 | 0.002  | 0.755 |
|120| pm3-pm52 | 0.013  | 0.306 | 0.001  | 0.845 | -0.006 | 0.426 |
|121| pm3-pm53 | -0.017 | 0.343 | 0.018  | 0.348 | 0.025  | 0.285 |
|122| pm3-pm54 | -0.06  | 0.03  | -0.101 | 0.005 | -0.082 | 0.016 |
|123| pm3-pm55 | 0.007  | 0.562 | -0.016 | 0.336 | 0.012  | 0.339 |
|124| pm3-pm56 | -0.225 | <0.001| -0.225 | <0.001| -0.247 | <0.001|
|125| pm3-pm57 | 0.014  | 0.339 | -0.019 | 0.363 | -0.002 | 0.817 |
|126| pm3-pm58 | -0.005 | 0.478 | -0.005 | 0.679 | -0.016 | 0.323 |
|127| pm3-pm59 | 0.024  | 0.285 | 0.01   | 0.378 | 0.024  | 0.259 |
|   | pm4-pm27  | pm4-pm28  | pm4-pm29  | pm4-pm30  | pm4-pm31  | pm4-pm32  | pm4-pm33  | pm4-pm34  | pm4-pm35  | pm4-pm36  | pm4-pm37  | pm5-pm6   | pm5-pm7   | pm5-pm8   | pm5-pm9   | pm5-pm10  | pm5-pm11  | pm5-pm12  | pm5-pm13  | pm5-pm14  | pm5-pm15  | pm5-pm16  | pm5-pm17  | pm5-pm18  | pm5-pm19  | pm5-pm20  | pm5-pm21  | pm5-pm22  | pm5-pm23  | pm5-pm24  |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 128| 0.037    | 0.215    | 0.024    | 0.229    | 0.033    | 0.273    |
| 129| -0.149   | 0.005    | -0.153   | 0.003    | -0.117   | 0.008    |
| 130| 0.025    | 0.269    | 0.023    | 0.255    | 0.026    | 0.276    |
| 131| -0.013   | 0.393    | 0.013    | 0.375    | 0.014    | 0.354    |
| 132| -0.001   | 0.712    | -0.033   | 0.293    | -0.012   | 0.332    |
| 133| 0.019    | 0.365    | -0.021   | 0.249    | 0.012    | 0.305    |
| 134| 0.013    | 0.345    | -0.007   | 0.574    | 0.016    | 0.367    |
| 135| -0.031   | 0.24     | -0.009   | 0.552    | 0.011    | 0.363    |
| 136| -0.007   | 0.554    | 0.028    | 0.261    | -0.003   | 0.83     |
| 137| 0        | 0.823    | -0.016   | 0.301    | 0.012    | 0.334    |
| 138| 0.004    | 0.704    | -0.011   | 0.316    | -0.01    | 0.346    |
| 139| -0.155   | 0.003    | -0.165   | 0.001    | -0.18    | 0.003    |
| 140| -0.264   | <0.001   | -0.235   | <0.001   | -0.222   | <0.001   |
| 141| 0.003    | 0.93     | 0        | 0.839    | 0.023    | 0.21     |
| 142| -0.023   | 0.284    | -0.005   | 0.632    | -0.004   | 0.916    |
| 143| -0.119   | 0.009    | -0.13    | 0.006    | -0.12    | 0.009    |
| 144| 0.012    | 0.347    | -0.013   | 0.392    | 0.012    | 0.37     |
| 145| -0.051   | 0.02     | -0.047   | 0.185    | -0.044   | 0.161    |
| 146| -0.006   | 0.424    | -0.008   | 0.55     | -0.032   | 0.249    |
| 147| -0.012   | 0.317    | 0.033    | 0.23     | 0.029    | 0.235    |
| 148| -0.003   | 0.849    | -0.012   | 0.369    | -0.018   | 0.353    |
| 149| 0.011    | 0.382    | 0.024    | 0.255    | 0.002    | 0.637    |
| 150| 0.015    | 0.302    | 0.046    | 0.154    | 0.016    | 0.375    |
| 151| 0.027    | 0.286    | -0.012   | 0.347    | 0.004    | 0.84     |
| 152| -0.003   | 0.927    | 0.017    | 0.33     | -0.001   | 0.772    |
| 153| -0.007   | 0.511    | -0.004   | 0.827    | -0.036   | 0.216    |
| 154| -0.112   | 0.009    | -0.086   | 0.013    | -0.109   | 0.007    |
| 155| -0.154   | 0.003    | -0.158   | 0.004    | -0.149   | 0.006    |
| 156| 0.011    | 0.349    | 0.035    | 0.283    | 0.036    | 0.206    |
| 157| 0.002    | 0.836    | 0.014    | 0.314    | -0.025   | 0.229    |
|   | pm5-pm25  | -0.024 | 0.269 | 0.022 | 0.221 | -0.013 | 0.357 |
|---|-----------|--------|-------|-------|-------|--------|-------|
|   | pm5-pm26  | 0.001  | 0.77  | -0.001 | 0.876 | 0.01   | 0.341 |
|   | pm5-pm27  | -0.015 | 0.306 | -0.018 | 0.354 | 0.011  | 0.397 |
|   | pm5-pm28  | -0.168 | 0.005 | -0.167 | 0.002 | -0.194 | 0.003 |
|   | pm5-pm29  | -0.024 | 0.204 | -0.003 | 0.951 | -0.031 | 0.288 |
|   | pm5-pm30  | -0.042 | 0.167 | -0.015 | 0.317 | -0.028 | 0.208 |
|   | pm5-pm31  | 0.018  | 0.317 | 0.033 | 0.256 | 0.025  | 0.225 |
|   | pm5-pm32  | -0.005 | 0.948 | -0.022 | 0.24  | -0.019 | 0.359 |
|   | pm5-pm33  | -0.014 | 0.307 | 0.002 | 0.712 | 0.028  | 0.226 |
|   | pm5-pm34  | 0.031  | 0.222 | 0.017 | 0.37  | 0.023  | 0.28  |
|   | pm5-pm35  | -0.013 | 0.397 | 0.008 | 0.545 | 0.024  | 0.235 |
|   | pm5-pm36  | -0.018 | 0.37  | -0.024 | 0.224 | 0.02   | 0.358 |
|   | pm5-pm37  | 0.017  | 0.374 | 0     | 0.67  | 0.028  | 0.291 |
|   | pm6-pm7   | -0.014 | 0.317 | -0.038 | 0.211 | -0.025 | 0.282 |
|   | pm6-pm8   | 0.016  | 0.373 | 0.014 | 0.393 | 0.018  | 0.378 |
|   | pm6-pm9   | 0.018  | 0.332 | 0.025 | 0.287 | 0.005  | 0.607 |
|   | pm6-pm10  | 0.196  | 0.004 | 0.211 | <0.001 | 0.185 | 0.002 |
|   | pm6-pm11  | 0.031  | 0.251 | 0.013 | 0.359 | -0.004 | 0.867 |
|   | pm6-pm12  | -0.092 | 0.012 | -0.052 | 0.04  | -0.056 | 0.03  |
|   | pm6-pm13  | 0.011  | 0.302 | -0.02 | 0.3   | 0.001  | 0.617 |
|   | pm6-pm14  | 0.007  | 0.484 | 0.009 | 0.486 | 0.039  | 0.299 |
|   | pm6-pm15  | 0.004  | 0.986 | 0.036 | 0.21  | -0.006 | 0.478 |
|   | pm6-pm16  | 0.014  | 0.377 | -0.487 | <0.001 | -0.473 | <0.001 |
|   | pm6-pm17  | 0.026  | 0.279 | 0.041 | 0.184 | 0.03   | 0.223 |
|   | pm6-pm18  | -0.46  | <0.001 | -0.486 | <0.001 | -0.464 | <0.001 |
|   | pm6-pm19  | 0.023  | 0.286 | 0.004 | 0.672 | 0.025  | 0.24  |
|   | pm6-pm20  | -0.268 | <0.001 | -0.253 | <0.001 | -0.274 | <0.001 |
|   | pm6-pm21  | -0.083 | 0.012 | -0.121 | 0.01  | -0.105 | 0.008 |
|   | pm6-pm22  | -0.436 | <0.001 | -0.441 | <0.001 | -0.485 | <0.001 |
|   | pm6-pm23  | 0.01   | 0.32  | 0.028 | 0.202 | 0.003  | 0.653 |
|   |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|
|   | pm6-pm24 | 0.028 | 0.241 | 0.03  | 0.217 | 0.009 | 0.55  |
|   | pm6-pm25 | 0.01  | 0.506 | -0.002| 0.768 | 0.021 | 0.216 |
|   | pm6-pm26 | 0.01  | 0.322 | 0.004 | 0.643 | 0.026 | 0.229 |
|   | pm6-pm27 | -0.226| <0.001| -0.214| <0.001| -0.194| 0.001 |
|   | pm6-pm28 | -0.202| <0.001| -0.237| <0.001| -0.232| <0.001|
|   | pm6-pm29 | -0.028| 0.264 | -0.014| 0.358 | -0.011| 0.311 |
|   | pm6-pm30 | -0.027| 0.29  | -0.037| 0.212 | -0.003| 0.61  |
|   | pm6-pm31 | -0.249| <0.001| -0.248| <0.001| -0.254| <0.001|
|   | pm6-pm32 | -0.263| <0.001| -0.243| <0.001| -0.259| <0.001|
|   | pm6-pm33 | -0.285| <0.001| -0.262| <0.001| -0.262| <0.001|
|   | pm6-pm34 | 0.014 | 0.338 | -0.173| 0.004 | 0.049 | 0.178 |
|   | pm6-pm35 | -0.02  | 0.287 | 0.017 | 0.341 | -0.01 | 0.376 |
|   | pm6-pm36 | 0.034 | 0.293 | 0.034 | 0.245 | 0.038 | 0.285 |
|   | pm6-pm37 | -0.035| 0.281 | -0.043| 0.166 | -0.044| 0.198 |
|   | pm7-pm8  | -0.015| 0.327 | -0.03 | 0.238 | -0.036| 0.226 |
|   | pm7-pm9  | 0.005 | 0.497 | -0.022| 0.274 | 0.007 | 0.515 |
|   | pm7-pm10 | 0.482 | <0.001| 0.463 | <0.001| 0.454 | <0.001|
|   | pm7-pm11 | -0.082| 0.019 | -0.054| 0.027 | -0.066| 0.025 |
|   | pm7-pm12 | -0.048| 0.183 | -0.057| 0.023 | -0.059| 0.02  |
|   | pm7-pm13 | -0.056| 0.043 | -0.076| 0.018 | -0.077| 0.018 |
|   | pm7-pm14 | 0.004 | 0.958 | 0.007 | 0.452 | -0.019| 0.352 |
|   | pm7-pm15 | -0.023| 0.203 | -0.029| 0.216 | -0.033| 0.292 |
|   | pm7-pm16 | 0    | 0.717 | -0.002| 0.721 | -0.03 | 0.264 |
|   | pm7-pm17 | 0.021 | 0.262 | -0.009| 0.538 | 0.013 | 0.341 |
|   | pm7-pm18 | -0.041| 0.165 | -0.045| 0.188 | -0.043| 0.158 |
|   | pm7-pm19 | -0.043| 0.173 | -0.067| 0.022 | -0.033| 0.257 |
|   | pm7-pm20 | -0.019| 0.376 | 0.009 | 0.437 | -0.014| 0.335 |
|   | pm7-pm21 | -0.074| 0.014 | -0.06 | 0.03  | -0.072| 0.015 |
|   | pm7-pm22 | -0.132| 0.006 | -0.162| 0.004 | -0.149| 0.009 |
|   | pm7-pm23 | 0.009 | 0.429 | 0.001 | 0.765 | 0.012 | 0.347 |
|       | pm7-pm24 | pm7-pm25 | pm7-pm26 | pm7-pm27 | pm7-pm28 | pm7-pm29 | pm7-pm30 | pm7-pm31 | pm7-pm32 | pm7-pm33 | pm7-pm34 | pm7-pm35 | pm7-pm36 | pm7-pm37 | pm8-pm9   | pm8-pm10  | pm8-pm11  | pm8-pm12  | pm8-pm13  | pm8-pm14  | pm8-pm15  | pm8-pm16  | pm8-pm17  | pm8-pm18  | pm8-pm19  | pm8-pm20  | pm8-pm21  | pm8-pm22  | pm8-pm23  | pm8-pm24  |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Value | -0.031   | -0.044   | -0.004   | 0.001    | -0.431   | -0.131   | 0.09     | -0.02    | -0.061   | -0.054   | -0.042   | -0.043   | -0.034   | -0.027   | 0.097    | -0.018   | -0.069   | -0.003   | 0.003    | 0.03     | -0.004   | 0.019    | 0.097    | -0.015   | -0.372   | 0.011    | -0.009   |
|       | 0.27     | 0.194    | 0.667    | 0.924    | <0.001   | 0.007    | 0.019    | 0.323    | 0.04     | 0.021    | 0.176    | 0.183    | -0.056   | 0.208    | 0.015    | 0.307    | 0.022    | 0.772    | 0.906    | 0.25     | 0.887    | 0.392    | 0.374    | <0.001   | 0.329    | -0.029   | 0.521    | -0.029   |
|       | -0.014   | -0.057   | -0.008   | -0.029   | -0.461   | -0.137   | 0.078    | -0.023   | -0.035   | -0.027   | -0.038   | -0.022   | -0.056   | -0.015   | 0.108    | 0.021    | -0.098   | -0.028   | -0.029   | 0.012    | 0.005    | -0.019   | -0.02   | 0.228    | -0.029   | -0.029   | 0.254    | 0.521    |
|       | 0.349    | 0.035    | 0.451    | 0.248    | <0.001   | 0.008    | 0.015    | 0.291    | 0.29     | 0.266    | 0.01    | 0.244    | 0.031    | 0.324    | 0.010    | 0.298    | 0.015    | 0.2      | 0.257    | 0.387    | 0.971    | 0.376    | 0.307    | 0.296    | 0.346    | 0.254    | 0.009    |
|       | -0.014   | -0.025   | -0.009   | -0.007   | -0.464   | -0.124   | 0.079    | -0.031   | 0.29     | -0.064   | -0.004   | -0.35    | -0.05    | -0.014   | 0.12     | -0.014   | -0.014   | 0.15     | -0.009   | 0.018    | 0.033    | -0.011   | 0.011    | -0.013   | 0.362    | -0.017   | -0.029   |
|       | 0.341    | 0.2       | 0.588    | 0.598    | <0.001   | 0.009    | 0.111    | 0.295    | 0.037    | 0.163    | 0.436    | 0.286    | 0.043    | 0.309    | 0.009    | 0.39     | 0.025    | 0.498    | 0.384    | 0.255    | 0.392    | 0.349    | 0.583    | 0.315    | 0.687    | 0.017    | 0.438    |
|     | pm8-pm25 | -0.018 | 0.35 | 0.013 | 0.349 | 0.018 | 0.373 |
|-----|----------|--------|------|-------|-------|-------|-------|
| 248 | pm8-pm26 | 0.015  | 0.305| -0.001| 0.873 | -0.007| 0.581 |
|     | pm8-pm27 | 0.013  | 0.364| 0.014 | 0.308 | -0.025| 0.258 |
| 250 | pm8-pm28 | -0.468 | <0.001| -0.477| <0.001| -0.448| <0.001|
|     | pm8-pm29 | 0.005  | 0.671| 0.016 | 0.305 | -0.006| 0.441 |
| 252 | pm8-pm30 | 0.015  | 0.324| -0.03 | 0.222 | -0.005| 0.672 |
|     | pm8-pm31 | 0.003  | 0.644| -0.022| 0.211 | 0.01  | 0.37  |
| 255 | pm8-pm32 | -0.011 | 0.346| 0.006 | 0.544 | 0.013 | 0.36  |
|     | pm8-pm33 | 0.021  | 0.283| 0.012 | 0.345 | 0.03  | 0.298 |
| 256 | pm8-pm34 | -0.011 | 0.336| -0.005| 0.491 | -0.008| 0.428 |
|     | pm8-pm35 | -0.009 | 0.452| -0.005| 0.535 | 0.006 | 0.545 |
| 258 | pm8-pm36 | -0.011 | 0.305| -0.001| 0.775 | 0.013 | 0.388 |
|     | pm8-pm37 | -0.007 | 0.507| -0.014| 0.335 | 0.024 | 0.218 |
| 260 | pm9-pm10 | 0.113  | 0.009| 0.098 | 0.018 | 0.115 | 0.007 |
|     | pm9-pm11 | 0.021  | 0.293| 0.01  | 0.358 | -0.006| 0.553 |
| 262 | pm9-pm12 | -0.041 | 0.161| -0.054| 0.034 | -0.02 | 0.343 |
|     | pm9-pm13 | -0.017 | 0.396| -0.002| 0.898 | -0.004| 0.987 |
| 264 | pm9-pm14 | 0.042  | 0.188| 0.012 | 0.328 | -0.003| 0.937 |
|     | pm9-pm15 | 0.012  | 0.392| 0    | 0.967 | 0.007 | 0.555 |
| 266 | pm9-pm16 | -0.063 | 0.021| -0.076| 0.018 | -0.081| 0.015 |
|     | pm9-pm17 | 0.01   | 0.556| -0.013| 0.371 | -0.001| 0.617 |
| 268 | pm9-pm18 | 0.019  | 0.328| 0.021 | 0.223 | 0.017 | 0.333 |
|     | pm9-pm19 | -0.022 | 0.23 | 0.014 | 0.361 | 0.006 | 0.578 |
| 270 | pm9-pm20 | -0.012 | 0.34 | -0.022| 0.299 | 0.022 | 0.282 |
|     | pm9-pm21 | -0.076 | 0.019| -0.119| 0.005 | -0.078| 0.011 |
| 272 | pm9-pm22 | -0.041 | 0.176| -0.054| 0.039 | -0.058| 0.023 |
|     | pm9-pm23 | 0.004  | 0.626| 0.027 | 0.213 | 0.041 | 0.163 |
| 274 | pm9-pm24 | -0.47  | <0.001| -0.487| <0.001| -0.465| <0.001|
|     | pm9-pm25 | 0.022  | 0.274| 0.021 | 0.274 | 0.035 | 0.204 |
| 276 | pm9-pm26 | -0.01  | 0.387| 0.001 | 0.899 | 0.003 | 0.625 |
| Row | Column | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 | Value7 |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| 969 | pm9-pm27 | -0.021 | 0.239 | -0.002 | 0.825 | 0.012 | 0.315 |
| 970 | pm9-pm28 | -0.039 | 0.224 | -0.037 | 0.24 | -0.045 | 0.17 |
| 971 | pm9-pm29 | -0.016 | 0.333 | -0.035 | 0.261 | -0.034 | 0.249 |
| 972 | pm9-pm30 | -0.03 | 0.261 | -0.006 | 0.517 | -0.031 | 0.239 |
| 973 | pm9-pm31 | 0.029 | 0.282 | 0.021 | 0.284 | 0.021 | 0.209 |
| 974 | pm9-pm32 | 0.006 | 0.477 | 0.03 | 0.218 | 0.016 | 0.397 |
| 975 | pm9-pm33 | 0.016 | 0.366 | -0.017 | 0.369 | 0.028 | 0.289 |
| 976 | pm9-pm34 | 0.002 | 0.669 | 0.033 | 0.242 | 0.018 | 0.318 |
| 977 | pm9-pm35 | 0.024 | 0.238 | 0.001 | 0.779 | -0.003 | 0.73 |
| 978 | pm9-pm36 | 0.012 | 0.343 | 0.028 | 0.218 | 0.011 | 0.36 |
| 979 | pm9-pm37 | 0.009 | 0.464 | -0.002 | 0.828 | -0.012 | 0.359 |
| 980 | pm10-pm11 | 0.149 | 0.005 | 0.163 | 0.002 | 0.169 | 0.004 |
| 981 | pm10-pm12 | -0.136 | 0.009 | -0.157 | 0.003 | -0.141 | 0.007 |
| 982 | pm10-pm13 | 0.119 | 0.007 | 0.107 | 0.005 | 0.128 | 0.009 |
| 983 | pm10-pm14 | 0.091 | 0.013 | 0.093 | 0.011 | 0.108 | 0.009 |
| 984 | pm10-pm15 | 0.065 | 0.026 | 0.071 | 0.013 | 0.07 | 0.032 |
| 985 | pm10-pm16 | -0.143 | 0.006 | -0.142 | 0.007 | -0.149 | 0.01 |
| 986 | pm10-pm17 | 0.091 | 0.014 | 0.084 | 0.010 | 0.082 | 0.018 |
| 987 | pm10-pm18 | -0.17 | 0.003 | -0.176 | 0.001 | -0.145 | 0.009 |
| 988 | pm10-pm19 | 0.09 | 0.019 | 0.086 | 0.014 | 0.104 | 0.010 |
| 989 | pm10-pm20 | 0.092 | 0.012 | 0.091 | 0.014 | 0.105 | 0.006 |
| 990 | pm10-pm21 | -0.182 | 0.004 | -0.151 | 0.002 | -0.158 | 0.003 |
| 991 | pm10-pm22 | -0.146 | 0.008 | -0.157 | 0.003 | -0.152 | 0.002 |
| 992 | pm10-pm23 | -0.082 | 0.02 | -0.107 | 0.01 | -0.093 | 0.015 |
| 993 | pm10-pm24 | 0.048 | 0.2 | 0.029 | 0.214 | 0.016 | 0.339 |
| 994 | pm10-pm25 | -0.128 | 0.006 | -0.118 | 0.006 | -0.14 | 0.008 |
| 995 | pm10-pm26 | 0.066 | 0.031 | 0.068 | 0.031 | 0.073 | 0.011 |
| 996 | pm10-pm27 | -0.099 | 0.014 | -0.142 | 0.009 | -0.128 | 0.005 |
| 997 | pm10-pm28 | -0.165 | 0.002 | -0.159 | 0.001 | -0.131 | 0.008 |
| 998 | pm10-pm29 | -0.258 | <0.001 | -0.18 | 0.005 | -0.182 | 0.002 |
|   | pm10-pm30 | pm10-pm31 | pm10-pm32 | pm10-pm33 | pm10-pm34 | pm10-pm35 | pm10-pm36 | pm10-pm37 | pm10-pm38 | pm10-pm39 | pm11-pm12 | pm11-pm13 | pm11-pm14 | pm11-pm15 | pm11-pm16 | pm11-pm17 | pm11-pm18 | pm11-pm19 | pm11-pm20 | pm11-pm21 | pm11-pm22 | pm11-pm23 | pm11-pm24 | pm11-pm25 | pm11-pm26 | pm11-pm27 | pm11-pm28 | pm11-pm29 | pm11-pm30 | pm11-pm31 | pm11-pm32 | pm11-pm33 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 308| 0.118    | 0.008    | 0.112    | 0.006    | 0.138    | 0.008    |
| 309| -0.11    | 0.007    | -0.141   | 0.01     | -0.114   | 0.006    |
| 310| 0.08     | 0.014    | 0.09     | 0.015    | 0.081    | 0.017    |
| 311| 0.057    | 0.029    | 0.066    | 0.026    | 0.058    | 0.029    |
| 312| 0.171    | 0.003    | 0.165    | 0.004    | 0.185    | 0.004    |
| 313| 0.109    | 0.009    | 0.109    | 0.007    | 0.094    | 0.015    |
| 314| 0.054    | 0.039    | 0.054    | 0.037    | 0.068    | 0.039    |
| 315| 0.319    | <0.001   | 0.33     | <0.001   | 0.331    | <0.001   |
| 316| -0.071   | 0.014    | -0.051   | 0.025    | -0.093   | 0.012    |
| 317| -0.034   | 0.291    | -0.024   | 0.29     | -0.026   | 0.246    |
| 318| 0.017    | 0.36     | 0.024    | 0.244    | 0.038    | 0.255    |
| 319| -0.021   | 0.21     | -0.008   | 0.421    | -0.004   | 0.826    |
| 320| 0.018    | 0.324    | 0.005    | 0.677    | 0.02     | 0.371    |
| 321| -0.035   | 0.278    | -0.009   | 0.584    | -0.009   | 0.438    |
| 322| -0.002   | 0.966    | 0.004    | 0.925    | -0.01    | 0.321    |
| 323| -0.031   | 0.247    | -0.031   | 0.204    | -0.012   | 0.375    |
| 324| -0.017   | 0.341    | -0.023   | 0.239    | -0.011   | 0.393    |
| 325| -0.133   | 0.006    | -0.121   | 0.009    | -0.129   | 0.006    |
| 326| -0.004   | 0.981    | 0.004    | 0.771    | 0.022    | 0.201    |
| 327| 0.023    | 0.205    | 0.011    | 0.32     | 0.012    | 0.309    |
| 328| -0.018   | 0.34     | 0.02     | 0.216    | -0.012   | 0.334    |
| 329| 0.024    | 0.291    | -0.001   | 0.682    | -0.019   | 0.376    |
| 330| -0.011   | 0.306    | -0.03    | 0.288    | -0.015   | 0.354    |
| 331| 0.013    | 0.366    | 0.001    | 0.63     | 0.003    | 0.616    |
| 332| -0.255   | <0.001   | -0.222   | <0.001   | -0.235   | <0.001   |
| 333| 0.004    | 0.995    | -0.01    | 0.404    | -0.018   | 0.377    |
| 334| -0.005   | 0.969    | -0.038   | 0.236    | -0.032   | 0.291    |
| 335| 0.039    | 0.207    | 0.027    | 0.207    | 0.012    | 0.354    |
| 336| -0.01    | 0.443    | -0.025   | 0.277    | 0.015    | 0.306    |
| 337| -0.016   | 0.39     | 0.028    | 0.24     | 0.011    | 0.312    |
|   | pm11-pm34 | pm11-pm35 | pm11-pm36 | pm11-pm37 | pm12-pm13 | pm12-pm14 | pm12-pm15 | pm12-pm16 | pm12-pm17 | pm12-pm18 | pm12-pm19 | pm12-pm20 | pm12-pm21 | pm12-pm22 | pm12-pm23 | pm12-pm24 | pm12-pm25 | pm12-pm26 | pm12-pm27 | pm12-pm28 | pm12-pm29 | pm12-pm30 | pm12-pm31 | pm12-pm32 | pm12-pm33 | pm12-pm34 | pm12-pm35 | pm12-pm36 | pm12-pm37 | pm13-pm14 |
|---|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|---------|
| 338| 0.015    | 0.334    | -0.018   | 0.332    | 0.008     | 0.453     |
| 339| -0.001   | 0.695    | -0.004   | 0.881    | 0.002     | 0.725     |
| 340| 0.004    | 0.995    | 0.013    | 0.381    | 0.007     | 0.423     |
| 341| -0.02    | 0.217    | 0.009    | 0.473    | -0.012    | 0.393     |
| 342| -0.081   | 0.015    | -0.087   | 0.011    | -0.079    | 0.013     |
| 343| -0.09    | 0.01     | -0.076   | 0.014    | -0.07     | 0.039     |
| 344| -0.094   | 0.013    | -0.091   | 0.016    | -0.068    | 0.02      |
| 345| -0.064   | 0.039    | -0.066   | 0.038    | -0.03     | 0.267     |
| 346| -0.082   | 0.018    | -0.08    | 0.013    | -0.105    | 0.01      |
| 347| -0.065   | 0.039    | -0.069   | 0.028    | -0.098    | 0.011     |
| 348| -0.105   | 0.007    | -0.093   | 0.014    | -0.068    | 0.031     |
| 349| -0.082   | 0.012    | -0.032   | 0.296    | -0.052    | 0.038     |
| 350| -0.154   | 0.003    | -0.116   | 0.007    | -0.132    | 0.009     |
| 351| -0.043   | 0.195    | -0.046   | 0.169    | -0.054    | 0.033     |
| 352| -0.049   | 0.162    | -0.046   | 0.168    | -0.052    | 0.039     |
| 353| -0.086   | 0.013    | -0.105   | 0.006    | -0.097    | 0.011     |
| 354| -0.059   | 0.04     | -0.058   | 0.03     | -0.092    | 0.011     |
| 355| -0.055   | 0.039    | -0.051   | 0.044    | -0.077    | 0.011     |
| 356| -0.091   | 0.012    | -0.104   | 0.008    | -0.067    | 0.043     |
| 357| 0.006    | 0.413    | 0.019    | 0.334    | 0.021     | 0.262     |
| 358| -0.058   | 0.031    | -0.069   | 0.027    | -0.048    | 0.165     |
| 359| -0.061   | 0.026    | -0.057   | 0.039    | -0.096    | 0.019     |
| 360| -0.038   | 0.252    | -0.043   | 0.166    | -0.064    | 0.036     |
| 361| -0.055   | 0.024    | -0.079   | 0.01     | -0.083    | 0.019     |
| 362| -0.109   | 0.008    | -0.072   | 0.011    | -0.107    | 0.009     |
| 363| -0.029   | 0.248    | -0.045   | 0.191    | -0.065    | 0.032     |
| 364| -0.082   | 0.013    | -0.096   | 0.019    | -0.108    | 0.008     |
| 365| -0.065   | 0.035    | -0.071   | 0.017    | -0.062    | 0.033     |
| 366| -0.051   | 0.033    | -0.079   | 0.016    | -0.072    | 0.019     |
| 367| 0.004    | 0.754    | 0.008    | 0.536    | 0.017     | 0.39      |
|   | pm13-pm15 | pm13-pm16 | pm13-pm17 | pm13-pm18 | pm13-pm19 | pm13-pm20 | pm13-pm21 | pm13-pm22 | pm13-pm23 | pm13-pm24 | pm13-pm25 | pm13-pm26 | pm13-pm27 | pm13-pm28 | pm13-pm29 | pm13-pm30 | pm13-pm31 | pm13-pm32 | pm13-pm33 | pm13-pm34 | pm13-pm35 | pm13-pm36 | pm13-pm37 | pm14-pm15 | pm14-pm16 | pm14-pm17 | pm14-pm18 | pm14-pm19 | pm14-pm20 | pm14-pm21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 368 | -0.03 | 0.256 | -0.036 | 0.291 | 0 | 0.959 |
| 369 | -0.022 | 0.246 | -0.008 | 0.569 | -0.015 | 0.399 |
| 370 | -0.012 | 0.335 | -0.04 | 0.153 | -0.017 | 0.328 |
| 371 | -0.022 | 0.218 | -0.01 | 0.414 | 0.012 | 0.345 |
| 372 | -0.012 | 0.33 | -0.013 | 0.377 | -0.017 | 0.304 |
| 373 | 0.022 | 0.202 | 0.016 | 0.353 | -0.016 | 0.363 |
| 374 | -0.106 | 0.008 | -0.127 | 0.007 | -0.142 | 0.008 |
| 375 | -0.031 | 0.267 | -0.032 | 0.247 | -0.009 | 0.552 |
| 376 | 0.005 | 0.932 | 0.014 | 0.379 | 0.027 | 0.272 |
| 377 | -0.028 | 0.252 | -0.031 | 0.266 | -0.023 | 0.278 |
| 378 | -0.013 | 0.325 | -0.03 | 0.282 | -0.026 | 0.252 |
| 379 | -0.005 | 0.775 | -0.013 | 0.308 | -0.007 | 0.59 |
| 380 | -0.029 | 0.209 | -0.03 | 0.279 | -0.05 | 0.154 |
| 381 | -0.25 | <0.001 | -0.251 | <0.001 | -0.281 | <0.001 |
| 382 | -0.047 | 0.159 | -0.032 | 0.238 | -0.051 | 0.029 |
| 383 | -0.038 | 0.253 | -0.029 | 0.252 | -0.054 | 0.035 |
| 384 | -0.023 | 0.268 | -0.007 | 0.411 | -0.021 | 0.204 |
| 385 | -0.026 | 0.214 | -0.026 | 0.25 | -0.003 | 0.72 |
| 386 | 0.034 | 0.254 | 0.022 | 0.254 | 0.015 | 0.397 |
| 387 | 0.014 | 0.384 | -0.008 | 0.466 | -0.02 | 0.291 |
| 388 | -0.038 | 0.28 | -0.069 | 0.037 | -0.038 | 0.249 |
| 389 | -0.009 | 0.494 | -0.011 | 0.352 | -0.005 | 0.553 |
| 390 | 0.009 | 0.403 | -0.006 | 0.503 | 0.005 | 0.858 |
| 391 | 0.002 | 0.671 | 0.003 | 0.981 | -0.01 | 0.495 |
| 392 | -0.031 | 0.286 | -0.011 | 0.378 | -0.001 | 0.628 |
| 393 | -0.008 | 0.5 | -0.026 | 0.215 | 0.003 | 0.703 |
| 394 | 0.034 | 0.222 | -0.002 | 0.965 | 0.009 | 0.587 |
| 395 | -0.003 | 0.86 | 0.027 | 0.222 | 0.032 | 0.264 |
| 396 | 0.013 | 0.356 | 0.011 | 0.389 | -0.02 | 0.328 |
| 397 | -0.127 | 0.006 | -0.132 | 0.009 | -0.123 | 0.01 |
|   | pm14-pm22 | pm14-pm23 | pm14-pm24 | pm14-pm25 | pm14-pm26 | pm14-pm27 | pm14-pm28 | pm14-pm29 | pm14-pm30 | pm14-pm31 | pm14-pm32 | pm14-pm33 | pm14-pm34 | pm14-pm35 | pm14-pm36 | pm14-pm37 | pm15-pm16 | pm15-pm17 | pm15-pm18 | pm15-pm19 | pm15-pm20 | pm15-pm21 | pm15-pm22 | pm15-pm23 | pm15-pm24 | pm15-pm25 | pm15-pm26 | pm15-pm27 | pm15-pm28 | pm15-pm29 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 398 | -0.496 | <0.001 | -0.477 | <0.001 | -0.46 | <0.001 |
| 399 | 0.014 | 0.345 | 0.033 | 0.223 | 0.002 | 0.699 |
| 400 | -0.007 | 0.561 | 0.015 | 0.38 | 0.001 | 0.739 |
| 401 | -0.015 | 0.311 | 0.021 | 0.211 | 0.01 | 0.334 |
| 402 | 0.029 | 0.226 | -0.01 | 0.443 | 0.028 | 0.294 |
| 403 | -0.013 | 0.324 | -0.013 | 0.303 | -0.006 | 0.46 |
| 404 | -0.43 | <0.001 | -0.449 | <0.001 | -0.427 | <0.001 |
| 405 | -0.042 | 0.162 | -0.063 | 0.037 | -0.05 | 0.026 |
| 406 | -0.051 | 0.026 | -0.018 | 0.4 | -0.052 | 0.035 |
| 407 | 0.001 | 0.998 | 0.037 | 0.233 | 0.027 | 0.297 |
| 408 | -0.014 | 0.365 | -0.014 | 0.348 | -0.021 | 0.266 |
| 409 | 0.007 | 0.465 | 0.003 | 0.663 | 0.016 | 0.364 |
| 410 | -0.016 | 0.358 | -0.031 | 0.229 | -0.006 | 0.569 |
| 411 | 0.029 | 0.28 | -0.016 | 0.365 | 0.007 | 0.429 |
| 412 | -0.015 | 0.318 | 0.019 | 0.362 | -0.027 | 0.224 |
| 413 | -0.283 | <0.001 | -0.258 | <0.001 | -0.266 | <0.001 |
| 414 | 0.013 | 0.369 | 0.006 | 0.557 | 0.001 | 0.845 |
| 415 | -0.003 | 0.763 | -0.014 | 0.318 | 0.003 | 0.653 |
| 416 | 0.014 | 0.392 | -0.025 | 0.271 | 0.005 | 0.544 |
| 417 | -0.022 | 0.23 | 0.02 | 0.283 | -0.007 | 0.444 |
| 418 | -0.113 | 0.005 | -0.079 | 0.012 | -0.098 | 0.018 |
| 419 | 0.028 | 0.234 | 0.038 | 0.283 | 0.006 | 0.569 |
| 420 | -0.008 | 0.591 | 0.016 | 0.311 | 0.004 | 0.844 |
| 421 | -0.029 | 0.273 | -0.002 | 0.741 | 0.005 | 0.599 |
| 422 | -0.008 | 0.6 | -0.006 | 0.584 | 0.012 | 0.348 |
| 423 | 0.015 | 0.345 | -0.016 | 0.335 | 0.011 | 0.37 |
| 424 | -0.009 | 0.488 | -0.001 | 0.774 | -0.023 | 0.296 |
| 425 | -0.465 | <0.001 | -0.464 | <0.001 | -0.434 | <0.001 |
| 426 | -0.033 | 0.242 | -0.009 | 0.464 | 0.012 | 0.364 |
| pm15-pm30 | -0.039 | 0.297 | -0.049 | 0.176 | -0.034 | 0.226 |
| pm15-pm31 | 0.015 | 0.336 | -0.015 | 0.311 | 0.008 | 0.513 |
| pm15-pm32 | -0.002 | 0.848 | 0.006 | 0.424 | -0.026 | 0.213 |
| pm15-pm33 | -0.046 | 0.185 | -0.01 | 0.37 | -0.012 | 0.325 |
| pm15-pm34 | 0.028 | 0.262 | 0.007 | 0.512 | -0.013 | 0.316 |
| pm15-pm35 | -0.025 | 0.296 | -0.022 | 0.225 | -0.027 | 0.219 |
| pm15-pm36 | -0.012 | 0.353 | -0.011 | 0.309 | 0.011 | 0.37 |
| pm15-pm37 | -0.014 | 0.379 | -0.025 | 0.231 | -0.015 | 0.318 |
| pm15-pm38 | -0.006 | 0.571 | -0.015 | 0.345 | 0 | 0.666 |
| pm16-pm17 | 0.013 | 0.343 | -0.011 | 0.337 | 0.007 | 0.419 |
| pm16-pm18 | 0.022 | 0.211 | 0.008 | 0.493 | 0.044 | 0.188 |
| pm16-pm19 | 0.013 | 0.397 | 0.021 | 0.219 | -0.001 | 0.628 |
| pm16-pm20 | -0.116 | 0.005 | -0.094 | 0.016 | -0.073 | 0.019 |
| pm16-pm21 | 0.024 | 0.263 | 0.017 | 0.397 | 0.014 | 0.335 |
| pm16-pm22 | 0.036 | 0.247 | 0.037 | 0.222 | 0.02 | 0.237 |
| pm16-pm23 | 0.018 | 0.319 | 0.001 | 0.916 | 0.022 | 0.295 |
| pm16-pm24 | 0.041 | 0.192 | 0.04 | 0.189 | 0.033 | 0.264 |
| pm16-pm25 | 0.01 | 0.558 | 0.046 | 0.164 | 0.019 | 0.378 |
| pm16-pm26 | 0.023 | 0.225 | 0.026 | 0.257 | 0.033 | 0.248 |
| pm16-pm27 | -0.479 | <0.001 | -0.447 | <0.001 | -0.442 | <0.001 |
| pm16-pm28 | -0.47 | <0.001 | -0.444 | <0.001 | -0.452 | <0.001 |
| pm16-pm29 | -0.021 | 0.219 | -0.033 | 0.282 | -0.019 | 0.395 |
| pm16-pm30 | -0.023 | 0.215 | -0.012 | 0.3 | -0.019 | 0.353 |
| pm16-pm31 | -0.011 | 0.317 | 0.003 | 0.763 | 0.012 | 0.374 |
| pm16-pm32 | -0.001 | 0.704 | -0.007 | 0.433 | -0.004 | 0.852 |
| pm16-pm33 | 0.034 | 0.241 | 0.008 | 0.423 | 0.004 | 0.659 |
| pm16-pm34 | -0.028 | 0.202 | -0.003 | 0.942 | -0.034 | 0.212 |
| pm16-pm35 | -0.015 | 0.345 | -0.017 | 0.359 | -0.004 | 0.761 |
| pm16-pm36 | 0.004 | 0.912 | -0.004 | 0.727 | -0.005 | 0.579 |
| pm16-pm37 | -0.021 | 0.218 | -0.008 | 0.465 | -0.007 | 0.48 |
| pm17-pm19  | 0  | 0.785 | 0.019 | 0.349 | -0.013 | 0.387 |
| pm17-pm20  | -0.013 | 0.36 | -0.018 | 0.354 | -0.014 | 0.346 |
| pm17-pm21  | -0.121 | 0.009 | -0.106 | 0.009 | -0.116 | 0.008 |
| pm17-pm22  | -0.007 | 0.478 | -0.002 | 0.712 | -0.032 | 0.3 |
| pm17-pm23  | 0.011 | 0.381 | 0.006 | 0.465 | -0.008 | 0.437 |
| pm17-pm24  | 0.016 | 0.399 | -0.002 | 0.851 | 0.023 | 0.205 |
| pm17-pm25  | -0.008 | 0.42 | 0.026 | 0.246 | 0 | 0.833 |
| pm17-pm26  | -0.015 | 0.388 | 0.011 | 0.374 | -0.009 | 0.438 |
| pm17-pm27  | -0.022 | 0.292 | -0.033 | 0.247 | -0.006 | 0.54 |
| pm17-pm28  | -0.273 | <0.001 | -0.271 | <0.001 | -0.244 | <0.001 |
| pm17-pm29  | -0.029 | 0.206 | -0.032 | 0.297 | -0.061 | 0.033 |
| pm17-pm30  | -0.068 | 0.032 | -0.054 | 0.045 | -0.051 | 0.037 |
| pm17-pm31  | -0.033 | 0.22 | 0.01 | 0.307 | -0.001 | 0.892 |
| pm17-pm32  | -0.003 | 0.898 | -0.021 | 0.287 | 0.012 | 0.334 |
| pm17-pm33  | -0.001 | 0.902 | -0.004 | 0.946 | -0.019 | 0.347 |
| pm17-pm34  | -0.05 | 0.171 | -0.013 | 0.369 | -0.041 | 0.155 |
| pm17-pm35  | -0.005 | 0.573 | -0.019 | 0.368 | 0.013 | 0.304 |
| pm17-pm36  | -0.011 | 0.341 | 0.016 | 0.314 | 0.028 | 0.204 |
| pm17-pm37  | -0.02 | 0.316 | -0.028 | 0.254 | -0.008 | 0.527 |
| pm18-pm19  | 0.013 | 0.304 | -0.009 | 0.517 | -0.023 | 0.202 |
| pm18-pm20  | 0.021 | 0.229 | -0.022 | 0.288 | -0.011 | 0.329 |
| pm18-pm21  | -0.134 | 0.008 | -0.103 | 0.007 | -0.12 | 0.009 |
| pm18-pm22  | -0.01 | 0.321 | 0.034 | 0.288 | -0.014 | 0.331 |
| pm18-pm23  | -0.26 | <0.001 | -0.221 | <0.001 | -0.222 | <0.001 |
| pm18-pm24  | 0.004 | 0.611 | -0.011 | 0.33 | -0.025 | 0.287 |
| pm18-pm25  | 0.019 | 0.347 | 0.008 | 0.571 | -0.022 | 0.224 |
| pm18-pm26  | -0.021 | 0.218 | -0.01 | 0.565 | 0.024 | 0.29 |
| pm18-pm27  | -0.022 | 0.296 | -0.015 | 0.374 | -0.026 | 0.247 |
| pm18-pm28  | -0.466 | <0.001 | -0.429 | <0.001 | -0.465 | <0.001 |
| pm18-pm29  | -0.018 | 0.343 | 0.008 | 0.556 | -0.033 | 0.25 |
|   | pm18-pm30 | pm18-pm31 | pm18-pm32 | pm18-pm33 | pm18-pm34 | pm18-pm35 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
|   | 0.009     | 0.04      | -0.009    | 0.002     | 0.001     | 0.004     |
|   | 0.555     | 0.159     | 0.495     | 0.841     | 0.929     | 0.902     |
|   | -0.038    | 0.006     | -0.002    | 0.023     | 0.32      | -0.021    |
|   | 0.283     | 0.583     | 0.345     | 0.28      | 0.66      | 0.277     |
|   | -0.027    | 0.023     | -0.008    | 0.016     | 0.04      | -0.029    |
|   | 0.274     | 0.233     | 0.592     | 0.311     | 0.259     | 0.205     |

|   | pm18-pm36 | pm18-pm37 | pm19-pm20 | pm19-pm21 | pm19-pm22 | pm19-pm23 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
|   | -0.02     | 0.005     | -0.006    | -0.125    | 0.071     | -0.013    |
|   | 0.32      | 0.514     | 0.464     | 0.008     | 0.721     | 0.9      |
|   | -0.018    | 0.015     | 0.017     | -0.087    | -0.003    | 0.036     |
|   | 0.368     | 0.364     | 0.363     | 0.014     | 0.797     | 0.271     |
|   | -0.012    | -0.007    | -0.011    | -0.123    | -0.003    | 0.012     |
|   | 0.363     | 0.511     | 0.393     | 0.01      | 0.995     | 0.342     |

|   | pm19-pm24 | pm19-pm25 | pm19-pm26 | pm19-pm27 | pm19-pm28 | pm19-pm29 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
|   | -0.014    | 0.002     | 0.01      | 0.035     | -0.44     | -0.014    |
|   | 0.314     | 0.286     | 0.525     | 0.326     | <0.001    | 0.393     |
|   | 0.005     | 0      | -0.021    | 0.004     | -0.442    | 0.017     |
|   | 0.468     | 0.945     | 0.272     | 0.877     | <0.001    | 0.335     |
|   | -0.013    | 0.011     | 0.01      | -0.001    | -0.481    | 0.01      |
|   | 0.363     | 0.315     | 0.304     | 0.72      | <0.001    | 0.415     |

|   | pm19-pm30 | pm19-pm31 | pm19-pm32 | pm19-pm33 | pm19-pm34 | pm19-pm35 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
|   | -0.016    | 0.005     | -0.007    | 0.015     | -0.022    | 0.015     |
|   | 0.35      | 0.903     | 0.458     | 0.382     | 0.279     | 0.382     |
|   | -0.029    | 0.024     | -0.004    | 0.028     | -0.02     | 0.023     |
|   | 0.288     | 0.259     | 0.877     | 0.245     | 0.231     | 0.276     |
|   | 0.004     | 0.032     | 0.013     | 0.013     | -0.015    | 0.021     |
|   | 0.965     | 0.205     | 0.378     | 0.345     | 0.226     | 0.214     |

|   | pm19-pm36 | pm19-pm37 | pm20-pm21 | pm20-pm22 | pm20-pm23 | pm20-pm24 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
|   | 0.012     | -0.011    | -0.117    | 0.046     | 0.03      | 0.031     |
|   | 0.385     | 0.366     | 0.005     | 0.198     | 0.235     | 0.267     |
|   | 0.023     | 0.035     | -0.091    | -0.252    | 0.035     | 0.04      |
|   | 0.276     | 0.24      | 0.012     | <0.001    | 0.286     | 0.179     |
|   | 0.021     | 0.034     | -0.129    | -0.26     | 0.017     | 0.036     |
|   | 0.226     | 0.214     | 0.007     | <0.001    | 0.31      | 0.256     |
|     | pm20-pm25 |   | pm20-pm26 |   | pm20-pm27 |   | pm20-pm28 |   | pm20-pm29 |   | pm20-pm30 |   | pm20-pm31 |   | pm20-pm32 |   | pm20-pm33 |   | pm20-pm34 |   | pm20-pm35 |   | pm20-pm36 |   | pm20-pm37 |   | pm20-pm38 |   |
|-----|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|
| 518 | -0.019   | .374 | -0.003   | .812 | 0.01     | .333 |
| 519 | 0.005    | .818 | -0.023   | .298 | 0.009    | .546 |
| 520 | 0.008    | .58  | -0.025   | .249 | -0.024   | .217 |
| 521 | -0.259   | <0.001 | -0.238  | <0.001 | -0.246   | <0.001 |
| 522 | -0.282   | <0.001 | -0.259  | <0.001 | -0.248   | <0.001 |
| 523 | -0.021   | 0.265 | -0.039   | 0.266 | -0.039   | 0.22  |
| 524 | 0.037    | 0.252 | 0.003    | 0.759 | 0.03     | 0.218 |
| 525 | -0.021   | 0.289 | -0.029   | 0.218 | -0.025   | 0.288 |
| 526 | 0.013    | 0.321 | -0.008   | 0.432 | -0.014   | 0.394 |
| 527 | -0.028   | 0.292 | -0.001   | 0.912 | -0.021   | 0.248 |
| 528 | -0.018   | 0.394 | -0.027   | 0.224 | 0.008    | 0.414 |
| 529 | 0.011    | 0.311 | -0.001   | 0.901 | 0.022    | 0.278 |
| 530 | -0.003   | 0.665 | -0.016   | 0.362 | 0.008    | 0.515 |
| 531 | -0.065   | 0.025 | -0.064   | 0.03  | -0.038   | 0.295 |
| 532 | -0.071   | 0.014 | -0.07    | 0.031 | -0.101   | 0.006 |
| 533 | -0.091   | 0.012 | -0.101   | 0.008 | -0.116   | 0.006 |
| 534 | -0.084   | 0.018 | -0.095   | 0.015 | -0.118   | 0.006 |
| 535 | -0.134   | 0.01  | -0.121   | 0.006 | -0.131   | 0.006 |
| 536 | -0.133   | 0.009 | -0.111   | 0.005 | -0.121   | 0.006 |
| 537 | -0.014   | 0.375 | -0.043   | 0.189 | -0.036   | 0.285 |
| 538 | -0.126   | 0.01  | -0.093   | 0.017 | -0.095   | 0.016 |
| 539 | -0.157   | 0.001 | -0.126   | 0.007 | -0.146   | 0.007 |
| 540 | -0.072   | 0.015 | -0.088   | 0.019 | -0.068   | 0.044 |
| 541 | -0.12    | 0.007 | -0.095   | 0.016 | -0.096   | 0.013 |
| 542 | -0.1     | 0.015 | -0.059   | 0.042 | -0.095   | 0.019 |
| 543 | -0.089   | 0.011 | -0.06    | 0.038 | -0.105   | 0.006 |
| 544 | -0.084   | 0.016 | -0.077   | 0.016 | -0.075   | 0.013 |
| 545 | -0.116   | 0.01  | -0.072   | 0.013 | -0.107   | 0.008 |
| 546 | -0.083   | 0.018 | -0.075   | 0.011 | -0.081   | 0.012 |
| 547 | 0.164    | 0.003 | 0.153    | 0.004 | 0.163    | 0.004 |
|   | pm22-pm24 | pm22-pm25 | pm22-pm26 | pm22-pm27 | pm22-pm28 | pm22-pm29 | pm22-pm30 | pm22-pm31 | pm22-pm32 | pm22-pm33 | pm22-pm34 | pm22-pm35 | pm22-pm36 | pm22-pm37 | pm23-pm24 | pm23-pm25 | pm23-pm26 | pm23-pm27 | pm23-pm28 | pm23-pm29 | pm23-pm30 | pm23-pm31 | pm23-pm32 | pm23-pm33 | pm23-pm34 | pm23-pm35 | pm23-pm36 | pm23-pm37 | pm23-pm38 | pm24-pm25 | pm24-pm26 |
|---|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 548| -0.276   | <0.001    | -0.083    | 0.016     | 0.045     | 0.197     |
| 549| 0.006    | 0.507     | 0.024     | 0.283     | 0.023     | 0.265     |
| 550| 0.001    | 0.813     | 0.025     | 0.229     | 0.029     | 0.236     |
| 551| 0.02     | 0.391     | 0.01      | 0.459     | 0.015     | 0.342     |
| 552| -0.22    | <0.001    | -0.211    | <0.001    | -0.227    | <0.001    |
| 553| -0.385   | <0.001    | -0.348    | <0.001    | -0.367    | <0.001    |
| 554| -0.067   | 0.03      | -0.066    | 0.035     | -0.065    | 0.026     |
| 555| 0.02     | 0.23      | 0.024     | 0.213     | 0.039     | 0.277     |
| 556| 0.025    | 0.299     | 0.038     | 0.268     | 0.004     | 0.938     |
| 557| 0.02     | 0.227     | -0.003    | 0.603     | 0.001     | 0.902     |
| 558| 0.007    | 0.528     | 0.027     | 0.25      | 0.014     | 0.376     |
| 559| 0.028    | 0.289     | 0.022     | 0.26      | 0.009     | 0.422     |
| 560| 0.011    | 0.38      | 0.01      | 0.339     | 0.012     | 0.384     |
| 561| 0.044    | 0.19      | 0.039     | 0.215     | 0.02      | 0.345     |
| 562| -0.215   | -0.001    | -0.255    | -0.001    | -0.25     | <0.001    |
| 563| 0.008    | 0.59      | -0.007    | 0.568     | -0.017    | 0.324     |
| 564| -0.277   | -0.001    | -0.243    | <0.001    | -0.24     | <0.001    |
| 565| -0.26    | -0.001    | -0.252    | <0.001    | -0.24     | <0.001    |
| 566| -0.215   | -0.001    | -0.219    | <0.001    | -0.206    | <0.001    |
| 567| 0.015    | 0.346     | 0.012     | 0.364     | 0.013     | 0.39      |
| 568| -0.032   | 0.228     | -0.038    | 0.254     | -0.028    | 0.213     |
| 569| 0.023    | 0.228     | 0.013     | 0.321     | 0.005     | 0.806     |
| 570| 0.021    | 0.214     | 0.003     | 0.69      | 0.038     | 0.212     |
| 571| 0.004    | 0.651     | 0.009     | 0.474     | -0.003    | 0.933     |
| 572| 0.012    | 0.398     | -0.023    | 0.282     | 0.004     | 0.813     |
| 573| 0.011    | 0.383     | 0.007     | 0.5       | -0.015    | 0.383     |
| 574| -0.475   | <0.001    | -0.444    | <0.001    | -0.472    | <0.001    |
| 575| 0.012    | 0.328     | -0.008    | 0.514     | -0.01     | 0.566     |
| 576| 0.026    | 0.268     | -0.002    | 0.63      | 0.007     | 0.588     |
| 577| -0.022   | 0.297     | -0.002    | 0.918     | 0.001     | 0.641     |
| PM24-PM27 | PM24-PM28 | PM24-PM29 | PM24-PM30 | PM24-PM31 | PM24-PM32 | PM24-PM33 | PM24-PM34 | PM24-PM35 | PM24-PM36 | PM24-PM37 | PM25-PM26 | PM25-PM27 | PM25-PM28 | PM25-PM29 | PM25-PM30 | PM25-PM31 | PM25-PM32 | PM25-PM33 | PM25-PM34 | PM25-PM35 | PM25-PM36 | PM25-PM37 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0         | 0.727     | -0.032    | 0.225     | -0.015    | 0.391     | 0.016     | 0.348     | -0.009    | 0.402     | 0.026     | 0.247     | 0.009     | 0.418     | -0.032    | 0.243     | -0.016    | 0.393     | -0.26     | <0.001    | -0.24     | <0.001    |
| -0.238    | <0.001    | -0.24     | <0.001    | -0.225    | <0.001    | 0.017     | 0.341     | 0.018     | 0.353     | -0.003    | 0.622     | 0.009     | 0.418     | -0.032    | 0.243     | -0.016    | 0.393     | -0.26     | <0.001    | -0.24     | <0.001    |
| -0.031    | 0.232     | -0.043    | 0.153     | -0.013    | 0.398     | 0.032     | 0.292     | 0.034     | 0.266     | 0         | 0.739     | 0.016     | 0.348     | -0.009    | 0.402     | 0.026     | 0.247     | 0.009     | 0.418     | -0.032    | 0.243     |
| -0.045    | 0.199     | -0.023    | 0.211     | -0.021    | 0.207     | -0.012    | 0.383     | -0.032    | 0.212     | 0         | 0.873     | 0.035     | 0.249     | 0.019     | 0.391     | 0.019     | 0.32      | 0.016     | 0.348     | -0.009    | 0.402     |
| 0.024     | 0.274     | -0.013    | 0.312     | -0.003    | 0.759     | -0.012    | 0.383     | -0.032    | 0.212     | 0         | 0.873     | 0.035     | 0.249     | 0.019     | 0.391     | 0.019     | 0.32      | 0.016     | 0.348     | -0.009    | 0.402     |
| -0.021    | 0.291     | 0.012     | 0.385     | -0.02     | 0.325     | 0.016     | 0.348     | -0.009    | 0.402     | 0.026     | 0.247     | 0.009     | 0.418     | -0.032    | 0.243     | -0.016    | 0.393     | -0.26     | <0.001    | -0.24     | <0.001    |
| -0.018    | 0.36      | -0.032    | 0.209     | -0.015    | 0.348     | 0.017     | 0.341     | 0.018     | 0.353     | -0.003    | 0.622     | 0.032     | 0.292     | 0.034     | 0.266     | 0         | 0.739     | 0.016     | 0.348     | -0.009    | 0.402     |
| 0.017     | 0.341     | 0.018     | 0.353     | -0.003    | 0.622     | 0.032     | 0.292     | 0.034     | 0.266     | 0         | 0.739     | 0.035     | 0.249     | 0.019     | 0.391     | 0.019     | 0.32      | 0.016     | 0.348     | -0.009    | 0.402     |
| 0.021     | 0.279     | 0.021     | 0.252     | 0.001     | 0.605     | -0.004    | 0.65      | -0.017    | 0.389     | 0.029     | 0.241     | 0.009     | 0.375     | 0.009     | 0.575     | -0.011    | 0.346     | 0.004     | 0.981     | -0.008    | 0.482     |
| -0.027    | 0.24      | 0.008     | 0.526     | -0.015    | 0.372     | 0.006     | 0.532     | 0.004     | 0.979     | -0.02     | 0.315     | 0.024     | 0.261     | 0.023     | 0.233     | 0.034     | 0.247     | 0.021     | 0.359     | 0.003     | 0.719     |
| 0.006     | 0.453     | 0.003     | 0.987     | -0.032    | 0.229     | -0.017    | 0.34      | -0.014    | 0.396     | -0.034    | 0.238     | -0.008    | 0.538     | -0.009    | 0.577     | 0.021     | 0.227     | 0.01     | 0.314     | 0.024     | 0.282     |
| 0.01     | 0.314     | 0.024     | 0.282     | -0.019    | 0.306     | -0.004    | 0.623     | -0.005    | 0.56      | 0.025     | 0.247     | -0.004    | 0.623     | -0.005    | 0.56      | 0.025     | 0.247     | 0.01     | 0.314     | 0.024     | 0.282     |
|   | pm26-pm34 | pm26-pm35 | pm26-pm36 | pm26-pm37 | pm27-pm28 | pm27-pm29 | pm27-pm30 | pm27-pm31 | pm27-pm32 | pm27-pm33 | pm27-pm34 | pm27-pm35 | pm27-pm36 | pm27-pm37 | pm28-pm29 | pm28-pm30 | pm28-pm31 | pm28-pm32 | pm28-pm33 | pm28-pm34 | pm28-pm35 | pm28-pm36 | pm29-pm30 | pm29-pm31 | pm29-pm32 | pm29-pm33 | pm29-pm34 | pm29-pm35 | pm29-pm36 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 608| 0.004    | 0.866    | -0.03    | 0.223    | -0.017   | 0.347    |
| 609| -0.03    | 0.205    | -0.009   | 0.418    | -0.031   | 0.24     |
| 610| 0.017    | 0.392    | 0.001    | 0.739    | 0.008    | 0.543    |
| 611| 0.022    | 0.231    | 0.006    | 0.41     | 0.007    | 0.559    |
| 612| -0.284   | <0.001   | -0.271   | <0.001   | -0.272   | <0.001   |
| 613| -0.009   | 0.567    | 0.009    | 0.442    | -0.011   | 0.304    |
| 614| -0.026   | 0.226    | -0.037   | 0.263    | -0.013   | 0.372    |
| 615| -0.021   | 0.291    | -0.02    | 0.371    | -0.027   | 0.246    |
| 616| -0.016   | 0.326    | 0.006    | 0.534    | 0.004    | 0.62     |
| 617| -0.023   | 0.208    | -0.028   | 0.212    | -0.028   | 0.247    |
| 618| 0.033    | 0.212    | 0.013    | 0.34     | 0.016    | 0.376    |
| 619| -0.01    | 0.464    | 0.021    | 0.289    | 0.027    | 0.289    |
| 620| 0.029    | 0.243    | -0.005   | 0.785    | -0.007   | 0.579    |
| 621| 0.031    | 0.272    | -0.007   | 0.449    | -0.009   | 0.466    |
| 622| -0.204   | <0.001   | -0.189   | 0.002    | -0.188   | 0.003    |
| 623| 0.024    | 0.222    | 0.006    | 0.503    | 0.031    | 0.261    |
| 624| -0.233   | <0.001   | -0.223   | <0.001   | -0.235   | <0.001   |
| 625| -0.263   | <0.001   | -0.279   | <0.001   | -0.267   | <0.001   |
| 626| -0.248   | <0.001   | -0.247   | <0.001   | -0.29    | <0.001   |
| 627| -0.213   | <0.001   | -0.222   | <0.001   | -0.229   | <0.001   |
| 628| -0.239   | <0.001   | -0.249   | <0.001   | -0.214   | <0.001   |
| 629| 0.022    | 0.282    | 0.018    | 0.302    | 0.003    | 0.745    |
| 630| -0.462   | <0.001   | -0.492   | <0.001   | -0.495   | <0.001   |
| 631| -0.258   | <0.001   | -0.243   | <0.001   | -0.277   | <0.001   |
| 632| 0.016    | 0.37     | 0.015    | 0.347    | 0.001    | 0.882    |
| 633| 0.001    | 0.932    | 0.038    | 0.23     | 0.009    | 0.444    |
| 634| -0.039   | 0.276    | -0.054   | 0.045    | -0.046   | 0.183    |
| 635| -0.026   | 0.271    | -0.011   | 0.389    | 0.012    | 0.361    |
| 636| -0.043   | 0.168    | -0.017   | 0.328    | 0.002    | 0.728    |
| 637| 0       | 0.696    | -0.012   | 0.39     | 0.019    | 0.362    |
|       |                  |       |       |       |       |       |
|-------|------------------|-------|-------|-------|-------|-------|
| 638   | pm29-pm37        | 0.027 | 0.222 | 0.03  | 0.229 | 0     | 0.744 |
| 639   | pm30-pm31        | -0.029| 0.252 | -0.025| 0.216 | 0.007 | 0.594 |
| 640   | pm30-pm32        | 0.003 | 0.661 | -0.041| 0.198 | -0.015| 0.341 |
| 641   | pm30-pm33        | 0.004 | 0.746 | 0     | 0.65  | -0.018| 0.376 |
| 642   | pm30-pm34        | -0.065| 0.045 | -0.039| 0.221 | -0.079| 0.013 |
| 643   | pm30-pm35        | -0.014| 0.354 | -0.021| 0.255 | 0.024 | 0.258 |
| 644   | pm30-pm36        | -0.008| 0.465 | 0.021 | 0.287 | 0.017 | 0.386 |
| 645   | pm30-pm37        | 0.01  | 0.586 | 0.026 | 0.247 | 0.016 | 0.358 |
| 646   | pm31-pm32        | -0.022| 0.273 | 0.014 | 0.322 | -0.014| 0.315 |
| 647   | pm31-pm33        | -0.004| 0.996 | 0.023 | 0.212 | 0.033 | 0.265 |
| 648   | pm31-pm34        | 0.014 | 0.324 | -0.014| 0.321 | 0.027 | 0.243 |
| 649   | pm31-pm35        | 0.019 | 0.371 | 0.01  | 0.592 | -0.001| 0.847 |
| 650   | pm31-pm36        | -0.003| 0.763 | -0.013| 0.367 | -0.011| 0.369 |
| 651   | pm31-pm37        | -0.016| 0.35  | 0.017 | 0.319 | -0.004| 0.728 |
| 652   | pm32-pm33        | 0.027 | 0.205 | -0.017| 0.394 | -0.01  |0.36  |
| 653   | pm32-pm34        | -0.011| 0.305 | -0.011| 0.372 | -0.015| 0.367 |
| 654   | pm32-pm35        | 0.016 | 0.399 | 0.035 | 0.291 | 0.028 | 0.297 |
| 655   | pm32-pm36        | 0     | 0.772 | -0.01 | 0.426 | 0     | 0.868 |
| 656   | pm32-pm37        | 0.011 | 0.356 | 0.017 | 0.341 | 0.016 | 0.365 |
| 657   | pm33-pm34        | -0.008| 0.593 | 0.013 | 0.374 | -0.025| 0.21  |
| 658   | pm33-pm35        | -0.003| 0.82  | 0.009 | 0.413 | 0.003 | 0.79  |
| 659   | pm33-pm36        | 0.023 | 0.214 | -0.019| 0.367 | 0.005 | 0.448 |
| 660   | pm33-pm37        | 0.012 | 0.333 | 0.024 | 0.289 | 0.01  | 0.555 |
| 661   | pm34-pm35        | 0.005 | 0.852 | 0.029 | 0.248 | 0.006 | 0.515 |
| 662   | pm34-pm36        | 0.032 | 0.267 | 0.024 | 0.201 | 0.012 | 0.306 |
| 663   | pm34-pm37        | 0.021 | 0.232 | -0.017| 0.399 | 0.012 | 0.334 |
| 664   | pm35-pm36        | -0.009| 0.597 | -0.002| 0.824 | 0.011 | 0.329 |
| 665   | pm35-pm37        | -0.007| 0.518 | -0.024| 0.279 | -0.021| 0.251 |
| 666   | pm36-pm37        | 0.007 | 0.44  | 0.004 | 0.852 | 0.003 | 0.672 |
Supplementary Data Set S4. Results of the distribution perturbation analyses for hypertrophy in the cardiac signaling network.

1a) Result of one-distribution perturbation analysis for hypertrophy when each response function was separately applied

|       | Lin     | Hill    | Sat     | Acc     |
|-------|---------|---------|---------|---------|
|       | Effect  | p-value | Effect  | p-value | Effect  | p-value | Effect  | p-value |
| pm1   | 1.019   | 0.818   | 1.025   | 0.806   | 1.020   | 0.132   | 0.998   | 0.328   |
| pm2   | 0.999   | 0.917   | 1.003   | 0.774   | 0.998   | 0.451   | 0.999   | 0.607   |
| pm3   | 1.002   | 0.679   | 1.034   | 0.908   | 0.994   | 0.421   | 1.019   | 0.670   |
| pm4   | 1.005   | 0.859   | 1.092   | 0.536   | 1.000   | 0.986   | 1.005   | 0.115   |
| pm5   | 1.008   | 0.486   | 1.000   | 0.870   | 0.998   | 0.693   | 1.003   | 0.585   |
| pm6   | 0.998   | 0.411   | 0.994   | 0.435   | 0.997   | 0.545   | 0.998   | 0.642   |
| pm7   | 3.115   | <0.001  | 2.285   | <0.001  | 3.306   | <0.001  | 2.322   | <0.001  |
| pm8   | 1.029   | 0.401   | 1.004   | 0.169   | 1.002   | 0.594   | 1.047   | 0.322   |
| pm9   | 1.040   | 0.377   | 1.066   | 0.493   | 1.027   | 0.349   | 1.024   | 0.754   |
| pm10  | 1.557   | <0.001  | 1.542   | <0.001  | 1.367   | <0.001  | 1.692   | <0.001  |
| pm11  | 0.998   | 0.616   | 0.996   | 0.422   | 0.996   | 0.593   | 0.996   | 0.548   |
| pm12  | 1.005   | 0.609   | 1.038   | 0.763   | 0.998   | 0.562   | 1.017   | 0.804   |
| pm13  | 0.864   | 0.012   | 0.841   | 0.009   | 0.897   | 0.184   | 0.765   | <0.001  |
| pm14  | 0.913   | 0.209   | 0.894   | 0.039   | 0.927   | 0.961   | 0.879   | 0.027   |
| pm15  | 1.151   | 0.021   | 1.267   | <0.001  | 1.162   | 0.024   | 1.169   | 0.020   |
| pm16  | 1.148   | 0.022   | 1.193   | 0.008   | 1.218   | <0.001  | 1.178   | 0.010   |
| pm17  | 1.148   | 0.022   | 1.170   | 0.009   | 1.196   | 0.007   | 1.154   | 0.020   |
| pm18  | 1.014   | 0.303   | 1.023   | 0.105   | 0.998   | 0.439   | 1.005   | 0.541   |
| pm19  | 1.002   | 0.625   | 1.077   | 0.645   | 1.042   | 0.492   | 1.051   | 0.681   |
| pm20  | 1.019   | 0.209   | 1.032   | 0.480   | 0.996   | 0.279   | 1.017   | 0.642   |
| pm21 | 1.626  <0.001 | 1.143  0.033 | 1.873  <0.001 | 1.207  <0.001 |
|------|----------------|-------------|---------------|---------------|
| pm22 | 0.984  0.277  | 1.045  0.356 | 0.928  0.751  | 0.992  0.262  |
| pm23 | 0.986  0.690  | 1.038  0.829 | 0.929  0.949  | 0.992  0.524  |
| pm24 | 0.998  0.278  | 1.029  0.591 | 0.999  0.638  | 0.995  0.793  |
| pm25 | 0.998  0.582  | 0.996  0.916 | 0.997  0.329  | 0.998  0.567  |
| pm26 | 0.997  0.572  | 0.995  0.407 | 0.997  0.502  | 0.998  0.403  |
| pm27 | 1.018  0.769  | 1.080  0.818 | 1.019  0.290  | 1.005  0.455  |
| pm28 | 1.010  0.149  | 1.028  0.562 | 1.002  0.357  | 1.026  0.216  |
| pm29 | 1.007  0.956  | 1.024  0.876 | 0.984  0.468  | 1.010  0.344  |
| pm30 | 1.011  0.362  | 1.023  0.357 | 0.988  0.718  | 1.026  0.774  |
| pm31 | 1.023  0.537  | 1.096  0.394 | 1.026  0.417  | 1.012  0.566  |
| pm32 | 1.001  0.985  | 1.020  0.375 | 1.003  0.292  | 1.072  0.920  |
| pm33 | 1.022  0.214  | 1.136  0.025 | 1.004  0.140  | 1.201  0.016  |
| pm34 | 1.016  0.806  | 1.036  0.871 | 0.921  0.660  | 1.072  0.380  |
| pm35 | 1.018  0.504  | 1.042  0.289 | 0.933  0.819  | 1.125  0.319  |
| pm36 | 1.000  0.654  | 0.998  0.622 | 0.996  0.608  | 0.998  0.532  |
| pm37 | 0.997  0.976  | 0.992  0.385 | 0.997  0.976  | 0.998  0.742  |

**Threshold: top 10%**

| pm1  | Lin Effect | Lin p-value | Hill Effect | Hill p-value | Sat Effect | Sat p-value | Acc Effect | Acc p-value |
|------|------------|-------------|-------------|-------------|------------|-------------|------------|-------------|
| pm1  | 1.016  0.508 | 1.024  0.780 | 1.017  0.301 | 0.998  0.834 |
| pm2  | 0.999  0.314 | 1.003  0.975 | 0.998  0.446 | 0.999  0.215 |
| pm3  | 1.002  0.140 | 1.030  0.454 | 0.994  0.836 | 1.017  0.203 |
| pm4  | 1.004  0.901 | 1.074  0.160 | 1.000  0.951 | 1.004  0.204 |
| pm5  | 1.007  0.629 | 1.000  0.628 | 0.998  0.547 | 1.003  0.792 |
| pm6  | 0.998  0.574 | 0.994  0.338 | 0.997  0.212 | 0.998  0.194 |
| pm7  | 2.920 | <0.001 | 2.081 | <0.001 | 2.798 | <0.001 | 2.387 | <0.001 |
|------|--------|---------|--------|---------|--------|---------|--------|---------|
| pm8  | 1.023  | 0.567   | 1.004  | 0.158   | 1.002  | 0.604   | 1.044  | 0.364   |
| pm9  | 1.041  | 0.166   | 1.067  | 0.974   | 1.023  | 0.880   | 1.023  | 0.479   |
| pm10 | 1.448  | <0.001  | 1.565  | <0.001  | 1.286  | <0.001  | 1.532  | <0.001  |
| pm11 | 0.998  | 0.967   | 0.996  | 0.968   | 0.997  | 0.842   | 0.996  | 0.155   |
| pm12 | 1.004  | 0.948   | 1.031  | 0.378   | 0.999  | 0.195   | 1.014  | 0.437   |
| pm13 | 0.860  | 0.013   | 0.856  | 0.012   | 0.896  | 0.224   | 0.822  | <0.001  |
| pm14 | 0.915  | 0.720   | 0.885  | 0.468   | 0.925  | 0.241   | 0.871  | 0.012   |
| pm15 | 1.126  | 0.033   | 1.260  | <0.001  | 1.125  | 0.033   | 1.144  | 0.021   |
| pm16 | 1.151  | 0.020   | 1.171  | 0.011   | 1.207  | <0.001  | 1.101  | 0.043   |
| pm17 | 1.156  | 0.021   | 1.185  | <0.001  | 1.221  | <0.001  | 1.142  | 0.022   |
| pm18 | 1.012  | 0.440   | 1.021  | 0.569   | 0.998  | 0.833   | 1.005  | 0.298   |
| pm19 | 1.002  | 0.249   | 1.069  | 0.983   | 1.040  | 0.574   | 1.043  | 0.430   |
| pm20 | 1.020  | 0.491   | 1.032  | 0.901   | 0.996  | 0.612   | 1.014  | 0.639   |
| pm21 | 1.574  | <0.001  | 1.129  | 0.036   | 1.831  | <0.001  | 1.183  | 0.012   |
| pm22 | 0.985  | 0.558   | 1.048  | 0.818   | 0.931  | 0.284   | 0.992  | 0.408   |
| pm23 | 0.987  | 0.110   | 1.029  | 0.756   | 0.934  | 0.145   | 0.991  | 0.634   |
| pm24 | 0.997  | 0.979   | 1.029  | 0.126   | 0.999  | 0.193   | 0.995  | 0.773   |
| pm25 | 0.998  | 0.446   | 0.996  | 0.431   | 0.997  | 0.978   | 0.998  | 0.522   |
| pm26 | 0.998  | 0.754   | 0.996  | 0.383   | 0.997  | 0.963   | 0.998  | 0.404   |
| pm27 | 1.014  | 0.656   | 1.083  | 0.972   | 1.022  | 0.276   | 1.005  | 0.683   |
| pm28 | 1.008  | 0.949   | 1.024  | 0.809   | 1.002  | 0.658   | 1.020  | 0.958   |
| pm29 | 1.006  | 0.323   | 1.018  | 0.400   | 0.987  | 0.485   | 1.010  | 0.369   |
| pm30 | 1.012  | 0.168   | 1.019  | 0.701   | 0.987  | 0.192   | 1.020  | 0.671   |
| pm31 | 1.019  | 0.880   | 1.084  | 0.359   | 1.023  | 0.567   | 1.014  | 0.632   |
| pm32 | 1.001  | 0.508   | 1.018  | 0.758   | 1.004  | 0.636   | 1.058  | 0.265   |
|       | Lin Effect | Lin p-value | Hill Effect | Hill p-value | Sat Effect | Sat p-value | Acc Effect | Acc p-value |
|-------|------------|-------------|-------------|-------------|------------|-------------|------------|-------------|
| pm1   | 1.015      | 0.113       | 1.018       | 0.686       | 1.015      | 0.168       | 0.998      | 0.315       |
| pm2   | 0.999      | 0.515       | 1.003       | 0.332       | 0.998      | 0.787       | 0.999      | 0.916       |
| pm3   | 1.002      | 0.188       | 1.026       | 0.631       | 0.995      | 0.648       | 1.015      | 0.433       |
| pm4   | 1.003      | 0.144       | 1.066       | 0.790       | 1.000      | 0.571       | 1.004      | 0.152       |
| pm5   | 1.006      | 0.438       | 1.000       | 0.341       | 0.999      | 0.884       | 1.002      | 0.698       |
| pm6   | 0.998      | 0.809       | 0.995       | 0.874       | 0.998      | 0.247       | 0.998      | 0.147       |
| pm7   | 2.654      | <0.001      | 1.920       | <0.001      | 2.509      | <0.001      | 2.203      | <0.001      |
| pm8   | 1.021      | 0.957       | 1.003       | 0.486       | 1.002      | 0.128       | 1.038      | 0.432       |
| pm9   | 1.036      | 0.657       | 1.056       | 0.944       | 1.020      | 0.557       | 1.020      | 0.459       |
| pm10  | 1.411      | <0.001      | 1.505       | <0.001      | 1.252      | <0.001      | 1.500      | <0.001      |
| pm11  | 0.998      | 0.291       | 0.996       | 0.977       | 0.997      | 0.421       | 0.996      | 0.896       |
| pm12  | 1.003      | 0.785       | 1.026       | 0.975       | 0.999      | 0.701       | 1.013      | 0.523       |
| pm13  | 0.893      | 0.038       | 0.869       | 0.024       | 0.905      | 0.708       | 0.837      | <0.001      |
| pm14  | 0.927      | 0.880       | 0.906       | 0.901       | 0.940      | 0.830       | 0.898      | 0.228       |
| pm15  | 1.134      | 0.040       | 1.223       | <0.001      | 1.135      | 0.035       | 1.139      | 0.031       |
| pm16  | 1.148      | 0.022       | 1.137       | 0.028       | 1.166      | 0.015       | 1.151      | 0.020       |
| pm17  | 1.127      | 0.041       | 1.156       | 0.030       | 1.173      | 0.011       | 1.130      | 0.037       |
| pm18  | 1.010      | 0.951       | 1.017       | 0.602       | 0.998      | 0.447       | 1.004      | 0.281       |
| pm19 | 1.002 | 1.000 | 1.061 | 0.129 | 1.036 | 0.230 | 1.037 | 0.170 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|
| pm20 | 1.016 | 0.182 | 1.026 | 0.169 | 0.996 | 0.839 | 1.012 | 0.530 |
| pm21 | 1.475 | <0.001| 1.122 | 0.042 | 1.748 | <0.001| 1.176 | 0.013 |
| pm22 | 0.987 | 0.687 | 1.039 | 0.252 | 0.933 | 0.206 | 0.993 | 0.432 |
| pm23 | 0.990 | 0.377 | 1.028 | 0.979 | 0.935 | 0.122 | 0.993 | 0.750 |
| pm24 | 0.998 | 0.511 | 1.024 | 0.350 | 0.999 | 0.992 | 0.996 | 0.276 |
| pm25 | 0.998 | 0.755 | 0.996 | 0.777 | 0.998 | 0.743 | 0.998 | 0.612 |
| pm26 | 0.998 | 0.534 | 0.996 | 0.137 | 0.998 | 0.893 | 0.998 | 0.927 |
| pm27 | 1.013 | 0.341 | 1.068 | 0.224 | 1.017 | 0.361 | 1.005 | 0.966 |
| pm28 | 1.007 | 0.405 | 1.021 | 0.156 | 1.002 | 0.783 | 1.019 | 0.442 |
| pm29 | 1.005 | 0.799 | 1.016 | 0.880 | 0.989 | 0.303 | 1.009 | 0.402 |
| pm30 | 1.009 | 0.191 | 1.017 | 0.220 | 0.989 | 0.809 | 1.017 | 0.289 |
| pm31 | 1.018 | 0.250 | 1.077 | 0.395 | 1.019 | 0.889 | 1.011 | 0.370 |
| pm32 | 1.001 | 0.423 | 1.015 | 0.646 | 1.003 | 0.494 | 1.049 | 0.327 |
| pm33 | 1.016 | 0.961 | 1.106 | 0.079 | 1.003 | 0.948 | 1.158 | 0.036 |
| pm34 | 1.011 | 0.390 | 1.029 | 0.688 | 0.942 | 0.969 | 1.057 | 0.515 |
| pm35 | 1.014 | 0.782 | 1.033 | 0.411 | 0.944 | 0.902 | 1.090 | 0.217 |
| pm36 | 1.000 | 0.219 | 0.998 | 0.792 | 0.997 | 0.602 | 0.998 | 0.403 |
| pm37 | 0.998 | 0.857 | 0.994 | 0.915 | 0.998 | 0.625 | 0.998 | 0.590 |
1b) Result of one-distribution perturbation analysis for hypertrophy when four different response function types were applied in a combined manner

|      | Top 5% |          | Top 10% |          | Top 20% |          |
|------|--------|----------|---------|----------|---------|----------|
|      | Effect | p-value  | Effect  | p-value  | Effect  | p-value  |
| pm1  | 1.014  | 0.956    | 1.012   | 0.965    | 1.009   | 0.889    |
| pm2  | 0.999  | 0.662    | 0.999   | 0.785    | 1.000   | 0.983    |
| pm3  | 1.002  | 0.405    | 1.001   | 0.860    | 1.001   | 0.290    |
| pm4  | 1.003  | 0.623    | 1.002   | 0.693    | 1.002   | 0.307    |
| pm5  | 1.007  | 0.274    | 1.005   | 0.950    | 1.005   | 0.831    |
| pm6  | 0.998  | 0.860    | 0.998   | 0.221    | 0.999   | 0.442    |
| pm7  | 2.412  | <0.001   | 2.350   | <0.001   | 1.955   | <0.001   |
| pm8  | 1.019  | 0.462    | 1.017   | 0.575    | 1.013   | 0.398    |
| pm9  | 1.037  | 0.122    | 1.030   | 0.709    | 1.025   | 0.933    |
| pm10 | 1.397  | <0.001   | 1.334   | <0.001   | 1.247   | <0.001   |
| pm11 | 0.998  | 0.673    | 0.998   | 0.269    | 0.999   | 0.828    |
| pm12 | 1.003  | 0.462    | 1.003   | 0.178    | 1.002   | 0.842    |
| pm13 | 0.879  | 0.018    | 0.913   | 0.037    | 0.919   | 0.031    |
| pm14 | 0.925  | 0.176    | 0.934   | 0.563    | 0.946   | 0.912    |
| pm15 | 1.291  | <0.001   | 1.175   | 0.010    | 1.165   | 0.012    |
| pm16 | 1.259  | <0.001   | 1.220   | <0.001   | 1.146   | 0.022    |
| pm17 | 1.191  | 0.006    | 1.153   | 0.018    | 1.142   | 0.025    |
| pm18 | 1.008  | 0.799    | 1.008   | 0.464    | 1.006   | 0.162    |
| pm19 | 1.002  | 0.816    | 1.001   | 0.713    | 1.001   | 0.458    |
| pm20 | 1.017  | 0.925    | 1.014   | 0.245    | 1.011   | 0.719    |
| pm21 | 1.438  | <0.001   | 1.396   | <0.001   | 1.292   | <0.001   |
| pm22 | 0.986 0.147 | 0.989 0.482 | 0.991 0.983 |
|------|------------|------------|------------|
| pm23 | 0.990 0.574 | 0.991 0.766 | 0.993 0.413 |
| pm24 | 0.998 0.884 | 0.998 0.748 | 0.999 0.644 |
| pm25 | 0.998 0.868 | 0.999 0.808 | 0.999 0.560 |
| pm26 | 0.998 0.719 | 0.998 0.959 | 0.999 0.432 |
| pm27 | 1.013 0.434 | 1.010 0.192 | 1.009 0.565 |
| pm28 | 1.008 0.619 | 1.006 0.770 | 1.004 0.778 |
| pm29 | 1.005 0.745 | 1.004 0.440 | 1.003 0.975 |
| pm30 | 1.009 0.238 | 1.008 0.951 | 1.006 0.275 |
| pm31 | 1.016 0.373 | 1.015 0.190 | 1.012 0.156 |
| pm32 | 1.001 0.553 | 1.001 0.766 | 1.001 0.381 |
| pm33 | 1.016 0.940 | 1.011 0.959 | 1.011 0.737 |
| pm34 | 1.010 0.947 | 1.008 0.988 | 1.007 0.694 |
| pm35 | 1.012 0.944 | 1.010 0.143 | 1.008 0.551 |
| pm36 | 1.000 0.914 | 1.000 0.542 | 1.000 0.784 |
| pm37 | 0.998 0.601 | 0.999 0.270 | 0.999 0.521 |
2) Result of reverse one-distribution perturbation analysis for hypertrophy in cardiac signaling network

2a) Result of reverse one-distribution perturbation analysis for hypertrophy when each response function was separately applied

|          | Lin Effect | Lin p-value | Hill Effect | Hill p-value | Sat Effect | Sat p-value | Acc Effect | Acc p-value |
|----------|------------|-------------|-------------|--------------|------------|-------------|------------|--------------|
| pm1      | 0.992      | 0.127       | 0.968       | 0.451        | 0.985      | 0.556       | 0.989      | 0.517        |
| pm2      | 0.998      | 0.134       | 0.990       | 0.868        | 0.997      | 0.434       | 0.995      | 0.733        |
| pm3      | 0.999      | 0.756       | 0.970       | 0.869        | 0.990      | 0.108       | 0.961      | 0.742        |
| pm4      | 0.996      | 0.570       | 0.932       | 0.189        | 0.992      | 0.366       | 0.972      | 0.915        |
| pm5      | 0.996      | 0.777       | 0.999       | 0.571        | 0.999      | 0.260       | 0.978      | 0.992        |
| pm6      | 0.997      | 0.258       | 0.994       | 0.451        | 0.997      | 0.587       | 0.998      | 0.184        |
| pm7      | 0.005      | <0.001      | 0.119       | <0.001       | 0.001      | <0.001      | 0.047      | <0.001       |
| pm8      | 0.983      | 0.737       | 0.996       | 0.814        | 0.992      | 0.311       | 0.954      | 0.868        |
| pm9      | 0.972      | 0.811       | 0.922       | 0.530        | 0.977      | 0.274       | 0.972      | 0.539        |
| pm10     | 0.509      | <0.001      | 0.443       | <0.001       | 0.647      | <0.001      | 0.322      | <0.001       |
| pm11     | 0.997      | 0.115       | 0.993       | 0.830        | 0.997      | 0.173       | 0.991      | 0.606        |
| pm12     | 0.992      | 0.461       | 0.982       | 0.709        | 0.999      | 0.167       | 0.977      | 0.851        |
| pm13     | 1.012      | 0.917       | 1.025       | 0.134        | 0.979      | 0.417       | 1.029      | 0.705        |
| pm14     | 1.120      | 0.879       | 1.082       | 0.411        | 1.092      | 0.766       | 1.102      | 0.843        |
| pm15     | 1.604      | <0.001      | 1.740       | <0.001       | 1.620      | <0.001      | 1.498      | <0.001       |
| pm16     | 0.498      | <0.001      | 0.417       | <0.001       | 0.481      | <0.001      | 0.585      | <0.001       |
| pm17     | 0.464      | <0.001      | 0.385       | <0.001       | 0.419      | <0.001      | 0.699      | <0.001       |
| pm18     | 0.993      | 0.320       | 0.983       | 0.628        | 0.998      | 0.881       | 0.978      | 0.533        |
| pm19     | 1.005      | 0.948       | 0.924       | 0.464        | 0.957      | 0.780       | 0.935      | 0.780        |
| pm20     | 0.989      | 0.693       | 0.977       | 0.712        | 0.997      | 0.141       | 0.989      | 0.411        |
| pm1  | Effect | p-value | Lin Effect | p-value | Hill Effect | p-value | Sat Effect | p-value | Acc Effect | p-value |
|------|--------|---------|------------|---------|-------------|---------|------------|---------|------------|---------|
| pm2  | 0.994  | 0.565   | 0.976      | 0.220   | 0.985       | 0.120   | 0.991      | 0.866   |            |         |
| pm3  | 0.998  | 0.391   | 0.990      | 0.190   | 0.997       | 0.334   | 0.996      | 0.205   |            |         |
| pm4  | 0.999  | 0.582   | 0.974      | 0.811   | 0.991       | 0.168   | 0.971      | 0.279   |            |         |
| pm5  | 0.996  | 0.610   | 0.935      | 0.567   | 0.994       | 0.822   | 0.977      | 0.542   |            |         |
| pm6  | 0.997  | 0.564   | 0.999      | 0.433   | 0.999       | 0.759   | 0.981      | 0.237   |            |         |

Threshold: top 10%
| pm7  | 0.048 | p<0.001 | 0.156 | p<0.001 | 0.178 | p<0.001 | 0.149 | p<0.001 |
|------|--------|---------|--------|---------|--------|---------|--------|---------|
| pm8  | 0.983 | 0.641   | 0.997 | 0.572   | 0.993 | 0.684   | 0.958 | 0.407   |
| pm9  | 0.971 | 0.934   | 0.936 | 0.622   | 0.974 | 0.330   | 0.973 | 0.170   |
| pm10  | 0.610 | p<0.001 | 0.466 | p<0.001 | 0.737 | p<0.001 | 0.477 | p<0.001 |
| pm11  | 0.997 | 0.168   | 0.994 | 0.164   | 0.998 | 0.806   | 0.992 | 0.966   |
| pm12  | 0.992 | 0.502   | 0.983 | 0.159   | 0.999 | 0.353   | 0.980 | 0.440   |
| pm13  | 1.009 | 0.516   | 1.025 | 0.426   | 0.980 | 0.952   | 1.030 | 0.322   |
| pm14  | 1.097 | 0.576   | 1.083 | 0.468   | 1.102 | 0.674   | 1.099 | 0.183   |
| pm15  | 1.558 | p<0.001 | 1.782 | p<0.001 | 1.534 | p<0.001 | 1.514 | p<0.001 |
| pm16  | 0.526 | p<0.001 | 0.385 | p<0.001 | 0.543 | p<0.001 | 0.551 | p<0.001 |
| pm17  | 0.613 | p<0.001 | 0.395 | p<0.001 | 0.500 | p<0.001 | 0.714 | p<0.001 |
| pm18  | 0.992 | 0.441   | 0.987 | 0.121   | 0.998 | 0.661   | 0.981 | 0.298   |
| pm19  | 1.005 | 0.225   | 0.941 | 0.889   | 0.966 | 0.801   | 0.944 | 0.727   |
| pm20  | 0.992 | 0.910   | 0.979 | 0.303   | 0.997 | 0.667   | 0.991 | 0.283   |
| pm21  | 0.572 | p<0.001 | 1.109 | 0.824   | 0.339 | p<0.001 | 0.795 | p<0.001 |
| pm22  | 0.994 | 0.508   | 0.984 | 1.000   | 0.987 | 0.665   | 0.984 | 0.847   |
| pm23  | 1.012 | 0.408   | 0.952 | 0.521   | 0.998 | 0.172   | 0.996 | 0.823   |
| pm24  | 0.999 | 0.290   | 0.976 | 0.268   | 0.999 | 0.850   | 0.997 | 0.482   |
| pm25  | 0.998 | 0.119   | 0.996 | 0.373   | 0.997 | 0.206   | 0.998 | 0.204   |
| pm26  | 0.998 | 0.933   | 0.996 | 0.865   | 0.997 | 0.918   | 0.998 | 0.614   |
| pm27  | 0.977 | 0.432   | 0.924 | 0.800   | 0.963 | 0.282   | 0.986 | 0.902   |
| pm28  | 1.002 | 0.600   | 0.990 | 0.534   | 0.992 | 0.841   | 0.970 | 0.575   |
| pm29  | 0.958 | 0.445   | 0.856 | 0.020   | 0.966 | 0.256   | 0.901 | 0.588   |
| pm30  | 1.024 | 0.212   | 1.075 | 0.885   | 1.006 | 0.696   | 1.040 | 0.294   |
| pm31  | 0.986 | 0.721   | 0.918 | 0.201   | 0.973 | 0.226   | 0.985 | 0.683   |
| pm32  | 0.997 | 0.784   | 0.996 | 0.933   | 0.989 | 0.105   | 0.937 | 0.385   |

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|        | Lin       | Hill       | Sat       | Acc       |
|--------|-----------|------------|-----------|-----------|
| pm1    | 0.995     | 0.583      | 0.980     | 0.742     |
| pm2    | 0.998     | 0.625      | 0.998     | 0.983     |
| pm3    | 0.997     | 0.989      | 0.999     | 0.823     |
| pm4    | 0.997     | 0.680      | 0.947     | 0.359     |
| pm5    | 0.976     | 0.687      | 0.999     | 0.200     |
| pm6    | 0.976     | 0.687      | 0.999     | 0.200     |
| pm7    | 0.669     | <0.001     | 0.299     | <0.001    |
| pm8    | 0.976     | 0.795      | 0.998     | 0.585     |
| pm9    | 0.976     | 0.174      | 0.948     | 0.261     |
| pm10   | 0.696     | <0.001     | 0.604     | <0.001    |
| pm11   | 0.998     | 0.439      | 0.995     | 0.815     |
| pm12   | 0.994     | 0.484      | 0.985     | 0.776     |
| pm13   | 1.008     | 0.834      | 1.022     | 0.908     |
| pm14   | 1.077     | 0.836      | 1.060     | 0.735     |
| pm15   | 1.456     | <0.001     | 1.607     | <0.001    |
| pm16   | 0.588     | <0.001     | 0.446     | <0.001    |
| pm17   | 0.648     | <0.001     | 0.499     | <0.001    |
| pm18   | 0.993     | 0.882      | 0.989     | 0.544     |

**Threshold: top 20%**

|        | Effect | Effect | Effect | Effect |
|--------|--------|--------|--------|--------|
|        | p-value| p-value| p-value| p-value|
| pm1    | 0.995  | 0.583  | 0.980  | 0.742  |
| pm2    | 0.998  | 0.625  | 0.998  | 0.983  |
| pm3    | 0.997  | 0.989  | 0.999  | 0.823  |
| pm4    | 0.997  | 0.680  | 0.947  | 0.359  |
| pm5    | 0.976  | 0.687  | 0.999  | 0.200  |
| pm6    | 0.976  | 0.687  | 0.999  | 0.200  |
| pm7    | 0.669  | <0.001 | 0.299  | <0.001 |
| pm8    | 0.976  | 0.795  | 0.998  | 0.585  |
| pm9    | 0.976  | 0.174  | 0.948  | 0.261  |
| pm10   | 0.696  | <0.001 | 0.604  | <0.001 |
| pm11   | 0.998  | 0.439  | 0.995  | 0.815  |
| pm12   | 0.994  | 0.484  | 0.985  | 0.776  |
| pm13   | 1.008  | 0.834  | 1.022  | 0.908  |
| pm14   | 1.077  | 0.836  | 1.060  | 0.735  |
| pm15   | 1.456  | <0.001 | 1.607  | <0.001 |
| pm16   | 0.588  | <0.001 | 0.446  | <0.001 |
| pm17   | 0.648  | <0.001 | 0.499  | <0.001 |
| pm18   | 0.993  | 0.882  | 0.989  | 0.544  |
| pm19 | 1.004 | 0.954 | 0.944 | 0.579 | 0.971 | 0.569 | 0.951 | 0.443 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|
| pm20 | 0.993 | 0.376 | 0.982 | 0.102 | 0.997 | 0.475 | 0.993 | 0.482 |
| pm21 | 0.672 | <0.001 | 1.056 | 0.799 | 0.486 | <0.001 | 0.854 | 0.014 |
| pm22 | 0.995 | 0.142 | 0.985 | 0.171 | 0.990 | 0.253 | 0.986 | 0.411 |
| pm23 | 1.009 | 0.416 | 0.964 | 0.637 | 0.998 | 0.881 | 0.997 | 0.349 |
| pm24 | 1.000 | 0.167 | 0.981 | 0.168 | 0.999 | 0.869 | 0.998 | 0.295 |
| pm25 | 0.998 | 0.329 | 0.996 | 0.806 | 0.998 | 0.251 | 0.999 | 0.341 |
| pm26 | 0.998 | 0.573 | 0.997 | 0.530 | 0.998 | 0.493 | 0.999 | 0.140 |
| pm27 | 0.980 | 0.193 | 0.940 | 0.816 | 0.973 | 0.790 | 0.988 | 0.709 |
| pm28 | 1.001 | 0.278 | 0.990 | 0.486 | 0.994 | 0.781 | 0.971 | 0.234 |
| pm29 | 0.966 | 0.147 | 0.876 | 0.021 | 0.969 | 0.717 | 0.922 | 0.328 |
| pm30 | 1.018 | 0.898 | 1.055 | 0.325 | 1.005 | 0.185 | 1.035 | 0.394 |
| pm31 | 0.989 | 0.581 | 0.936 | 0.492 | 0.980 | 0.308 | 0.989 | 0.420 |
| pm32 | 0.997 | 0.556 | 0.997 | 0.745 | 0.992 | 0.170 | 0.950 | 0.414 |
| pm33 | 0.988 | 0.253 | 0.930 | 0.836 | 0.986 | 0.595 | 0.859 | 0.011 |
| pm34 | 1.080 | 0.589 | 0.983 | 0.748 | 1.042 | 0.896 | 1.099 | 0.530 |
| pm35 | 0.901 | 0.040 | 0.884 | 0.041 | 0.898 | 0.031 | 0.741 | <0.001 |
| pm36 | 1.000 | 0.243 | 0.997 | 0.774 | 0.999 | 0.503 | 0.998 | 0.498 |
| pm37 | 0.998 | 0.436 | 0.997 | 0.340 | 0.998 | 0.246 | 0.998 | 0.133 |
2b) Result of reverse one-distribution perturbation analysis for hypertrophy when four different response function types were applied in a combined manner

| Top 5% | Top 10% | Top 20% |
|--------|---------|---------|
|        | Effect  | p-value | Effect  | p-value | Effect  | p-value |
| pm1    | 1.005   | 0.325   | 1.004   | 0.126   | 1.003   | 0.720   |
| pm2    | 0.998   | 0.198   | 0.999   | 0.689   | 0.999   | 0.586   |
| pm3    | 0.999   | 0.726   | 0.999   | 0.104   | 0.999   | 0.752   |
| pm4    | 0.997   | 0.980   | 0.997   | 0.963   | 0.998   | 0.588   |
| pm5    | 0.998   | 0.444   | 0.998   | 0.997   | 0.998   | 0.568   |
| pm6    | 0.998   | 0.580   | 0.999   | 0.665   | 0.999   | 0.318   |
| pm7    | 0.177   | <0.001  | 0.269   | <0.001  | 0.503   | <0.001  |
| pm8    | 0.986   | 0.415   | 0.989   | 0.524   | 0.991   | 0.720   |
| pm9    | 0.979   | 0.343   | 0.983   | 0.933   | 0.987   | 0.272   |
| pm10   | 0.685   | <0.001  | 0.759   | <0.001  | 0.795   | <0.001  |
| pm11   | 0.998   | 0.265   | 0.998   | 0.261   | 0.998   | 0.230   |
| pm12   | 0.994   | 0.404   | 0.995   | 0.608   | 0.996   | 0.182   |
| pm13   | 1.008   | 0.692   | 1.006   | 0.655   | 1.005   | 0.548   |
| pm14   | 1.081   | 0.557   | 1.068   | 0.302   | 1.051   | 0.344   |
| pm15   | 1.376   | <0.001  | 1.346   | <0.001  | 1.286   | <0.001  |
| pm16   | 0.634   | <0.001  | 0.693   | <0.001  | 0.747   | <0.001  |
| pm17   | 0.699   | <0.001  | 0.733   | <0.001  | 0.778   | <0.001  |
| pm18   | 0.994   | 0.427   | 0.996   | 0.711   | 0.996   | 0.544   |
| pm19   | 1.003   | 0.768   | 1.003   | 0.165   | 1.002   | 0.738   |
| pm20   | 0.994   | 0.573   | 0.995   | 0.118   | 0.996   | 0.365   |
| pm21   | 1.051   | 0.735   | 1.040   | 0.585   | 1.030   | 0.298   |
### 3a) Result of two-distribution perturbation analysis for hypertrophy when each response function was separately applied (1 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin | Hill | Sat | Acc | Synergistic effect | p-value |
|-----|------------------------------------------|-----|------|-----|-----|-------------------|---------|
| 1   | pm1-pm2                                  | 1.001 | 0.984 | 1.017 | 0.995 | -0.014 | 0.31 |
| 2   | pm1-pm3                                  | 1.031 | 1.036 | 0.999 | 1.03 | -0.001 | 0.782 |
| 3   | pm1-pm4                                  | 1.011 | 1.099 | 1.025 | 1.01 | 0.002 | 0.895 |
|   | pm1-pm5 | 1.013 | 1.001 | 1.015 | 0.978 | -0.014 | 0.351 |
|---|---------|-------|-------|-------|-------|--------|-------|
| 5 | pm1-pm6 | 0.988 | 0.995 | 1.001 | 0.979 | -0.02  | 0.314 |
| 6 | pm1-pm7 | 2.826 | 2.074 | 2.686 | 2.258 | -0.099 | 0.016 |
| 7 | pm1-pm8 | 1.043 | 1.022 | 0.998 | 1.084 | 0.005  | 0.874 |
| 8 | pm1-pm9 | 1.038 | 1.067 | 1.047 | 1.037 | -0.005 | 0.72  |
| 9 | pm1-pm10 | 1.466 | 1.557 | 1.262 | 1.473 | -0.032 | 0.234 |
|10 | pm1-pm11 | 1.017 | 0.96  | 0.993 | 1.002 | -0.017 | 0.353 |
|11 | pm1-pm12 | 1.01  | 1.054 | 0.997 | 1.014 | -0.007 | 0.49  |
|12 | pm1-pm13 | 0.943 | 0.924 | 0.905 | 0.864 | 0.037  | 0.233 |
|13 | pm1-pm14 | 0.922 | 0.907 | 0.953 | 0.91  | 0.01   | 0.315 |
|14 | pm1-pm15 | 1.083 | 1.222 | 1.127 | 0.989 | -0.072 | 0.015 |
|15 | pm1-pm16 | 1.227 | 1.227 | 1.181 | 1.053 | 0.001  | 0.749 |
|16 | pm1-pm17 | 1.19  | 1.183 | 1.188 | 1.029 | -0.042 | 0.183 |
|17 | pm1-pm18 | 1.028 | 1.032 | 1.033 | 1.025 | 0.007  | 0.408 |
|18 | pm1-pm19 | 0.987 | 1.065 | 1.027 | 1.028 | -0.025 | 0.276 |
|19 | pm1-pm20 | 1.029 | 1.058 | 1.019 | 1.022 | 0.003  | 0.848 |
|20 | pm1-pm21 | 1.528 | 1.099 | 1.857 | 1.228 | -0.015 | 0.381 |
|21 | pm1-pm22 | 1.033 | 1.055 | 1.037 | 0.966 | 0.02   | 0.219 |
|22 | pm1-pm23 | 1.012 | 1.045 | 1.024 | 1.002 | 0.022  | 0.205 |
|23 | pm1-pm24 | 1.013 | 1.064 | 0.998 | 1.008 | 0.002  | 0.662 |
|24 | pm1-pm25 | 1.024 | 1.05  | 1.015 | 1.016 | 0.015  | 0.39  |
|25 | pm1-pm26 | 0.994 | 1.031 | 1.017 | 0.988 | -0.003 | 0.612 |
|26 | pm1-pm27 | 1.039 | 1.049 | 1.019 | 0.996 | -0.019 | 0.331 |
|27 | pm1-pm28 | 1.025 | 1.064 | 1.006 | 1.011 | 0     | 0.648 |
|28 | pm1-pm29 | 1.013 | 1.068 | 1.012 | 1.041 | 0.015  | 0.394 |
|29 | pm1-pm30 | 1.05  | 1.016 | 1.021 | 0.983 | -0.006 | 0.497 |
|30 | pm1-pm31 | 1.019 | 1.101 | 1.04  | 0.992 | -0.011 | 0.306 |
|31 | pm1-pm32 | 1.01  | 1.039 | 0.995 | 1.083 | -0.002 | 0.818 |
|32 | pm1-pm33 | 1.027 | 1.15  | 1.006 | 1.13  | -0.018 | 0.334 |
|33 | pm1-pm34 | 0.982 | 1.043 | 0.956 | 1.108 | -0.001 | 0.759 |
|   | pm1-pm35 | pm1-pm36 | pm1-pm37 | pm1-pm38 | pm1-pm39 | pm1-pm40 | pm1-pm41 | pm1-pm42 | pm1-pm43 | pm1-pm44 | pm1-pm45 | pm1-pm46 | pm1-pm47 | pm1-pm48 | pm1-pm49 | pm1-pm50 | pm1-pm51 | pm1-pm52 | pm1-pm53 | pm1-pm54 | pm1-pm55 | pm1-pm56 | pm1-pm57 | pm1-pm58 | pm1-pm59 | pm1-pm60 | pm1-pm61 | pm1-pm62 | pm1-pm63 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 34 | 1.013   | 1.077   | 0.955   | 1.106   | 0       | 0.84    |
| 35 | 1.042   | 1.033   | 1.015   | 0.979   | 0.006   | 0.548   |
| 36 | 1.033   | 1.002   | 1.009   | 0.997   | 0       | 0.728   |
| 37 | 0.972   | 0.973   | 0.991   | 1.033   | -0.018  | 0.39    |
| 38 | 0.975   | 1.07    | 1.013   | 1.001   | -0.005  | 0.544   |
| 39 | 1.017   | 0.97    | 0.997   | 1.029   | 0.001   | 0.949   |
| 40 | 1.019   | 0.971   | 0.988   | 0.985   | -0.006  | 0.455   |
| 41 | 2.838   | 1.959   | 2.588   | 2.249   | -0.137  | 0.008   |
| 42 | 1.008   | 1.004   | 0.994   | 1.043   | -0.005  | 0.583   |
| 43 | 1.032   | 1.063   | 1.005   | 1.056   | 0.001   | 0.827   |
| 44 | 1.426   | 1.511   | 1.276   | 1.484   | -0.033  | 0.268   |
| 45 | 1.004   | 0.986   | 0.981   | 1.021   | 0.002   | 0.994   |
| 46 | 0.997   | 1.04    | 0.993   | 1.003   | -0.003  | 0.643   |
| 47 | 0.886   | 0.841   | 0.929   | 0.864   | 0.022   | 0.249   |
| 48 | 0.898   | 0.85    | 0.939   | 0.895   | -0.003  | 0.661   |
| 49 | 1.069   | 1.19    | 1.133   | 1.034   | -0.057  | 0.044   |
| 50 | 1.124   | 1.154   | 1.147   | 1.063   | -0.036  | 0.296   |
| 51 | 1.14    | 1.171   | 1.187   | 1.035   | -0.042  | 0.176   |
| 52 | 1.013   | 1.01    | 0.984   | 1.016   | -0.003  | 0.719   |
| 53 | 0.992   | 1.049   | 1.03    | 1.033   | -0.012  | 0.389   |
| 54 | 1.018   | 1.009   | 1.006   | 1.053   | 0.007   | 0.43    |
| 55 | 1.561   | 1.074   | 1.874   | 1.222   | 0.004   | 0.83    |
| 56 | 0.996   | 1.035   | 0.993   | 0.989   | 0.015   | 0.379   |
| 57 | 0.991   | 1.043   | 0.98    | 1.005   | 0.019   | 0.383   |
| 58 | 1.01    | 1.042   | 0.989   | 0.984   | 0.001   | 0.604   |
| 59 | 0.989   | 1.005   | 0.995   | 1.011   | 0.003   | 0.965   |
| 60 | 1.004   | 0.997   | 1.003   | 1.019   | 0.009   | 0.448   |
| 61 | 1.011   | 1.07    | 1.007   | 0.988   | -0.012  | 0.335   |
| 62 | 1.016   | 1.019   | 1.013   | 1.027   | 0.006   | 0.516   |
| 63 | 1.01    | 1.021   | 0.973   | 0.992   | -0.008  | 0.437   |
|   | pm2-pm30 | pm2-pm31 | pm2-pm32 | pm2-pm33 | pm2-pm34 | pm2-pm35 | pm2-pm36 | pm2-pm37 | pm3-pm38 | pm3-pm39 | pm3-pm40 | pm3-pm41 | pm3-pm42 | pm3-pm43 | pm3-pm44 | pm3-pm45 | pm3-pm46 | pm3-pm47 | pm3-pm48 | pm3-pm49 | pm3-pm50 | pm3-pm51 | pm3-pm52 | pm3-pm53 | pm3-pm54 | pm3-pm55 | pm3-pm56 | pm3-pm57 | pm3-pm58 | pm3-pm59 | pm3-pm60 | pm3-pm61 | pm3-pm62 | pm3-pm63 | pm3-pm64 | pm3-pm65 | pm3-pm66 | pm3-pm67 | pm3-pm68 | pm3-pm69 | pm3-pm70 | pm3-pm71 | pm3-pm72 | pm3-pm73 | pm3-pm74 | pm3-pm75 | pm3-pm76 | pm3-pm77 | pm3-pm78 | pm3-pm79 | pm3-pm80 | pm3-pm81 | pm3-pm82 | pm3-pm83 | pm3-pm84 | pm3-pm85 | pm3-pm86 | pm3-pm87 | pm3-pm88 | pm3-pm89 | pm3-pm90 | pm3-pm91 | pm3-pm92 | pm3-pm93 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|  |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|     | pm3-pm26 | 1.016 | 1.012 | 0.996 | 1.029 | 0.005 | 0.468 |
|-----|----------|-------|-------|-------|-------|-------|-------|
| 95  | pm3-pm27 | 1.008 | 1.066 | 0.998 | 1.035 | -0.017| 0.368 |
| 96  | pm3-pm28 | 0.996 | 1.02  | 1.006 | 1.031 | -0.011| 0.358 |
| 97  | pm3-pm29 | 1.02  | 1.038 | 1.031 | 1.04  | 0.016 | 0.346 |
| 98  | pm3-pm30 | 1.043 | 1.055 | 0.986 | 1.022 | 0.006 | 0.465 |
| 99  | pm3-pm31 | 1.024 | 1.056 | 1.004 | 1.027 | -0.018| 0.32  |
| 100 | pm3-pm32 | 1.008 | 1.018 | 0.965 | 1.103 | -0.007| 0.567 |
| 101 | pm3-pm33 | 0.981 | 1.106 | 0.993 | 1.202 | -0.022| 0.285 |
| 102 | pm3-pm34 | 1.035 | 1.04  | 0.936 | 1.103 | 0.008 | 0.524 |
| 103 | pm3-pm35 | 1.041 | 1.025 | 0.937 | 1.117 | -0.005| 0.425 |
| 104 | pm3-pm36 | 1.016 | 1.002 | 0.992 | 1.011 | -0.003| 0.817 |
| 105 | pm3-pm37 | 0.998 | 1.007 | 0.981 | 1.004 | -0.01 | 0.371 |
| 106 | pm4-pm5  | 1.014 | 1.11  | 0.999 | 1.023 | 0.014 | 0.388 |
| 107 | pm4-pm6  | 1.006 | 1.095 | 1.007 | 1.013 | 0.013 | 0.308 |
| 108 | pm4-pm7  | 2.81  | 2.098 | 2.643 | 2.296 | -0.105| 0.006 |
| 109 | pm4-pm8  | 1.019 | 1.092 | 1.006 | 1.031 | -0.002| 0.853 |
| 110 | pm4-pm9  | 1.055 | 1.15  | 1.036 | 1.051 | 0.014 | 0.324 |
| 111 | pm4-pm10 | 1.44  | 1.561 | 1.263 | 1.541 | -0.027| 0.266 |
| 112 | pm4-pm11 | 1.014 | 1.073 | 0.997 | 1.015 | 0.008 | 0.58  |
| 113 | pm4-pm12 | 1.008 | 1.107 | 1.013 | 1.023 | 0.006 | 0.517 |
| 114 | pm4-pm13 | 0.888 | 0.938 | 0.942 | 0.879 | 0.033 | 0.299 |
| 115 | pm4-pm14 | 0.917 | 0.936 | 0.938 | 0.908 | 0.005 | 0.484 |
| 116 | pm4-pm15 | 1.098 | 1.267 | 1.128 | 1.022 | -0.055| 0.04  |
| 117 | pm4-pm16 | 1.161 | 1.267 | 1.153 | 1.086 | -0.011| 0.341 |
| 118 | pm4-pm17 | 1.166 | 1.23  | 1.221 | 1.079 | -0.023| 0.224 |
| 119 | pm4-pm18 | 1.015 | 1.091 | 1.01  | 1.041 | 0.01  | 0.578 |
| 120 | pm4-pm19 | 0.988 | 1.107 | 1.047 | 1.047 | -0.012| 0.362 |
| 121 | pm4-pm20 | 1.033 | 1.109 | 1.003 | 1.015 | 0.004 | 0.613 |
| 122 | pm4-pm21 | 1.511 | 1.164 | 1.818 | 1.188 | -0.03 | 0.224 |
| 123 | pm4-pm22 | 1.002 | 1.131 | 0.991 | 1.0  | 0.021 | 0.2   |
|   | pm4-pm23   | 1.015 | 1.139 | 1.017 | 1.025 | 0.043 | 0.165 |
|---|------------|-------|-------|-------|-------|-------|-------|
| 125| pm4-pm24   | 1.005 | 1.14  | 1.021 | 1.004 | 0.017 | 0.334 |
| 126| pm4-pm25   | 0.994 | 1.104 | 1.011 | 0.992 | 0.008 | 0.489 |
| 127| pm4-pm26   | 0.993 | 1.115 | 0.985 | 1.013 | 0.009 | 0.43  |
| 128| pm4-pm27   | 1.004 | 1.13  | 1.022 | 1.027 | -0.006| 0.6   |
| 129| pm4-pm28   | 1.012 | 1.102 | 1.001 | 1.025 | 0.001 | 0.748 |
| 130| pm4-pm29   | 1.014 | 1.16  | 1.002 | 1.042 | 0.029 | 0.244 |
| 131| pm4-pm30   | 1.016 | 1.092 | 1.01  | 1.022 | 0.005 | 0.731 |
| 132| pm4-pm31   | 1.034 | 1.183 | 1.018 | 1.033 | 0.011 | 0.321 |
| 133| pm4-pm32   | 0.988 | 1.094 | 0.998 | 1.038 | -0.011| 0.342 |
| 134| pm4-pm33   | 0.996 | 1.158 | 0.969 | 1.203 | -0.021| 0.291 |
| 135| pm4-pm34   | 0.985 | 1.141 | 0.926 | 1.079 | 0.003 | 0.833 |
| 136| pm4-pm35   | 1.018 | 1.102 | 0.933 | 1.131 | 0.001 | 0.793 |
| 137| pm4-pm36   | 0.996 | 1.042 | 1.008 | 0.98  | -0.012| 0.308 |
| 138| pm4-pm37   | 1.009 | 1.075 | 1.007 | 1.015 | 0.009 | 0.472 |
| 139| pm5-pm6    | 0.981 | 0.984 | 1.003 | 0.998 | -0.007| 0.479 |
| 140| pm5-pm7    | 2.845 | 2.009 | 2.656 | 2.267 | -0.104| 0.009 |
| 141| pm5-pm8    | 1.039 | 1.003 | 0.994 | 1.058 | 0.003 | 0.878 |
| 142| pm5-pm9    | 1.076 | 1.084 | 1.035 | 1.013 | 0.011 | 0.341 |
| 143| pm5-pm10   | 1.431 | 1.486 | 1.212 | 1.488 | -0.056| 0.021 |
| 144| pm5-pm11   | 1.014 | 0.99  | 0.99  | 1.019 | 0.005 | 0.693 |
| 145| pm5-pm12   | 1.017 | 1.027 | 0.986 | 1.014 | -0.003| 0.942 |
| 146| pm5-pm13   | 0.923 | 0.848 | 0.907 | 0.836 | 0.018 | 0.377 |
| 147| pm5-pm14   | 0.948 | 0.92  | 0.956 | 0.913 | 0.034 | 0.282 |
| 148| pm5-pm15   | 1.122 | 1.145 | 1.121 | 1.011 | -0.066| 0.035 |
| 149| pm5-pm16   | 1.136 | 1.167 | 1.122 | 1.071 | -0.035| 0.25  |
| 150| pm5-pm17   | 1.16  | 1.145 | 1.21  | 1.044 | -0.038| 0.243 |
| 151| pm5-pm18   | 1.049 | 0.987 | 0.995 | 1.016 | 0.001 | 0.609 |
| 152| pm5-pm19   | 1.005 | 1.009 | 1.008 | 1.059 | -0.02 | 0.278 |
| 153| pm5-pm20   | 1.021 | 1.036 | 1.007 | 1.016 | 0.003 | 0.965 |
|   | pm5-pm21 | pm5-pm22 | pm5-pm23 | pm5-pm24 | pm5-pm25 | pm5-pm26 |
|---|---------|---------|---------|---------|---------|---------|
| 154 | 1.534  | 1.093  | 1.86    | 1.208   | -0.008  | 0.523   |
| 155 | 1.01    | 1.017  | 1.02    | 1.025   | 0.027   | 0.28    |
| 156 | 1.03    | 1.075  | 1.005   | 1.016   | 0.044   | 0.179   |
| 157 | 0.974   | 1.046  | 0.986   | 1.013   | -0.002  | 0.842   |
| 158 | 1.001   | 0.966  | 1.018   | 0.998   | -0.003  | 0.893   |
| 159 | 0.99    | 0.994  | 1.006   | 1.005   | 0       | 0.69    |
| 160 | 1.018   | 1.081  | 1.025   | 1.024   | 0.004   | 0.828   |
| 161 | 1.009   | 0.992  | 1.012   | 1.033   | -0.004  | 0.836   |
| 162 | 1.005   | 1.037  | 0.982   | 1.015   | 0.003   | 0.722   |
| 163 | 1.063   | 1.028  | 1.009   | 1.027   | 0.02    | 0.21    |
| 164 | 1.031   | 1.059  | 1.034   | 1.015   | -0.002  | 0.967   |
| 165 | 1.010   | 0.988  | 1.002   | 1.082   | -0.001  | 0.759   |
| 166 | 1.022   | 1.151  | 0.996   | 1.137   | -0.007  | 0.501   |
| 167 | 0.994   | 1.015  | 0.95    | 1.069   | -0.004  | 0.633   |
| 168 | 1.009   | 1.035  | 0.939   | 1.117   | -0.001  | 0.78    |
| 169 | 1.002   | 0.989  | 0.98    | 0.994   | -0.009  | 0.538   |
| 170 | 1.012   | 0.975  | 1.004   | 1.031   | 0.007   | 0.433   |
| 171 | 2.818   | 2.029  | 2.689   | 2.235   | -0.1    | 0.01    |
| 172 | 1.035   | 1.012  | 1.009   | 1.043   | 0.01    | 0.582   |
| 173 | 1.068   | 1.065  | 1.007   | 1.025   | 0.006   | 0.475   |
| 174 | 1.402   | 1.488  | 1.262   | 1.508   | -0.04   | 0.22    |
| 175 | 0.977   | 1.009  | 1.015   | 0.998   | 0.006   | 0.505   |
| 176 | 0.998   | 1.029  | 1.001   | 1.006   | 0       | 0.663   |
| 177 | 0.85    | 0.865  | 0.927   | 0.831   | 0.013   | 0.333   |
| 178 | 0.93    | 0.899  | 0.899   | 0.872   | 0.004   | 0.975   |
| 179 | 1.101   | 1.208  | 1.118   | 0.999   | -0.054  | 0.04    |
| 180 | 1.151   | 1.156  | 1.182   | 1.058   | -0.018  | 0.319   |
| 181 | 1.14    | 1.204  | 1.194   | 1.035   | -0.03   | 0.243   |
| 182 | 1.042   | 1.013  | 0.999   | 1.045   | 0.019   | 0.342   |
| 183 | 0.996   | 1.108  | 1.029   | 1.032   | 0.006   | 0.48    |
|    | pm6-pm20  | 1.04 | 1.018 | 1.011 | 1.016 | 0.009 | 0.428 |
|----|-----------|------|-------|-------|-------|-------|-------|
| 185| pm6-pm21  | 1.51 | 1.173 | 1.877 | 1.225 | 0.02  | 0.209 |
| 186| pm6-pm22  | 0.983| 1.058 | 1.011 | 0.977 | 0.022 | 0.272 |
| 187| pm6-pm23  | 0.987| 1.045 | 0.993 | 0.968 | 0.016 | 0.352 |
| 188| pm6-pm24  | 1.007| 1.003 | 0.985 | 0.985 | -0.007| 0.545 |
| 189| pm6-pm25  | 1.015| 1.01  | 1.011 | 0.99  | 0.013 | 0.37  |
| 190| pm6-pm26  | 1.01 | 0.989 | 1.02  | 1.015 | 0.015 | 0.377 |
| 191| pm6-pm27  | 1.025| 1.045 | 1.035 | 0.998 | -0.002| 0.659 |
| 192| pm6-pm28  | 1.033| 1.019 | 1.011 | 1.019 | 0.01  | 0.322 |
| 193| pm6-pm29  | 0.982| 1.035 | 0.989 | 1.01  | 0.002 | 0.85  |
| 194| pm6-pm30  | 1.04 | 1.044 | 1.021 | 1.013 | 0.023 | 0.274 |
| 195| pm6-pm31  | 1.039| 1.089 | 1.034 | 1.021 | 0.014 | 0.359 |
| 196| pm6-pm32  | 0.994| 1.026 | 1.007 | 1.078 | 0.01  | 0.581 |
| 197| pm6-pm33  | 1.015| 1.115 | 0.984 | 1.179 | -0.006| 0.536 |
| 198| pm6-pm34  | 0.997| 1.001 | 0.921 | 1.09  | -0.004| 0.833 |
| 199| pm6-pm35  | 0.999| 1.062 | 0.935 | 1.134 | 0.012 | 0.375 |
| 200| pm6-pm36  | 1.004| 0.987 | 0.983 | 0.986 | -0.005| 0.697 |
| 201| pm6-pm37  | 0.986| 0.976 | 1     | 0.99  | -0.006| 0.571 |
| 202| pm7-pm8   | 2.855| 2.001 | 2.605 | 2.303 | -0.124| 0.01  |
| 203| pm7-pm9   | 2.923| 2.136 | 2.703 | 2.264 | -0.079| 0.015 |
| 204| pm7-pm10  | 3.856| 3.011 | 3.241 | 3.323 | 0.354 | <0.001|
| 205| pm7-pm11  | 2.832| 1.996 | 2.606 | 2.252 | -0.121| 0.008 |
| 206| pm7-pm12  | 2.805| 2.032 | 2.617 | 2.279 | -0.125| 0.005 |
| 207| pm7-pm13  | 2.873| 2.13  | 2.812 | 2.331 | 0.132 | 0.007 |
| 208| pm7-pm14  | 2.983| 2.183 | 2.909 | 2.382 | 0.169 | 0.003 |
| 209| pm7-pm15  | 3.058| 2.416 | 2.904 | 2.343 | -0.03 | 0.278 |
| 210| pm7-pm16  | 3.168| 2.317 | 3.092 | 2.388 | 0.037 | 0.285 |
| 211| pm7-pm17  | 3.203| 2.306 | 3.132 | 2.354 | 0.026 | 0.251 |
| 212| pm7-pm18  | 2.813| 2.024 | 2.645 | 2.303 | -0.109| 0.007 |
| 213| pm7-pm19  | 2.803| 2.011 | 2.739 | 2.271 | -0.129| 0.007 |
|     | pm7-pm20 | 2.855 | 2.017 | 2.654 | 2.252 | -0.117 | 0.007 |
|-----|----------|-------|-------|-------|-------|--------|-------|
|     | pm7-pm21 | 4.082 | 2.207 | 4.566 | 2.705 | 0.414 | <0.001 |
|     | pm7-pm22 | 2.757 | 2.069 | 2.671 | 2.285 | -0.09 | 0.015 |
|     | pm7-pm23 | 2.804 | 2.103 | 2.634 | 2.263 | -0.081 | 0.015 |
|     | pm7-pm24 | 2.84 | 2.027 | 2.625 | 2.211 | -0.126 | 0.009 |
|     | pm7-pm25 | 2.792 | 2.044 | 2.633 | 2.233 | -0.118 | 0.01 |
|     | pm7-pm26 | 2.734 | 2.019 | 2.64 | 2.266 | -0.129 | 0.005 |
|     | pm7-pm27 | 2.83 | 2.096 | 2.699 | 2.222 | -0.116 | 0.007 |
|     | pm7-pm28 | 2.876 | 2.045 | 2.652 | 2.257 | -0.102 | 0.009 |
|     | pm7-pm29 | 2.852 | 2.015 | 2.646 | 2.266 | -0.107 | 0.005 |
|     | pm7-pm30 | 2.81 | 2.065 | 2.617 | 2.275 | -0.114 | 0.009 |
|     | pm8-pm9  | 1.043 | 1.122 | 1.029 | 1.106 | 0.018 | 0.332 |
|     | pm8-pm10 | 1.439 | 1.456 | 1.268 | 1.554 | -0.047 | 0.18 |
|     | pm8-pm11 | 1.03 | 0.994 | 0.998 | 1.065 | 0.007 | 0.512 |
|     | pm8-pm12 | 1.042 | 1.036 | 0.998 | 1.03 | -0.003 | 0.887 |
|     | pm8-pm13 | 0.954 | 0.874 | 0.923 | 0.865 | 0.027 | 0.28 |
|     | pm8-pm14 | 0.927 | 0.855 | 0.945 | 0.914 | -0.007 | 0.489 |
|     | pm8-pm15 | 1.097 | 1.194 | 1.101 | 1.066 | -0.067 | 0.032 |
|     | pm8-pm16 | 1.181 | 1.186 | 1.132 | 1.133 | -0.018 | 0.349 |
|     | pm8-pm17 | 1.176 | 1.175 | 1.175 | 1.087 | -0.041 | 0.16 |
|     | pm8-pm18 | 1.044 | 1.025 | 1.019 | 1.064 | 0.011 | 0.361 |
|     | pm8-pm19 | 0.989 | 1.062 | 1.037 | 1.099 | -0.01 | 0.588 |
|     | pm8-pm20 | 1.053 | 1.056 | 1.011 | 1.047 | 0.008 | 0.415 |
|    | pm8-pm21 |    | pm8-pm22 |    | pm8-pm23 |    | pm8-pm24 |    | pm8-pm25 |    | pm8-pm26 |    | pm8-pm27 |    | pm8-pm28 |    | pm8-pm29 |    | pm8-pm30 |    | pm8-pm31 |    | pm8-pm32 |    | pm8-pm33 |    | pm8-pm34 |    | pm9-pm10 |    | pm9-pm11 |    | pm9-pm12 |    | pm9-pm13 |    | pm9-pm14 |    | pm9-pm15 |    | pm9-pm16 |    | pm9-pm17 |    | pm9-pm18 |    | pm9-pm19 |    | pm9-pm20 |    | pm9-pm21 |    | pm9-pm22 |    | pm9-pm23 |    |
|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|----------|----|
| 244| 1.536    | 1.115| 1.842    | 1.24| -0.015   | 0.363| 1.051    | 1.079| 0.999    | 1.029| 0.032    | 0.237| 0.988    | 1.076| 0.983    | 1.016| 0.012    | 0.346| 1.018    | 1.037| 1.006    | 1.026| -0.001   | 0.885| 1.029    | 1.009| 1.002    | 1.051| 0.007    | 0.569| 1.009    | 1.017| 1.013    | 1.065| 0.011    | 0.334| 1.039    | 1.043| 1.019    | 1.032| -0.016   | 0.397| 1.014    | 1.005| 0.994    | 1.059| -0.014   | 0.323| 1.039    | 1.092| 1.029    | 1.062| 0.032    | 0.279| 1.062    | 1.025| 1.004    | 1.038| 0.004    | 0.909| 1.077    | 1.122| 1.066    | 1.103| 0.021    | 0.214| 0.998    | 1.065| 0.976    | 1.146| 0.008    | 0.405| 0.987    | 1.134| 1.018    | 1.203| -0.015   | 0.324| 1.005    | 1.015| 0.917    | 1.101| -0.018   | 0.391| 1.036    | 1.059| 0.976    | 1.183| 0.021    | 0.202| 1.021    | 0.982| 1.026    | 1.034| -0.001   | 0.81 | 1.025    | 1.02| 0.995    | 1.079| 0.015    | 0.38 | 1.455    | 1.572| 1.296    | 1.512| -0.038   | 0.245| 1.089    | 1.064| 1.014    | 1.024| 0.013    | 0.392| 1.084    | 1.116| 1.029    | 1.028| 0.014    | 0.327| 0.937    | 0.916| 0.912    | 0.894| 0.018    | 0.343| 0.958    | 0.905| 0.943    | 0.911| -0.008   | 0.583| 1.174    | 1.268| 1.174    | 1.083| -0.027   | 0.255| 1.232    | 1.252| 1.184    | 1.097| -0.005   | 0.959| 1.224    | 1.207| 1.256    | 1.088| -0.021   | 0.249| 1.069    | 1.121| 1.016    | 1.07 | 0.021    | 0.282| 1.045    | 1.12 | 1.043    | 1.093| -0.002   | 0.996| 1.073    | 1.076| 1.001    | 1.043| -0.006   | 0.547| 1.627    | 1.177| 1.892    | 1.291| 0.029    | 0.298| 1.062    | 1.147| 1.003    | 1.008| 0.027    | 0.225|
| pm9-pm23 | 1.065 | 1.122 | 1.008 | 1.048 | 0.037 | 0.216 |
|---------|-------|-------|-------|-------|-------|-------|
| pm9-pm24 | 1.038 | 1.143 | 1.023 | 1.019 | 0.012 | 0.343 |
| pm9-pm25 | 1.069 | 1.094 | 1.042 | 1.032 | 0.023 | 0.235 |
| pm9-pm26 | 1.041 | 1.064 | 1.025 | 1.039 | 0.006 | 0.589 |
| pm9-pm27 | 1.07 | 1.182 | 1.072 | 1.056 | 0.025 | 0.265 |
| pm9-pm28 | 1.06 | 1.117 | 0.998 | 1.044 | 0.003 | 0.631 |
| pm9-pm29 | 1.062 | 1.157 | 1.041 | 1.018 | 0.026 | 0.287 |
| pm9-pm30 | 1.097 | 1.105 | 1.021 | 1.063 | 0.023 | 0.259 |
| pm9-pm31 | 1.081 | 1.182 | 1.042 | 1.042 | 0.013 | 0.373 |
| pm9-pm32 | 1.065 | 1.113 | 1.011 | 1.08 | 0.009 | 0.478 |
| pm9-pm33 | 1.024 | 1.16 | 0.982 | 1.147 | -0.043 | 0.185 |
| pm9-pm34 | 1.012 | 1.116 | 0.981 | 1.109 | 0.007 | 0.541 |
| pm9-pm35 | 1.069 | 1.141 | 0.995 | 1.107 | 0.015 | 0.302 |
| pm9-pm36 | 1.046 | 1.08 | 1.046 | 1.036 | 0.015 | 0.357 |
| pm9-pm37 | 1.052 | 1.061 | 1.014 | 1.031 | 0.004 | 0.841 |
| pm10-pm11 | 1.479 | 1.527 | 1.257 | 1.488 | -0.017 | 0.338 |
| pm10-pm12 | 1.454 | 1.59 | 1.258 | 1.502 | -0.019 | 0.365 |
| pm10-pm13 | 1.298 | 1.312 | 1.201 | 1.243 | -0.053 | 0.041 |
| pm10-pm14 | 1.529 | 1.501 | 1.384 | 1.51 | 0.124 | 0.008 |
| pm10-pm15 | 1.569 | 1.806 | 1.379 | 1.527 | -0.051 | 0.043 |
| pm10-pm16 | 1.571 | 1.723 | 1.441 | 1.545 | -0.046 | 0.151 |
| pm10-pm17 | 1.624 | 1.708 | 1.477 | 1.543 | -0.046 | 0.181 |
| pm10-pm18 | 1.412 | 1.483 | 1.276 | 1.557 | -0.035 | 0.272 |
| pm10-pm19 | 1.437 | 1.606 | 1.317 | 1.541 | -0.021 | 0.228 |
| pm10-pm20 | 1.441 | 1.516 | 1.26 | 1.475 | -0.05 | 0.029 |
| pm10-pm21 | 1.989 | 1.577 | 2.148 | 1.71 | -0.032 | 0.261 |
| pm10-pm22 | 1.35 | 1.613 | 1.249 | 1.456 | -0.03 | 0.285 |
| pm10-pm23 | 1.417 | 1.497 | 1.252 | 1.46 | -0.037 | 0.283 |
| pm10-pm24 | 1.418 | 1.531 | 1.288 | 1.469 | -0.037 | 0.293 |
| pm10-pm25 | 1.459 | 1.474 | 1.252 | 1.512 | -0.031 | 0.231 |
|   |      |      |      |      |      |      |
|---|------|------|------|------|------|------|
| 304 | pm10-pm26 | 1.383 | 1.485 | 1.255 | 1.444 | -0.063 | 0.036 |
| 305 | pm10-pm27 | 1.429 | 1.602 | 1.285 | 1.525 | -0.029 | 0.261 |
| 306 | pm10-pm28 | 1.466 | 1.548 | 1.267 | 1.513 | -0.023 | 0.278 |
| 307 | pm10-pm29 | 1.411 | 1.547 | 1.261 | 1.465 | -0.042 | 0.156 |
| 308 | pm10-pm30 | 1.406 | 1.553 | 1.216 | 1.516 | -0.045 | 0.186 |
| 309 | pm10-pm31 | 1.468 | 1.643 | 1.301 | 1.513 | -0.012 | 0.361 |
| 310 | pm10-pm32 | 1.435 | 1.568 | 1.254 | 1.611 | -0.011 | 0.315 |
| 311 | pm10-pm33 | 1.45 | 1.61 | 1.269 | 1.721 | -0.028 | 0.264 |
| 312 | pm10-pm34 | 1.451 | 1.547 | 1.188 | 1.556 | -0.032 | 0.232 |
| 313 | pm10-pm35 | 1.442 | 1.554 | 1.208 | 1.594 | -0.033 | 0.299 |
| 314 | pm10-pm36 | 1.416 | 1.488 | 1.269 | 1.479 | -0.043 | 0.169 |
| 315 | pm10-pm37 | 1.429 | 1.432 | 1.275 | 1.475 | -0.052 | 0.035 |
| 316 | pm11-pm12 | 1.019 | 1.008 | 1.024 | 1.011 | 0.007 | 0.442 |
| 317 | pm11-pm13 | 0.909 | 0.836 | 0.916 | 0.815 | 0.014 | 0.362 |
| 318 | pm11-pm14 | 0.908 | 0.828 | 0.93 | 0.9 | -0.004 | 0.937 |
| 319 | pm11-pm15 | 1.112 | 1.182 | 1.115 | 1.058 | -0.044 | 0.187 |
| 320 | pm11-pm16 | 1.181 | 1.165 | 1.145 | 1.066 | -0.015 | 0.36 |
| 321 | pm11-pm17 | 1.174 | 1.155 | 1.202 | 1.032 | -0.032 | 0.207 |
| 322 | pm11-pm18 | 1.034 | 1.01 | 1.008 | 1.037 | 0.017 | 0.371 |
| 323 | pm11-pm19 | 1.004 | 1.004 | 0.988 | 1.027 | -0.029 | 0.227 |
| 324 | pm11-pm20 | 1.028 | 1.028 | 0.997 | 1.005 | 0.003 | 0.694 |
| 325 | pm11-pm21 | 1.51 | 1.098 | 1.843 | 1.185 | -0.017 | 0.332 |
| 326 | pm11-pm22 | 1.009 | 1.029 | 0.993 | 0.99 | 0.02 | 0.398 |
| 327 | pm11-pm23 | 1.031 | 1.051 | 0.982 | 1.036 | 0.043 | 0.186 |
| 328 | pm11-pm24 | 1.005 | 1.035 | 1.021 | 0.983 | 0.009 | 0.518 |
| 329 | pm11-pm25 | 0.977 | 0.983 | 0.993 | 0.998 | -0.006 | 0.57 |
| 330 | pm11-pm26 | 1.016 | 1.01 | 0.987 | 1.019 | 0.014 | 0.372 |
| 331 | pm11-pm27 | 1.028 | 1.04 | 1.028 | 1.009 | -0.001 | 0.852 |
| 332 | pm11-pm28 | 1.002 | 1.057 | 0.989 | 1.041 | 0.012 | 0.3 |
| 333 | pm11-pm29 | 0.995 | 1.025 | 0.994 | 0.977 | -0.004 | 0.785 |
|   | pm11-pm30 | pm11-pm31 | pm11-pm32 | pm11-pm33 | pm11-pm34 | pm11-pm35 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 334| 1.044     | 1.003     | 0.986     | 1.003     | 0.003     | 0.68      |
| 335| 1.041     | 1.061     | 1.023     | 1.021     | 0.005     | 0.886     |
| 336| 0.994     | 1.031     | 0.997     | 1.05      | 0.001     | 0.816     |
| 337| 1.008     | 1.103     | 1.008     | 1.202     | 0.001     | 0.655     |
| 338| 0.988     | 1.057     | 0.904     | 1.043     | -0.007    | 0.422     |
| 339| 1.041     | 1.06      | 0.946     | 1.124     | 0.022     | 0.276     |
| 340| 0.996     | 0.983     | 0.992     | 1.016     | 0.002     | 0.799     |
| 341| 1.011     | 1.009     | 0.977     | 1         | 0.006     | 0.592     |
| 342| 0.872     | 0.934     | 0.903     | 0.831     | 0.015     | 0.33      |
| 343| 0.948     | 0.917     | 0.938     | 0.888     | 0.012     | 0.359     |
| 344| 1.08      | 1.176     | 1.14      | 1.038     | -0.067    | 0.038     |
| 345| 1.174     | 1.214     | 1.162     | 1.089     | -0.01     | 0.498     |
| 346| 1.189     | 1.14      | 1.201     | 1.065     | -0.039    | 0.266     |
| 347| 1.046     | 1.047     | 1.015     | 1.024     | 0.012     | 0.35      |
| 348| 1.012     | 1.037     | 1.006     | 1.032     | -0.028    | 0.205     |
| 349| 1.034     | 1.039     | 1.008     | 0.992     | -0.009    | 0.446     |
| 350| 1.523     | 1.167     | 1.803     | 1.234     | -0.01     | 0.41      |
| 351| 1.01      | 1.06      | 1.017     | 0.992     | 0.019     | 0.368     |
| 352| 1.004     | 1.091     | 1.016     | 1.006     | 0.032     | 0.201     |
| 353| 0.995     | 1.035     | 0.999     | 1.018     | -0.005    | 0.523     |
| 354| 0.996     | 1.005     | 1.013     | 1.017     | -0.001    | 0.727     |
| 355| 1.023     | 1.003     | 0.998     | 1.028     | 0.004     | 0.659     |
| 356| 1.033     | 1.11      | 1.05      | 1.014     | 0.009     | 0.561     |
| 357| 1.025     | 1.03      | 0.99      | 1.021     | -0.009    | 0.593     |
| 358| 1.017     | 1.07      | 0.998     | 1.019     | 0.009     | 0.468     |
| 359| 1.083     | 1.029     | 1.02      | 1.068     | 0.029     | 0.223     |
| 360| 1.018     | 1.131     | 1.037     | 1.024     | 0.006     | 0.495     |
| 361| 1.024     | 1.05      | 0.996     | 1.08      | 0.006     | 0.439     |
| 362| 0.99      | 1.149     | 1.025     | 1.145     | -0.017    | 0.335     |
| 363| 0.975     | 1.063     | 0.911     | 1.04      | -0.024    | 0.202     |
|    | pm12-pm35 | 1.038 | 1.053 | 0.94  | 1.134 | 0.005 | 0.407 |
|----|-----------|-------|-------|-------|-------|-------|-------|
| 365| pm12-pm36 | 0.999 | 1.053 | 1.005 | 1.004 | 0.006 | 0.554 |
| 366| pm12-pm37 | 1.012 | 1.012 | 1.009 | 1.024 | 0.005 | 0.558 |
| 367| pm13-pm14 | 0.858 | 0.786 | 0.841 | 0.856 | 0.078 | 0.065 |
| 368| pm13-pm15 | 0.991 | 1.043 | 0.982 | 0.852 | -0.055 | 0.032 |
| 369| pm13-pm16 | 1.058 | 0.944 | 1.04  | 0.902 | -0.03  | 0.299 |
| 370| pm13-pm17 | 0.955 | 0.994 | 1.068 | 0.892 | -0.057 | 0.021 |
| 371| pm13-pm18 | 0.906 | 0.937 | 0.897 | 0.838 | 0.027  | 0.255 |
| 372| pm13-pm19 | 0.905 | 0.908 | 0.973 | 0.865 | 0.016  | 0.391 |
| 373| pm13-pm20 | 0.907 | 0.889 | 0.881 | 0.847 | 0.007  | 0.429 |
| 374| pm13-pm21 | 1.436 | 0.959 | 1.661 | 1.043 | -0.013 | 0.351 |
| 375| pm13-pm22 | 0.908 | 0.854 | 0.894 | 0.831 | 0.024  | 0.25  |
| 376| pm13-pm23 | 0.89  | 0.828 | 0.891 | 0.845 | 0.02   | 0.348 |
| 377| pm13-pm24 | 0.877 | 0.896 | 0.903 | 0.844 | 0.016  | 0.356 |
| 378| pm13-pm25 | 0.857 | 0.832 | 0.93  | 0.834 | 0.007  | 0.511 |
| 379| pm13-pm26 | 0.887 | 0.881 | 0.9   | 0.831 | 0.019  | 0.362 |
| 380| pm13-pm27 | 0.881 | 0.888 | 0.904 | 0.835 | -0.013 | 0.317 |
| 381| pm13-pm28 | 0.919 | 0.874 | 0.89  | 0.873 | 0.017  | 0.3  |
| 382| pm13-pm29 | 0.856 | 0.92  | 0.927 | 0.872 | 0.03   | 0.276 |
| 383| pm13-pm30 | 0.878 | 0.855 | 0.894 | 0.875 | 0.007  | 0.431 |
| 384| pm13-pm31 | 0.933 | 0.947 | 0.945 | 0.848 | 0.024  | 0.252 |
| 385| pm13-pm32 | 0.92  | 0.867 | 0.873 | 0.919 | 0.016  | 0.304 |
| 386| pm13-pm33 | 0.906 | 0.905 | 0.877 | 0.948 | -0.032 | 0.216 |
| 387| pm13-pm34 | 0.88  | 0.909 | 0.824 | 0.889 | 0.008  | 0.509 |
| 388| pm13-pm35 | 0.887 | 0.891 | 0.837 | 0.969 | 0.013  | 0.392 |
| 389| pm13-pm36 | 0.874 | 0.847 | 0.88  | 0.843 | 0.004  | 0.883 |
| 390| pm13-pm37 | 0.905 | 0.839 | 0.876 | 0.831 | 0.007  | 0.437 |
| 391| pm14-pm15 | 1.026 | 1.08  | 1.031 | 0.907 | -0.052 | 0.038 |
| 392| pm14-pm16 | 1.044 | 1.006 | 1.065 | 0.921 | -0.048 | 0.168 |
| 393| pm14-pm17 | 1.042 | 0.974 | 1.112 | 0.92  | -0.063 | 0.037 |
|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 394 | pm14-pm18 | 0.913 | 0.896 | 0.912 | 0.869 | -0.01 | 0.358 |
| 395 | pm14-pm19 | 0.918 | 0.95 | 0.955 | 0.906 | -0.005 | 0.588 |
| 396 | pm14-pm20 | 0.909 | 0.941 | 0.93 | 0.905 | 0.007 | 0.511 |
| 397 | pm14-pm21 | 1.416 | 0.983 | 1.718 | 1.104 | -0.023 | 0.258 |
| 398 | pm14-pm22 | 0.892 | 0.942 | 0.929 | 0.876 | 0.022 | 0.247 |
| 399 | pm14-pm23 | 0.879 | 0.938 | 0.899 | 0.884 | 0.016 | 0.372 |
| 400 | pm14-pm24 | 0.93 | 0.898 | 0.911 | 0.872 | -0.001 | 0.994 |
| 401 | pm14-pm25 | 0.924 | 0.862 | 0.93 | 0.869 | 0 | 0.777 |
| 402 | pm14-pm26 | 0.931 | 0.926 | 0.9 | 0.886 | 0.015 | 0.391 |
| 403 | pm14-pm27 | 0.939 | 0.982 | 0.958 | 0.919 | 0.019 | 0.356 |
| 404 | pm14-pm28 | 0.942 | 0.826 | 0.933 | 0.888 | -0.015 | 0.312 |
| 405 | pm14-pm29 | 0.911 | 0.88 | 0.89 | 0.878 | -0.014 | 0.349 |
| 406 | pm14-pm30 | 0.939 | 0.883 | 0.894 | 0.866 | -0.013 | 0.397 |
| 407 | pm14-pm31 | 0.915 | 0.957 | 0.999 | 0.921 | 0.014 | 0.392 |
| 408 | pm14-pm32 | 0.887 | 0.937 | 0.945 | 0.957 | 0.012 | 0.37 |
| 409 | pm14-pm33 | 0.902 | 0.989 | 0.922 | 0.954 | -0.039 | 0.288 |
| 410 | pm14-pm34 | 0.928 | 0.892 | 0.873 | 0.912 | -0.007 | 0.595 |
| 411 | pm14-pm35 | 0.927 | 0.867 | 0.919 | 0.964 | -0.004 | 0.8 |
| 412 | pm14-pm36 | 0.934 | 0.852 | 0.91 | 0.894 | 0 | 0.867 |
| 413 | pm14-pm37 | 0.928 | 0.892 | 0.944 | 0.858 | 0.01 | 0.464 |
| 414 | pm15-pm16 | 1.272 | 1.398 | 1.223 | 1.121 | -0.068 | 0.043 |
| 415 | pm15-pm17 | 1.233 | 1.425 | 1.296 | 1.092 | -0.078 | 0.014 |
| 416 | pm15-pm18 | 1.136 | 1.165 | 1.104 | 1.018 | -0.067 | 0.037 |
| 417 | pm15-pm19 | 1.113 | 1.256 | 1.168 | 1.078 | -0.048 | 0.195 |
| 418 | pm15-pm20 | 1.129 | 1.229 | 1.126 | 1.04 | -0.048 | 0.151 |
| 419 | pm15-pm21 | 1.697 | 1.319 | 2.116 | 1.269 | 0.007 | 0.426 |
| 420 | pm15-pm22 | 1.113 | 1.226 | 1.125 | 1.037 | -0.027 | 0.219 |
| 421 | pm15-pm23 | 1.066 | 1.273 | 1.13 | 1.008 | -0.029 | 0.259 |
| 422 | pm15-pm24 | 1.099 | 1.239 | 1.128 | 1.011 | -0.05 | 0.185 |
| 423 | pm15-pm25 | 1.136 | 1.217 | 1.127 | 1.026 | -0.034 | 0.274 |
|       |                  |       |       |       |       |       |
|-------|------------------|-------|-------|-------|-------|-------|
|   424 | pm15-pm26        | 1.133 | 1.196 | 1.124 | 1.07  | -0.03 |
|   425 | pm15-pm27        | 1.145 | 1.283 | 1.137 | 1.017 | -0.049|
|   426 | pm15-pm28        | 1.092 | 1.223 | 1.125 | 1.073 | -0.049|
|   427 | pm15-pm29        | 1.093 | 1.158 | 1.08  | 1.034 | -0.077|
|   428 | pm15-pm30        | 1.138 | 1.235 | 1.125 | 1.096 | -0.024|
|   429 | pm15-pm31        | 1.103 | 1.28  | 1.155 | 1.051 | -0.051|
|   430 | pm15-pm32        | 1.078 | 1.252 | 1.093 | 1.104 | -0.052|
|   431 | pm15-pm33        | 1.114 | 1.362 | 1.135 | 1.158 | -0.053|
|   432 | pm15-pm34        | 1.137 | 1.232 | 1.047 | 1.066 | -0.052|
|   433 | pm15-pm35        | 1.102 | 1.216 | 1.051 | 1.187 | -0.049|
|   434 | pm15-pm36        | 1.11  | 1.227 | 1.113 | 0.989 | -0.051|
|   435 | pm15-pm37        | 1.115 | 1.193 | 1.138 | 1.034 | -0.041|
|   436 | pm16-pm17        | 1.5   | 1.527 | 1.555 | 1.373 | 0.155 |
|   437 | pm16-pm18        | 1.182 | 1.215 | 1.152 | 1.047 | -0.018|
|   438 | pm16-pm19        | 1.148 | 1.27  | 1.183 | 1.094 | -0.022|
|   439 | pm16-pm20        | 1.166 | 1.189 | 1.122 | 1.077 | -0.034|
|   440 | pm16-pm21        | 1.762 | 1.277 | 2.15  | 1.257 | 0.024 |
|   441 | pm16-pm22        | 1.172 | 1.227 | 1.164 | 1.017 | -0.001|
|   442 | pm16-pm23        | 1.145 | 1.207 | 1.15  | 1.071 | 0     |
|   443 | pm16-pm24        | 1.116 | 1.248 | 1.162 | 1.072 | -0.013|
|   444 | pm16-pm25        | 1.163 | 1.146 | 1.162 | 1.056 | -0.023|
|   445 | pm16-pm26        | 1.156 | 1.148 | 1.133 | 1.057 | -0.031|
|   446 | pm16-pm27        | 1.142 | 1.195 | 1.186 | 1.038 | -0.048|
|   447 | pm16-pm28        | 1.169 | 1.216 | 1.15  | 1.112 | -0.009|
|   448 | pm16-pm29        | 1.163 | 1.163 | 1.174 | 1.086 | -0.016|
|   449 | pm16-pm30        | 1.139 | 1.141 | 1.126 | 1.059 | -0.051|
|   450 | pm16-pm31        | 1.215 | 1.278 | 1.191 | 1.07  | -0.004|
|   451 | pm16-pm32        | 1.127 | 1.163 | 1.153 | 1.168 | -0.025|
|   452 | pm16-pm33        | 1.209 | 1.299 | 1.19  | 1.213 | -0.012|
|   453 | pm16-pm34        | 1.157 | 1.229 | 1.127 | 1.127 | -0.007|
|   |                  |      |      |      |      |      |
|---|-----------------|------|------|------|------|------|
| 454| pm16-pm35       | 1.159| 1.253| 1.119| 1.218| 0.005| 0.516|
| 455| pm16-pm36       | 1.138| 1.16  | 1.149| 1.062| -0.028| 0.207|
| 456| pm16-pm37       | 1.143| 1.151| 1.141| 1.041| -0.035| 0.215|
| 457| pm17-pm18       | 1.178| 1.175| 1.182| 1.06 | -0.036| 0.248|
| 458| pm17-pm19       | 1.154| 1.235| 1.223| 1.097| -0.037| 0.234|
| 459| pm17-pm20       | 1.157| 1.172| 1.205| 1.075| -0.039| 0.237|
| 460| pm17-pm21       | 1.816| 1.32 | 2.212| 1.17 | 0.024| 0.254|
| 461| pm17-pm22       | 1.162| 1.216| 1.208| 1.005| -0.017| 0.391|
| 462| pm17-pm23       | 1.151| 1.248| 1.198| 0.995| -0.013| 0.324|
| 463| pm17-pm24       | 1.168| 1.16 | 1.178| 1.015| -0.051| 0.031|
| 464| pm17-pm25       | 1.159| 1.147| 1.177| 1.038| -0.043| 0.189|
| 465| pm17-pm26       | 1.128| 1.212| 1.19 | 1.019| -0.036| 0.237|
| 466| pm17-pm27       | 1.141| 1.19 | 1.253| 1.069| -0.044| 0.178|
| 467| pm17-pm28       | 1.161| 1.201| 1.187| 1.044| -0.041| 0.182|
| 468| pm17-pm29       | 1.158| 1.189| 1.239| 1.034| -0.026| 0.298|
| 469| pm17-pm30       | 1.163| 1.151| 1.211| 1.032| -0.046| 0.157|
| 470| pm17-pm31       | 1.154| 1.255| 1.217| 1.064| -0.039| 0.262|
| 471| pm17-pm32       | 1.117| 1.15 | 1.202| 1.114| -0.05 | 0.024|
| 472| pm17-pm33       | 1.175| 1.29 | 1.193| 1.204| -0.043| 0.162|
| 473| pm17-pm34       | 1.155| 1.186| 1.146| 1.101| -0.038| 0.23 |
| 474| pm17-pm35       | 1.168| 1.206| 1.138| 1.165| -0.031| 0.22 |
| 475| pm17-pm36       | 1.129| 1.15 | 1.23 | 1.021| -0.041| 0.178|
| 476| pm17-pm37       | 1.175| 1.131| 1.227| 1.06 | -0.025| 0.291|
| 477| pm18-pm19       | 1.005| 1.019| 1.051| 1.055| -0.015| 0.346|
| 478| pm18-pm20       | 1.044| 1.009| 1.024| 1.027| 0.002 | 0.692|
| 479| pm18-pm21       | 1.517| 1.117| 1.844| 1.273| -0.001| 0.823|
| 480| pm18-pm22       | 1.037| 1.033| 0.986| 1.027| 0.023 | 0.269|
| 481| pm18-pm23       | 1.006| 1.079| 1.005| 1.01  | 0.031 | 0.29 |
| 482| pm18-pm24       | 1.041| 1.062| 0.983| 1.002| 0.008 | 0.531|
| 483| pm18-pm25       | 1.015| 1.009| 1.02 | 1.03  | 0.012 | 0.313|
|   |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|
| 484 | pm18-pm26 | 1.017 | 0.986 | 0.986 | 1.054 | 0.004 | 0.836 |
| 485 | pm18-pm27 | 1.024 | 1.067 | 1.012 | 1.009 | -0.012 | 0.352 |
| 486 | pm18-pm28 | 1.03 | 1.065 | 0.996 | 1.018 | 0.005 | 0.822 |
| 487 | pm18-pm29 | 1.024 | 1.065 | 1.017 | 1.01 | 0.015 | 0.372 |
| 488 | pm18-pm30 | 1.051 | 1.017 | 1.038 | 1.016 | 0.012 | 0.313 |
| 489 | pm18-pm31 | 1.042 | 1.093 | 0.995 | 1.044 | 0 | 0.963 |
| 490 | pm18-pm32 | 1.027 | 1.081 | 0.999 | 1.091 | 0.021 | 0.265 |
| 491 | pm18-pm33 | 1.03 | 1.137 | 0.996 | 1.185 | -0.004 | 0.782 |
| 492 | pm18-pm34 | 1.018 | 1.035 | 0.896 | 1.127 | 0.001 | 0.671 |
| 493 | pm18-pm35 | 1.061 | 1.05 | 0.941 | 1.16 | 0.02 | 0.342 |
| 494 | pm18-pm36 | 1.01 | 1.036 | 0.987 | 1.043 | 0.012 | 0.388 |
| 495 | pm18-pm37 | 1.026 | 1.012 | 1.009 | 1.022 | 0.011 | 0.375 |
| 496 | pm19-pm20 | 0.988 | 1.109 | 1.01 | 1.037 | -0.017 | 0.358 |
| 497 | pm19-pm21 | 1.516 | 1.146 | 1.874 | 1.242 | -0.023 | 0.244 |
| 498 | pm19-pm22 | 1.028 | 1.024 | 1.019 | 1.04 | 0 | 0.635 |
| 499 | pm19-pm23 | 0.995 | 1.085 | 0.995 | 1.064 | 0.011 | 0.381 |
| 500 | pm19-pm24 | 1.001 | 1.047 | 1.049 | 1.024 | -0.013 | 0.374 |
| 501 | pm19-pm25 | 1.014 | 1.069 | 1.036 | 1.043 | 0.005 | 0.754 |
| 502 | pm19-pm26 | 0.989 | 1.065 | 1.048 | 1.061 | 0.005 | 0.57 |
| 503 | pm19-pm27 | 1.016 | 1.111 | 1.071 | 1.075 | -0.001 | 0.645 |
| 504 | pm19-pm28 | 0.999 | 1.055 | 1.035 | 1.086 | -0.008 | 0.419 |
| 505 | pm19-pm29 | 1.017 | 1.095 | 1.01 | 1.074 | 0.006 | 0.474 |
| 506 | pm19-pm30 | 0.983 | 1.055 | 1.031 | 1.054 | -0.017 | 0.368 |
| 507 | pm19-pm31 | 1.014 | 1.112 | 1.047 | 1.027 | -0.023 | 0.254 |
| 508 | pm19-pm32 | 1.028 | 1.041 | 1.037 | 1.099 | -0.007 | 0.428 |
| 509 | pm19-pm33 | 1.007 | 1.188 | 1.013 | 1.164 | -0.027 | 0.228 |
| 510 | pm19-pm34 | 0.986 | 1.081 | 0.934 | 1.102 | -0.022 | 0.248 |
| 511 | pm19-pm35 | 1.032 | 1.145 | 0.972 | 1.123 | 0.005 | 0.488 |
| 512 | pm19-pm36 | 0.99 | 1.018 | 1.025 | 1.034 | -0.02 | 0.37 |
| 513 | pm19-pm37 | 1.008 | 1.101 | 1.029 | 1.032 | 0.007 | 0.476 |
| pm20-pm21 | 1.563 | 1.155 | 1.819 | 1.217 | -0.006 | 0.487 |
| pm20-pm22 | 1.006 | 1.089 | 0.988 | 0.998 | 0.016 | 0.355 |
| pm20-pm23 | 1.012 | 1.087 | 1.004 | 1.037 | 0.034 | 0.248 |
| pm20-pm24 | 0.998 | 1.044 | 0.998 | 1.006 | -0.009 | 0.527 |
| pm20-pm25 | 1.012 | 1.059 | 1.001 | 1.035 | 0.014 | 0.399 |
| pm20-pm26 | 1.008 | 1.06 | 0.98 | 1.009 | 0.002 | 0.958 |
| pm20-pm27 | 1.021 | 1.017 | 1.03 | 1.033 | -0.021 | 0.212 |
| pm20-pm28 | 1.022 | 1.064 | 1.002 | 1.052 | 0.006 | 0.437 |
| pm20-pm29 | 1.003 | 1.049 | 0.973 | 1.019 | -0.009 | 0.473 |
| pm20-pm30 | 1.047 | 1.032 | 0.993 | 1.041 | 0.003 | 0.813 |
| pm20-pm31 | 1.031 | 1.124 | 1.058 | 1.039 | 0.013 | 0.321 |
| pm20-pm32 | 1.023 | 1.032 | 1.007 | 1.104 | 0.006 | 0.433 |
| pm20-pm33 | 1.061 | 1.086 | 1.001 | 1.156 | -0.021 | 0.264 |
| pm20-pm34 | 1.019 | 1.034 | 0.911 | 1.064 | -0.017 | 0.384 |
| pm20-pm35 | 1.006 | 1.062 | 0.962 | 1.141 | 0.003 | 0.691 |
| pm20-pm36 | 1.005 | 0.997 | 1.007 | 1.026 | -0.004 | 0.981 |
| pm20-pm37 | 0.992 | 1.04 | 1.012 | 0.998 | -0.002 | 0.943 |
| pm21-pm22 | 1.521 | 1.149 | 1.824 | 1.162 | -0.005 | 0.831 |
| pm21-pm23 | 1.532 | 1.151 | 1.841 | 1.191 | 0.014 | 0.331 |
| pm21-pm24 | 1.574 | 1.131 | 1.816 | 1.203 | -0.004 | 0.864 |
| pm21-pm25 | 1.535 | 1.086 | 1.804 | 1.218 | -0.016 | 0.378 |
| pm21-pm26 | 1.515 | 1.124 | 1.814 | 1.206 | -0.012 | 0.327 |
| pm21-pm27 | 1.529 | 1.202 | 1.823 | 1.235 | -0.013 | 0.307 |
| pm21-pm28 | 1.566 | 1.126 | 1.864 | 1.243 | 0.007 | 0.417 |
| pm21-pm29 | 1.545 | 1.095 | 1.793 | 1.186 | -0.029 | 0.235 |
| pm21-pm30 | 1.502 | 1.07 | 1.832 | 1.2 | -0.038 | 0.214 |
| pm21-pm31 | 1.537 | 1.159 | 1.844 | 1.24 | -0.02 | 0.327 |
| pm21-pm32 | 1.519 | 1.165 | 1.785 | 1.249 | -0.02 | 0.303 |
| pm21-pm33 | 1.55 | 1.21 | 1.883 | 1.39 | -0.003 | 0.951 |
| pm21-pm34 | 1.549 | 1.131 | 1.762 | 1.23 | -0.021 | 0.266 |
|   | pm21-pm35 |   |   |   |   |   |
|---|-----------|---|---|---|---|---|
| 544| 1.524     | 1.173 | 1.778 | 1.365 | 0.007 | 0.433 |
| 545| 1.502     | 1.086 | 1.823 | 1.213 | -0.022 | 0.266 |
| 546| 1.524     | 1.124 | 1.867 | 1.182 | -0.002 | 0.641 |
| 547| 1.0       | 1.061 | 0.988 | 0.985 | 0.034 | 0.211 |
| 548| 0.981     | 1.095 | 1.007 | 0.986 | 0.023 | 0.236 |
| 549| 0.998     | 1.033 | 1.026 | 0.991 | 0.026 | 0.258 |
| 550| 1.031     | 1.033 | 1.001 | 0.986 | 0.027 | 0.23  |
| 551| 1.009     | 1.092 | 1.007 | 1.03  | 0.014 | 0.328 |
| 552| 1.015     | 1.065 | 1.005 | 1.033 | 0.027 | 0.281 |
| 553| 1.002     | 1.08  | 0.977 | 1.017 | 0.025 | 0.288 |
| 554| 0.99      | 1.088 | 0.967 | 1.007 | 0.015 | 0.367 |
| 555| 1.062     | 1.124 | 1.01  | 0.987 | 0.022 | 0.257 |
| 556| 1.008     | 1.081 | 0.988 | 1.039 | 0.02  | 0.245 |
| 557| 1.003     | 1.145 | 0.989 | 1.172 | 0.007 | 0.511 |
| 558| 0.984     | 1.061 | 0.952 | 1.057 | 0.016 | 0.338 |
| 559| 1.019     | 1.075 | 0.982 | 1.113 | 0.034 | 0.224 |
| 560| 1.003     | 1.029 | 0.98  | 0.973 | 0.009 | 0.464 |
| 561| 0.98      | 1.049 | 1.001 | 1.001 | 0.022 | 0.241 |
| 562| 1.028     | 1.152 | 0.987 | 0.923 | 0.032 | 0.281 |
| 563| 0.989     | 1.044 | 0.996 | 1.012 | 0.028 | 0.206 |
| 564| 1.009     | 1.031 | 1.016 | 1.003 | 0.032 | 0.291 |
| 565| 1.012     | 1.159 | 1.036 | 0.97  | 0.028 | 0.247 |
| 566| 1.019     | 1.069 | 0.997 | 1.031 | 0.03  | 0.203 |
| 567| 1.014     | 1.049 | 0.98  | 0.991 | 0.018 | 0.312 |
| 568| 0.996     | 1.068 | 0.976 | 0.983 | 0.011 | 0.378 |
| 569| 1.043     | 1.168 | 1.035 | 1.003 | 0.042 | 0.153 |
| 570| 0.987     | 1.075 | 0.997 | 1.093 | 0.033 | 0.239 |
| 571| 1.01      | 1.186 | 1.002 | 1.134 | 0.015 | 0.332 |
| 572| 0.947     | 1.094 | 0.939 | 1.023 | 0.006 | 0.556 |
| 573| 1.008     | 1.087 | 0.933 | 1.119 | 0.027 | 0.269 |
|       |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|
| 574   | pm23-pm36 | 1.006 | 1.067 | 1.004 | 1.014 | 0.039 | 0.283 |
| 575   | pm23-pm37 | 0.981 | 1.083 | 1.023 | 0.979 | 0.034 | 0.233 |
| 576   | pm24-pm25 | 1.008 | 1.057 | 1   | 0.994 | 0.012 | 0.334 |
| 577   | pm24-pm26 | 1.004 | 1.042 | 1.012 | 1.002 | 0.013 | 0.356 |
| 578   | pm24-pm27 | 0.984 | 1.077 | 1.047 | 0.98 | -0.014 | 0.364 |
| 579   | pm24-pm28 | 0.987 | 1.017 | 0.991 | 1.029 | -0.013 | 0.368 |
| 580   | pm24-pm29 | 0.985 | 1.074 | 0.993 | 0.974 | -0.004 | 0.841 |
| 581   | pm24-pm30 | 1.029 | 1.064 | 0.98 | 1.007 | 0.005 | 0.49 |
| 582   | pm24-pm31 | 1.019 | 1.121 | 1.005 | 1.022 | 0.001 | 0.726 |
| 583   | pm24-pm32 | 0.994 | 1.07 | 0.999 | 1.073 | 0.009 | 0.484 |
| 584   | pm24-pm33 | 0.996 | 1.151 | 0.994 | 1.154 | -0.013 | 0.303 |
| 585   | pm24-pm34 | 1.016 | 1.045 | 0.945 | 1.056 | 0.001 | 0.999 |
| 586   | pm24-pm35 | 1.021 | 1.114 | 0.904 | 1.118 | 0.01 | 0.556 |
| 587   | pm24-pm36 | 0.976 | 1.027 | 1.014 | 1.014 | 0.005 | 0.833 |
| 588   | pm24-pm37 | 1.019 | 1.014 | 1.003 | 1.01 | 0.01 | 0.526 |
| 589   | pm25-pm26 | 0.984 | 1   | 0.996 | 1.01 | 0.003 | 0.89 |
| 590   | pm25-pm27 | 0.987 | 1.039 | 1.015 | 1.003 | -0.017 | 0.313 |
| 591   | pm25-pm28 | 1.002 | 1.046 | 0.995 | 1.033 | 0.008 | 0.4 |
| 592   | pm25-pm29 | 1.02 | 1.058 | 1.002 | 0.982 | 0.013 | 0.326 |
| 593   | pm25-pm30 | 1.035 | 1.038 | 1.011 | 1.023 | 0.02 | 0.207 |
| 594   | pm25-pm31 | 1.027 | 1.119 | 0.996 | 0.991 | 0.001 | 0.879 |
| 595   | pm25-pm32 | 0.985 | 1.018 | 1.007 | 1.053 | -0.001 | 0.683 |
| 596   | pm25-pm33 | 1   | 1.115 | 0.991 | 1.118 | -0.023 | 0.207 |
| 597   | pm25-pm34 | 1.003 | 1.02 | 0.931 | 1.066 | -0.001 | 0.733 |
| 598   | pm25-pm35 | 1.034 | 1.077 | 0.96 | 1.135 | 0.03 | 0.26 |
| 599   | pm25-pm36 | 0.997 | 1.002 | 1.015 | 0.987 | 0.005 | 0.502 |
| 600   | pm25-pm37 | 0.996 | 1.006 | 1.006 | 1.021 | 0.013 | 0.392 |
| 601   | pm26-pm27 | 1.022 | 1.045 | 1.041 | 1.013 | 0.002 | 0.698 |
| 602   | pm26-pm28 | 0.992 | 0.988 | 0.991 | 1.041 | -0.008 | 0.462 |
| 603   | pm26-pm29 | 1   | 1.053 | 0.98 | 0.981 | 0.001 | 0.924 |
|   | pm26-pm30 |   | pm26-pm31 |   | pm26-pm32 |   | pm26-pm33 |   | pm26-pm34 |   | pm26-pm35 |   | pm26-pm36 |   | pm26-pm37 |   | pm26-pm38 |   | pm26-pm39 |   |
|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|
|604| 1.042     | 0.996     | 0.988     | 1.018     | 0.004     | 0.986     |
|605| 1.045     | 1.094     | 1.046     | 1.018     | 0.019     | 0.38      |
|606| 1.003     | 1.01      | 0.969     | 1.058     | -0.007    | 0.402     |
|607| 1.021     | 1.139     | 0.967     | 1.155     | -0.009    | 0.485     |
|608| 0.991     | 1.037     | 0.919     | 1.048     | -0.008    | 0.498     |
|609| 1.029     | 1.017     | 0.939     | 1.137     | 0.009     | 0.516     |
|610| 0.986     | 1.016     | 1.04      | 1.014     | 0.991     | 0.006     | 0.476     |
|611| 0.991     | 0.996     | 1.006     | 0.992     | 0.002     | 0.804     |
|612| 0.999     | 1.098     | 1.046     | 1.025     | -0.003    | 0.926     |
|613| 0.996     | 1.104     | 1.008     | 1.019     | -0.005    | 0.769     |
|614| 1.013     | 1.062     | 1.016     | 1.021     | -0.013    | 0.311     |
|615| 1.062     | 1.171     | 1.057     | 1.025     | 0.012     | 0.37      |
|616| 1.008     | 1.143     | 1.014     | 1.071     | 0.008     | 0.58      |
|617| 1.019     | 1.169     | 1.042     | 1.189     | -0.009    | 0.421     |
|618| 1.015     | 1.11      | 0.977     | 1.057     | -0.001    | 0.644     |
|619| 1.033     | 1.091     | 0.965     | 1.131     | -0.001    | 0.997     |
|620| 1.022     | 1.023     | 1.036     | 1         | -0.009    | 0.533     |
|621| 0.997     | 1.05      | 1.026     | 1         | -0.01     | 0.51      |
|622| 1.015     | 1.039     | 1.014     | 1.028     | 0.005     | 0.57      |
|623| 1.053     | 1.048     | 1.006     | 1.058     | 0.018     | 0.398     |
|624| 1.039     | 1.114     | 1.031     | 1.029     | 0.005     | 0.756     |
|625| 1.015     | 1.083     | 1.003     | 1.099     | 0.016     | 0.385     |
|626| 1.033     | 1.191     | 0.99      | 1.183     | 0.004     | 0.806     |
|627| 1         | 1.061     | 0.935     | 1.057     | -0.009    | 0.465     |
|628| 1.006     | 1.076     | 0.952     | 1.136     | 0.005     | 0.82      |
|629| 1.01      | 1.018     | 1.026     | 1.009     | 0.004     | 0.971     |
|630| 1.012     | 1.019     | 0.987     | 1.045     | 0.006     | 0.541     |
|631| 1.022     | 1.047     | 0.991     | 1.012     | 0.003     | 0.618     |
|632| 1.024     | 1.173     | 1.058     | 1.014     | 0.027     | 0.258     |
|633| 0.994     | 1.046     | 0.997     | 1.084     | 0.005     | 0.58      |
|     |          |         |         |         |         |         |
|-----|----------|---------|---------|---------|---------|---------|
| 634 | pm29-pm33 | 1.018   | 1.136   | 1.012   | 1.167   | -0.004  | 0.867   |
| 635 | pm29-pm34 | 0.967   | 1.097   | 0.904   | 1.097   | 0.002   | 0.657   |
| 636 | pm29-pm35 | 1.04    | 1.039   | 0.946   | 1.142   | 0.012   | 0.311   |
| 637 | pm29-pm36 | 0.991   | 1.021   | 1.009   | 0.979   | -0.003  | 0.85    |
| 638 | pm29-pm37 | 1.01    | 1.061   | 0.971   | 1.013   | 0.012   | 0.335   |
| 639 | pm30-pm31 | 1.043   | 1.113   | 1.048   | 1.019   | 0.011   | 0.39    |
| 640 | pm30-pm32 | 1.016   | 1.062   | 0.992   | 1.066   | 0.004   | 0.932   |
| 641 | pm30-pm33 | 1.056   | 1.138   | 1.01    | 1.178   | 0.004   | 0.958   |
| 642 | pm30-pm34 | 1.008   | 1.047   | 0.914   | 1.043   | -0.016  | 0.352   |
| 643 | pm30-pm35 | 1.045   | 1.062   | 0.96    | 1.167   | 0.025   | 0.21    |
| 644 | pm30-pm36 | 1.04    | 1.018   | 1.021   | 1.004   | 0.013   | 0.324   |
| 645 | pm30-pm37 | 1.021   | 1.018   | 1.009   | 1.052   | 0.019   | 0.396   |
| 646 | pm31-pm32 | 1.031   | 1.183   | 1.007   | 1.059   | 0.015   | 0.356   |
| 647 | pm31-pm33 | 1.041   | 1.165   | 1.019   | 1.195   | -0.012  | 0.385   |
| 648 | pm31-pm34 | 1.034   | 1.15    | 0.966   | 1.068   | 0.01    | 0.349   |
| 649 | pm31-pm35 | 1.036   | 1.135   | 0.953   | 1.134   | 0.005   | 0.501   |
| 650 | pm31-pm36 | 1.023   | 1.081   | 1.01    | 0.994   | -0.006  | 0.453   |
| 651 | pm31-pm37 | 1.056   | 1.106   | 1.048   | 1.019   | 0.026   | 0.232   |
| 652 | pm32-pm33 | 1.035   | 1.143   | 1.013   | 1.238   | 0.005   | 0.574   |
| 653 | pm32-pm34 | 1.01    | 1.06    | 0.932   | 1.136   | 0.006   | 0.483   |
| 654 | pm32-pm35 | 1.036   | 1.126   | 0.947   | 1.207   | 0.035   | 0.207   |
| 655 | pm32-pm36 | 1.008   | 1.055   | 0.982   | 1.063   | 0.009   | 0.472   |
| 656 | pm32-pm37 | 1.001   | 1.055   | 0.98    | 1.077   | 0.011   | 0.388   |
| 657 | pm33-pm34 | 1.037   | 1.114   | 0.978   | 1.24    | 0.001   | 0.681   |
| 658 | pm33-pm35 | 1.047   | 1.176   | 0.891   | 1.285   | -0.006  | 0.582   |
| 659 | pm33-pm36 | 0.993   | 1.101   | 0.994   | 1.175   | -0.014  | 0.368   |
| 660 | pm33-pm37 | 1.004   | 1.164   | 1.007   | 1.152   | 0.003   | 0.678   |
| 661 | pm34-pm35 | 1.034   | 1.058   | 0.957   | 1.141   | 0.014   | 0.349   |
| 662 | pm34-pm36 | 0.996   | 1.028   | 0.975   | 1.075   | 0.011   | 0.369   |
| 663 | pm34-pm37 | 1.002   | 1.027   | 0.943   | 1.054   | 0       | 0.634   |
3b) Result of two-distribution perturbation analysis for hypertrophy when each response function was separately applied (10 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin    | Hill   | Sat    | Acc    | Synergistic effect | p-value |
|-----|------------------------------------------|--------|--------|--------|--------|--------------------|---------|
| 1   | pm1-pm2                                 | 0.995  | 0.984  | 1      | 1.004  | -0.018             | 0.387   |
| 2   | pm1-pm3                                 | 1.009  | 1.043  | 0.998  | 1.046  | -0.001             | 0.822   |
| 3   | pm1-pm4                                 | 0.992  | 1.114  | 1.001  | 1.007  | -0.006             | 0.435   |
| 4   | pm1-pm5                                 | 1.037  | 0.994  | 1.027  | 0.99   | -0.003             | 0.753   |
| 5   | pm1-pm6                                 | 1.004  | 1.006  | 0.997  | 1.002  | -0.008             | 0.592   |
| 6   | pm1-pm7                                 | 2.802  | 2.076  | 2.705  | 2.249  | -0.102             | 0.006   |
| 7   | pm1-pm8                                 | 1.05   | 1.05   | 1.028  | 1.085  | 0.021              | 0.217   |
| 8   | pm1-pm9                                 | 1.055  | 1.078  | 1.038  | 1.03   | -0.002             | 0.912   |
| 9   | pm1-pm10                                | 1.434  | 1.539  | 1.259  | 1.485  | -0.042             | 0.196   |
| 10  | pm1-pm11                                | 1      | 0.998  | 1.01   | 1.012  | -0.005             | 0.574   |
| 11  | pm1-pm12                                | 1.039  | 1.044  | 1.012  | 0.988  | -0.005             | 0.712   |
| 12  | pm1-pm13                                | 0.93   | 0.921  | 0.917  | 0.84   | 0.03               | 0.218   |
| 13  | pm1-pm14                                | 0.935  | 0.891  | 0.94   | 0.911  | 0.007              | 0.488   |
| 14  | pm1-pm15                                | 1.107  | 1.217  | 1.129  | 1.005  | -0.063             | 0.036   |
| 15  | pm1-pm16                                | 1.197  | 1.225  | 1.2    | 1.037  | -0.007             | 0.559   |
| 16  | pm1-pm17                                | 1.165  | 1.179  | 1.181  | 1.052  | -0.046             | 0.163   |
| 17  | pm1-pm18                                | 1.058  | 1.01   | 1.005  | 1.026  | 0.002              | 0.88    |
| 18  | pm1-pm19                                | 1.012  | 1.08   | 1.057  | 1.029  | -0.007             | 0.483   |
| 19  | pm1-pm20                                | 1.033  | 1.086  | 1.028  | 1.003  | 0.009              | 0.442   |
|     | pm1-pm21  | 1.516 | 1.117 | 1.842 | 1.204 | -0.024 | 0.269 |
|-----|-----------|-------|-------|-------|-------|--------|-------|
|     | pm1-pm22  | 1.01  | 1.058 | 1.005 | 0.984 | 0.012  | 0.335 |
|     | pm1-pm23  | 1.047 | 1.069 | 1.01  | 0.996 | 0.032  | 0.215 |
|     | pm1-pm24  | 0.993 | 1.081 | 1.009 | 1.015 | 0.006  | 0.411 |
|     | pm1-pm25  | 1.025 | 1.024 | 1.006 | 0.988 | 0  | 0.692 |
|     | pm1-pm26  | 1.012 | 1.056 | 1.016 | 0.987 | 0.007  | 0.574 |
|     | pm1-pm27  | 1.011 | 1.082 | 1.04  | 1.012 | -0.008 | 0.543 |
|     | pm1-pm28  | 1.009 | 1.037 | 1.023 | 1.008 | -0.008 | 0.531 |
|     | pm1-pm29  | 1.038 | 1.077 | 1.003 | 1.003 | 0.012  | 0.392 |
|     | pm1-pm30  | 1.047 | 1.009 | 1.027 | 1.015 | 0.001  | 0.644 |
|     | pm1-pm31  | 1.029 | 1.097 | 1.069 | 1.022 | 0.006  | 0.506 |
|     | pm1-pm32  | 1.019 | 1.011 | 1.013 | 1.089 | 0 | 0.723 |
|     | pm1-pm33  | 1.026 | 1.135 | 1.001 | 1.16 | -0.015 | 0.368 |
|     | pm1-pm34  | 0.971 | 1.039 | 0.941 | 1.084 | -0.014 | 0.38  |
|     | pm1-pm35  | 1.006 | 1.095 | 0.972 | 1.112 | 0.009  | 0.42  |
|     | pm1-pm36  | 1.029 | 1.037 | 1.007 | 1.005 | 0.008  | 0.444 |
|     | pm1-pm37  | 1.036 | 1.005 | 1.02  | 1.018 | 0.009  | 0.466 |
|     | pm2-pm3   | 0.995 | 0.996 | 0.968 | 1.031 | -0.013 | 0.373 |
|     | pm2-pm4   | 0.966 | 1.058 | 1.005 | 1.016 | -0.009 | 0.483 |
|     | pm2-pm5   | 1.01  | 0.995 | 1.026 | 1.016 | 0.01   | 0.378 |
|     | pm2-pm6   | 0.992 | 0.968 | 1.012 | 1.012 | 0 | 0.67  |
|     | pm2-pm7   | 2.862 | 1.995 | 2.617 | 2.246 | -0.116 | 0.006 |
|     | pm2-pm8   | 1.001 | 1.019 | 1.012 | 1.029 | -0.003 | 0.772 |
|     | pm2-pm9   | 1.059 | 1.059 | 1.032 | 1.024 | 0.005  | 0.545 |
|     | pm2-pm10  | 1.43  | 1.5   | 1.289 | 1.482 | -0.032 | 0.222 |
|     | pm2-pm11  | 1.008 | 0.985 | 0.993 | 1.009 | 0.002  | 0.845 |
|     | pm2-pm12  | 1.009 | 1.023 | 1.003 | 0.973 | -0.009 | 0.51  |
|     | pm2-pm13  | 0.889 | 0.85  | 0.933 | 0.838 | 0.019  | 0.352 |
|     | pm2-pm14  | 0.912 | 0.859 | 0.931 | 0.87  | -0.006 | 0.543 |
|     | pm2-pm15  | 1.082 | 1.175 | 1.134 | 1.034 | -0.057 | 0.027 |
|   | pm2-pm16 | pm2-pm17 | pm2-pm18 | pm2-pm19 | pm2-pm20 | pm2-pm21 | pm2-pm22 | pm2-pm23 | pm2-pm24 | pm2-pm25 | pm2-pm26 | pm2-pm27 | pm2-pm28 | pm2-pm29 | pm2-pm30 | pm2-pm31 | pm2-pm32 | pm2-pm33 | pm2-pm34 | pm2-pm35 | pm2-pm36 | pm2-pm37 | pm3-pm4 | pm3-pm5 | pm3-pm6 | pm3-pm7 | pm3-pm8 | pm3-pm9 | pm3-pm10 | pm3-pm11 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 50 | 1.132   | 1.152   | 1.167   | 1.051   | -0.032  | 0.254   |
| 51 | 1.169   | 1.182   | 1.198   | 1.034   | -0.03   | 0.227   |
| 52 | 1.013   | 1.007   | 1.002   | 1.014   | 0       | 0.667   |
| 53 | 0.972   | 1.059   | 1.037   | 1.034   | -0.013  | 0.337   |
| 54 | 1.012   | 1.023   | 0.992   | 1.057   | 0.006   | 0.55    |
| 55 | 1.545   | 1.099   | 1.882   | 1.235   | 0.011   | 0.395   |
| 56 | 0.996   | 1.024   | 0.984   | 0.986   | 0.009   | 0.557   |
| 57 | 1.022   | 1.063   | 0.976   | 0.986   | 0.027   | 0.202   |
| 58 | 0.979   | 1.016   | 0.998   | 0.988   | -0.009  | 0.438   |
| 59 | 0.99   | 1.012   | 1.016   | 0.992   | 0.006   | 0.519   |
| 60 | 1.02   | 0.975   | 0.992   | 0.985   | -0.004  | 0.6     |
| 61 | 1.027   | 1.056   | 1.042   | 1.022   | 0.006   | 0.508   |
| 62 | 1.025   | 1.028   | 1.022   | 1.038   | 0.015   | 0.31    |
| 63 | 0.989   | 1.021   | 0.98    | 1.004   | -0.006  | 0.533   |
| 64 | 1.025   | 1.031   | 0.992   | 1.001   | 0.003   | 0.664   |
| 65 | 1.043   | 1.114   | 1.046   | 1.008   | 0.018   | 0.337   |
| 66 | 0.992   | 1.029   | 0.998   | 1.077   | 0.005   | 0.739   |
| 67 | 1.002   | 1.16    | 0.99    | 1.136   | -0.01   | 0.498   |
| 68 | 0.977   | 1.015   | 0.958   | 1.069   | -0.004  | 0.664   |
| 69 | 0.999   | 1.032   | 0.961   | 1.127   | 0.006   | 0.537   |
| 70 | 1.01    | 1.036   | 0.978   | 1.016   | 0.013   | 0.301   |
| 71 | 1.026   | 0.995   | 1.001   | 1.012   | 0.012   | 0.31    |
| 72 | 0.996   | 1.093   | 0.998   | 1.025   | -0.003  | 0.835   |
| 73 | 1.029   | 1.012   | 0.984   | 1.02    | -0.001  | 0.743   |
| 74 | 1.011   | 1.008   | 0.986   | 1.01    | -0.004  | 0.845   |
| 75 | 2.893   | 1.954   | 2.658   | 2.247   | -0.119  | 0.009   |
| 76 | 1.002   | 1.008   | 0.976   | 1.051   | -0.02   | 0.386   |
| 77 | 1.079   | 1.066   | 1.043   | 1.053   | 0.01    | 0.372   |
| 78 | 1.458   | 1.498   | 1.233   | 1.564   | -0.03   | 0.235   |
| 79 | 0.988   | 1.029   | 0.997   | 1.026   | 0.003   | 0.974   |
|   | pm3-pm12 | pm3-pm13 | pm3-pm14 | pm3-pm15 | pm3-pm16 | pm3-pm17 | pm3-pm18 | pm3-pm19 | pm3-pm20 | pm3-pm21 | pm3-pm22 | pm3-pm23 | pm3-pm24 | pm3-pm25 | pm3-pm26 | pm3-pm27 | pm3-pm28 | pm3-pm29 | pm3-pm30 | pm3-pm31 | pm3-pm32 | pm3-pm33 | pm3-pm34 | pm3-pm35 | pm3-pm36 | pm3-pm37 | pm3-pm38 | pm3-pm39 | pm3-pm40 | pm4-pm5 | pm4-pm6 | pm4-pm7 | pm4-pm8   |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 80| 0.999   | 1.053   | 1.025   | 1.02    | 0.002   | 0.78    |
| 81| 0.936   | 0.89    | 0.9     | 0.861   | 0.028   | 0.2     |
| 82| 0.927   | 0.952   | 0.921   | 0.889   | 0.012   | 0.36    |
| 83| 1.098   | 1.204   | 1.093   | 1.071   | -0.058  | 0.033   |
| 84| 1.156   | 1.152   | 1.174   | 1.115   | -0.019  | 0.373   |
| 85| 1.165   | 1.199   | 1.141   | 1.061   | -0.045  | 0.168   |
| 86| 1.051   | 1.01    | 0.968   | 1.042   | -0.002  | 0.719   |
| 87| 0.993   | 1.074   | 1.008   | 1.033   | -0.022  | 0.247   |
| 88| 1.032   | 1.013   | 0.985   | 1.051   | -0.006  | 0.489   |
| 89| 1.507   | 1.149   | 1.819   | 1.2     | -0.022  | 0.272   |
| 90| 0.984   | 1.045   | 0.995   | 1.014   | 0.01    | 0.478   |
| 91| 1.002   | 1.069   | 0.995   | 1.029   | 0.028   | 0.218   |
| 92| 0.995   | 1.05    | 1.007   | 1.018   | 0.001   | 0.91    |
| 93| 1.012   | 0.982   | 0.978   | 0.992   | -0.017  | 0.339   |
| 94| 0.996   | 0.99    | 1.011   | 1.027   | -0.002  | 0.98    |
| 95| 1.011   | 1.041   | 1.001   | 1.033   | -0.02   | 0.207   |
| 96| 1.024   | 1.009   | 1.005   | 1.062   | 0       | 0.691   |
| 97| 1.008   | 1.056   | 1.002   | 1.028   | 0.008   | 0.518   |
| 98| 1.038   | 1.024   | 0.987   | 1.03    | 0       | 0.766   |
| 99| 1.023   | 1.092   | 1.019   | 1.018   | -0.008  | 0.454   |
|100| 1.002   | 1.039   | 0.983   | 1.105   | 0.001   | 0.968   |
|101| 1.01    | 1.112   | 0.994   | 1.182   | -0.019  | 0.344   |
|102| 1.022   | 1.016   | 0.945   | 1.095   | -0.001  | 0.958   |
|103| 1.065   | 1.033   | 0.909   | 1.109   | -0.006  | 0.489   |
|104| 0.994   | 0.998   | 0.989   | 1.004   | -0.013  | 0.309   |
|105| 1.006   | 1.041   | 0.985   | 1.026   | 0.007   | 0.582   |
|106| 1.03    | 1.114   | 0.972   | 1.016   | 0.011   | 0.363   |
|107| 0.994   | 1.104   | 1      | 1.036   | 0.016   | 0.309   |
|108| 2.835   | 2.119   | 2.628   | 2.33    | -0.089  | 0.018   |
|109| 1.008   | 1.073   | 0.978   | 1.061   | -0.009  | 0.598   |
|   | pm4-pm9  | pm4-pm10 | pm4-pm11 | pm4-pm12 | pm4-pm13 | pm4-pm14 | pm4-pm15 | pm4-pm16 | pm4-pm17 | pm4-pm18 | pm4-pm19 | pm4-pm20 | pm4-pm21 | pm4-pm22 | pm4-pm23 | pm4-pm24 | pm4-pm25 | pm4-pm26 | pm4-pm27 | pm4-pm28 | pm4-pm29 | pm4-pm30 | pm4-pm31 | pm4-pm32 | pm4-pm33 | pm4-pm34 | pm4-pm35 | pm4-pm36 | pm4-pm37 | pm4-pm38 | pm4-pm39 | pm4-pm40 | pm5-pm6  |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|   | 1.076   | 1.142   | 1.052   | 1.046   | 0.02    | 0.291   | 1.448   | 1.57    | 1.258   | 1.518   | -0.03   | 0.265   | 1.017   | 1.066   | 0.995   | 1.001   | 0.003   | 0.775   | 1.004   | 1.101   | 0.996   | 1.011   | -0.004  | 0.68    | 0.888   | 0.94    | 0.91    | 0.865   | 0.021   | 0.257   | 0.936   | 0.925   | 0.966   | 0.874   | 0.006   | 0.593   | 1.105   | 1.288   | 1.116   | 1.036   | -0.048  | 0.158   |
|   | 1.173   | 1.245   | 1.157   | 1.11    | -0.007  | 0.548   | 1.145   | 1.23    | 1.203   | 1.069   | -0.035  | 0.202   | 1.006   | 1.092   | 1.001   | 1.033   | 0.004   | 0.65    | 0.958   | 1.138   | 1.026   | 1.036   | -0.019  | 0.332   | 1.029   | 1.1     | 1.006   | 1.045   | 0.009   | 0.445   | 1.524   | 1.168   | 1.818   | 1.183   | -0.027  | 0.283   | 1.016   | 1.142   | 0.998   | 0.995   | 0.028   | 0.266   |
|   | 1.025   | 1.147   | 0.988   | 1.043   | 0.045   | 0.183   | 0.986   | 1.123   | 0.995   | 1.01    | 0.003   | 0.8     | 0.996   | 1.106   | 0.987   | 1.01    | 0.007   | 0.481   | 1.018   | 1.092   | 0.999   | 1.02    | 0.014   | 0.354   | 1.011   | 1.111   | 1.024   | 1.025   | -0.009  | 0.503   | 1.003   | 1.103   | 1.003   | 1.034   | 0.002   | 0.633   | 1.02    | 1.171   | 0.972   | 1.044   | 0.026   | 0.214   |
|   | 1.02    | 1.092   | 0.998   | 1.025   | 0.004   | 0.657   | 1.044   | 1.184   | 1.046   | 1.045   | 0.024   | 0.29    | 0.999   | 1.081   | 1.005   | 1.054   | -0.005  | 0.474   | 1.008   | 1.171   | 0.971   | 1.2     | -0.015  | 0.316   | 1.012   | 1.164   | 0.959   | 1.065   | 0.02    | 0.228   | 1.02    | 1.125   | 0.957   | 1.12    | 0.011   | 0.359   | 1.01    | 1.06    | 1.015   | 0.993   | 0.001   | 0.984   |
|   | 1.026   | 1.074   | 0.994   | 1.029   | 0.013   | 0.394   | 0.982   | 1.014   | 1.02    | 1.011   | 0.008   | 0.455   | 284     |
|     | pm5-pm7 | pm5-pm8 | pm5-pm9 | pm5-pm10 | pm5-pm11 | pm5-pm12 | pm5-pm13 | pm5-pm14 | pm5-pm15 | pm5-pm16 | pm5-pm17 | pm5-pm18 | pm5-pm19 | pm5-pm20 | pm5-pm21 | pm5-pm22 | pm5-pm23 | pm5-pm24 | pm5-pm25 | pm5-pm26 | pm5-pm27 | pm5-pm28 | pm5-pm29 | pm5-pm30 | pm5-pm31 | pm5-pm32 | pm5-pm33 | pm5-pm34 | pm5-pm35 | pm5-pm36 |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 140 | 2.827   | 1.983   | 2.656   | 2.272   | -0.114  | 0.009   |
| 141 | 1.036   | 0.989   | 1.004   | 1.055   | 0.001   | 0.975   |
| 142 | 1.071   | 1.061   | 1.015   | 1.017   | 0       | 0.779   |
| 143 | 1.459   | 1.487   | 1.21    | 1.493   | -0.048  | 0.182   |
| 144 | 0.996   | 0.981   | 1.005   | 1.006   | -0.001  | 0.827   |
| 145 | 1.001   | 1.024   | 1.015   | 1.014   | 0       | 0.924   |
| 146 | 0.911   | 0.832   | 0.899   | 0.838   | 0.01    | 0.505   |
| 147 | 0.919   | 0.898   | 0.957   | 0.9     | 0.017   | 0.307   |
| 148 | 1.145   | 1.154   | 1.121   | 1.027   | -0.054  | 0.025   |
| 149 | 1.128   | 1.139   | 1.125   | 1.1     | -0.037  | 0.271   |
| 150 | 1.18    | 1.149   | 1.213   | 1.041   | -0.032  | 0.244   |
| 151 | 1.036   | 0.987   | 0.985   | 1.019   | -0.004  | 0.905   |
| 152 | 0.995   | 1.012   | 1.016   | 1.052   | -0.022  | 0.269   |
| 153 | 1.01    | 1.043   | 1.018   | 1.026   | 0.007   | 0.587   |
| 154 | 1.55    | 1.106   | 1.835   | 1.222   | -0.003  | 0.898   |
| 155 | 1.015   | 1.03    | 1.018   | 1.001   | 0.025   | 0.293   |
| 156 | 1.015   | 1.08    | 1.028   | 1.01    | 0.046   | 0.184   |
| 157 | 0.975   | 1.042   | 0.991   | 0.998   | -0.006  | 0.595   |
| 158 | 0.989   | 0.983   | 0.998   | 1.006   | -0.005  | 0.836   |
| 159 | 1.008   | 1       | 1.02    | 1.004   | 0.008   | 0.591   |
| 160 | 1.02    | 1.084   | 1.065   | 1.034   | 0.018   | 0.396   |
| 161 | 1.002   | 0.997   | 1.01    | 1.034   | -0.005  | 0.985   |
| 162 | 1.023   | 1.036   | 0.984   | 1.032   | 0.012   | 0.388   |
| 163 | 1.05    | 1.058   | 0.988   | 0.996   | 0.011   | 0.325   |
| 164 | 1.028   | 1.092   | 1.051   | 1.009   | 0.008   | 0.459   |
| 165 | 0.993   | 1.018   | 1.019   | 1.086   | 0.007   | 0.464   |
| 166 | 1.016   | 1.165   | 0.965   | 1.142   | -0.012  | 0.369   |
| 167 | 0.994   | 1.009   | 0.918   | 1.086   | -0.009  | 0.566   |
| 168 | 1.038   | 1.036   | 0.924   | 1.153   | 0.012   | 0.366   |
| 169 | 1.017   | 1.009   | 0.992   | 0.995   | 0.003   | 0.912   |
| pm5-pm37 | 1.011 | 0.966 | 1.007 | 1.006 | -0.001 | 0.946 |
| pm6-pm7  | 2.804 | 2.013 | 2.675 | 2.235 | -0.111 | 0.006 |
| pm6-pm8  | 1.032 | 1.014 | 0.996 | 1.068 | 0.012 | 0.389 |
| pm6-pm9  | 1.068 | 1.094 | 1.019 | 1.034 | 0.018 | 0.362 |
| pm6-pm10 | 1.432 | 1.467 | 1.281 | 1.527 | -0.028 | 0.298 |
| pm6-pm11 | 0.989 | 0.997 | 0.995 | 1.023 | 0.008 | 0.528 |
| pm6-pm12 | 1.014 | 1.024 | 1.011 | 1.012 | 0.007 | 0.496 |
| pm6-pm13 | 0.845 | 0.84  | 0.916 | 0.834 | 0.003 | 0.813 |
| pm6-pm14 | 0.931 | 0.894 | 0.925 | 0.871 | 0.009 | 0.544 |
| pm6-pm15 | 1.104 | 1.2   | 1.106 | 1.001 | -0.057 | 0.033 |
| pm6-pm16 | 1.16  | 1.169 | 1.194 | 1.056 | -0.01  | 0.431 |
| pm6-pm17 | 1.154 | 1.175 | 1.209 | 1.045 | -0.027 | 0.299 |
| pm6-pm18 | 1.032 | 1.023 | 0.988 | 1.023 | 0.011 | 0.369 |
| pm6-pm19 | 0.999 | 1.066 | 1.033 | 1.004 | 0     | 0.841 |
| pm6-pm20 | 1.037 | 1.054 | 1    | 1.005 | 0.012 | 0.372 |
| pm6-pm21 | 1.54  | 1.157 | 1.885 | 1.239 | 0.029 | 0.271 |
| pm6-pm22 | 0.982 | 1.036 | 0.974 | 1.002 | 0.013 | 0.333 |
| pm6-pm23 | 0.994 | 1.067 | 0.984 | 0.974 | 0.023 | 0.212 |
| pm6-pm24 | 0.976 | 1.012 | 0.983 | 1.004 | -0.008 | 0.457 |
| pm6-pm25 | 0.98  | 1.016 | 0.999 | 1.007 | 0.007 | 0.492 |
| pm6-pm26 | 0.998 | 0.994 | 0.986 | 0.985 | -0.003 | 0.898 |
| pm6-pm27 | 1.037 | 1.071 | 1.026 | 1.02  | 0.01   | 0.346 |
| pm6-pm28 | 1.013 | 1.012 | 0.991 | 1.042 | 0.004 | 0.916 |
| pm6-pm29 | 0.989 | 1.039 | 0.988 | 1.015 | 0.006 | 0.585 |
| pm6-pm30 | 1.033 | 1.036 | 1.009 | 1.032 | 0.021 | 0.27 |
| pm6-pm31 | 1.06  | 1.078 | 1.028 | 1.003 | 0.01   | 0.349 |
| pm6-pm32 | 0.99  | 1.036 | 1.003 | 1.047 | 0.002 | 0.752 |
| pm6-pm33 | 0.998 | 1.114 | 1.01  | 1.186 | -0.002 | 0.802 |
| pm6-pm34 | 0.977 | 1.021 | 0.911 | 1.069 | -0.011 | 0.332 |
| pm6-pm35 | 1.023 | 1.061 | 0.965 | 1.111 | 0.019 | 0.337 |
| Sequence | pm6-pm36 | pm6-pm37 | pm7-pm8 | pm7-pm9 | pm7-pm10 | pm7-pm11 | pm7-pm12 | pm7-pm13 | pm7-pm14 | pm7-pm15 | pm7-pm16 | pm7-pm17 | pm7-pm18 | pm7-pm19 | pm7-pm20 | pm7-pm21 | pm7-pm22 | pm7-pm23 | pm7-pm24 | pm7-pm25 | pm7-pm26 | pm7-pm27 | pm7-pm28 | pm7-pm29 | pm7-pm30 | pm7-pm31 | pm7-pm32 | pm7-pm33 | pm7-pm34 | pm7-pm35 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 200      | 0.995    | 1.017    | 0.978    | 1.014    | 0.006    | 0.483    |
| 201      | 0.989    | 1.005    | 1        | 0.999    | 0.005    | 0.616    |
| 202      | 2.857    | 2.013    | 2.619    | 2.304    | -0.116   | 0.005    |
| 203      | 2.949    | 2.144    | 2.698    | 2.272    | -0.069   | 0.031    |
| 204      | 3.888    | 3.013    | 3.25     | 3.287    | 0.355    | <0.001   |
| 205      | 2.859    | 2.011    | 2.603    | 2.25     | -0.112   | 0.006    |
| 206      | 2.812    | 2       | 2.61     | 2.296    | -0.128   | 0.005    |
| 207      | 2.884    | 2.126    | 2.819    | 2.328    | 0.134    | 0.01     |
| 208      | 2.988    | 2.187    | 2.887    | 2.383    | 0.166    | 0.002    |
| 209      | 3.044    | 2.395    | 2.928    | 2.355    | -0.03    | 0.269    |
| 210      | 3.16     | 2.335    | 3.106    | 2.392    | 0.044    | 0.165    |
| 211      | 3.174    | 2.29     | 3.16     | 2.328    | 0.016    | 0.38     |
| 212      | 2.828    | 2.051    | 2.658    | 2.294    | -0.097   | 0.016    |
| 213      | 2.81     | 2.006    | 2.737    | 2.265    | -0.13    | 0.006    |
| 214      | 2.862    | 2.035    | 2.631    | 2.253    | -0.116   | 0.01     |
| 215      | 4.102    | 2.215    | 4.559    | 2.699    | 0.418    | <0.001   |
| 216      | 2.775    | 2.062    | 2.635    | 2.297    | -0.093   | 0.014    |
| 217      | 2.822    | 2.102    | 2.622    | 2.265    | -0.079   | 0.014    |
| 218      | 2.845    | 2.01     | 2.637    | 2.226    | -0.122   | 0.007    |
| 219      | 2.784    | 2.042    | 2.664    | 2.249    | -0.109   | 0.009    |
| 220      | 2.739    | 2.01     | 2.633    | 2.246    | -0.137   | 0.01     |
| 221      | 2.807    | 2.102    | 2.67     | 2.213    | -0.13    | 0.006    |
| 222      | 2.887    | 2.027    | 2.638    | 2.272    | -0.104   | 0.007    |
| 223      | 2.865    | 2.007    | 2.652    | 2.273    | -0.102   | 0.008    |
| 224      | 2.833    | 2.055    | 2.61     | 2.246    | -0.12    | 0.009    |
| 225      | 2.873    | 2.148    | 2.683    | 2.302    | -0.08    | 0.011    |
| 226      | 2.833    | 2.051    | 2.645    | 2.357    | -0.095   | 0.014    |
| 227      | 2.773    | 2.216    | 2.731    | 2.484    | -0.077   | 0.013    |
| 228      | 2.882    | 2.077    | 2.553    | 2.31     | -0.1     | 0.013    |
| 229      | 2.925    | 2.101    | 2.492    | 2.451    | -0.078   | 0.011    |
|    | pm7-pm36 | pm7-pm37 | pm8-pm9  | pm8-pm10 | pm8-pm11 | pm8-pm12 | pm8-pm13 |
|----|----------|----------|----------|----------|----------|----------|----------|
| 230| 2.86     | 1.923    | 2.675    | 2.22     | -0.125   | 0.007    |
| 231| 2.789    | 1.968    | 2.646    | 2.206    | -0.141   | 0.008    |
| 232| 1.077    | 1.099    | 1.037    | 1.073    | 0.014    | 0.344    |
| 233| 1.437    | 1.467    | 1.279    | 1.541    | -0.045   | 0.186    |
| 234| 1.023    | 1.012    | 1.015    | 1.073    | 0.016    | 0.36     |
| 235| 1.047    | 1.04     | 0.989    | 1.03     | -0.003   | 0.605    |
| 236| 0.926    | 0.876    | 0.931    | 0.878    | 0.026    | 0.246    |
| 237| 0.927    | 0.877    | 0.944    | 0.912    | -0.002   | 0.736    |
| 238| 1.11     | 1.184    | 1.125    | 1.077    | -0.058   | 0.044    |
| 239| 1.186    | 1.17     | 1.144    | 1.127    | -0.019   | 0.326    |
| 240| 1.166    | 1.191    | 1.196    | 1.102    | -0.03    | 0.244    |
| 241| 1.054    | 1.003    | 1.008    | 1.069    | 0.006    | 0.524    |
| 242| 1.012    | 1.079    | 1.051    | 1.1      | 0.004    | 0.757    |
| 243| 1.044    | 1.02     | 1.004    | 1.038    | -0.007   | 0.424    |
| 244| 1.556    | 1.09     | 1.844    | 1.247    | -0.013   | 0.333    |
| 245| 1.07     | 1.06     | 0.982    | 1.022    | 0.026    | 0.201    |
| 246| 1.025    | 1.057    | 1.007    | 1.042    | 0.029    | 0.223    |
| 247| 0.999    | 1.042    | 0.991    | 1.021    | -0.01    | 0.38     |
| 248| 1.04     | 1.004    | 0.992    | 1.026    | 0        | 0.714    |
| 249| 1.029    | 1.014    | 1.009    | 1.06     | 0.012    | 0.324    |
| 250| 1.043    | 1.063    | 1.012    | 1.027    | -0.013   | 0.336    |
| 251| 1.004    | 1.026    | 1.016    | 1.071    | -0.002   | 0.623    |
| 252| 1.033    | 1.085    | 1.003    | 1.066    | 0.023    | 0.2      |
| 253| 1.037    | 1.004    | 1.009    | 1.018    | -0.011   | 0.318    |
| 254| 1.051    | 1.102    | 1.036    | 1.049    | 0.006    | 0.442    |
| 255| 1.032    | 1.064    | 1.013    | 1.151    | 0.027    | 0.299    |
| 256| 1.008    | 1.129    | 1.004    | 1.206    | -0.014   | 0.312    |
| 257| 1.011    | 0.992    | 0.93     | 1.1      | -0.019   | 0.321    |
| 258| 1.042    | 1.05     | 0.973    | 1.171    | 0.016    | 0.353    |
| 259| 1.037    | 0.992    | 1.02     | 1.035    | 0.005    | 0.925    |
| pm8-pm37 | 260 | 1.039 | 0.993 | 1.008 | 1.058 | 0.009 | 0.56 |
| pm9-pm10 | 261 | 1.492 | 1.575 | 1.306 | 1.492 | -0.03 | 0.254 |
| pm9-pm11 | 262 | 1.065 | 1.068 | 0.995 | 1.053 | 0.01 | 0.427 |
| pm9-pm12 | 263 | 1.088 | 1.114 | 1.047 | 1.043 | 0.022 | 0.259 |
| pm9-pm13 | 264 | 0.936 | 0.915 | 0.912 | 0.887 | 0.015 | 0.365 |
| pm9-pm14 | 265 | 0.936 | 0.93 | 0.927 | 0.92 | -0.009 | 0.462 |
| pm9-pm15 | 266 | 1.147 | 1.266 | 1.172 | 1.064 | -0.04 | 0.195 |
| pm9-pm16 | 267 | 1.232 | 1.252 | 1.181 | 1.088 | -0.008 | 0.524 |
| pm9-pm17 | 268 | 1.202 | 1.207 | 1.265 | 1.11 | -0.019 | 0.369 |
| pm9-pm18 | 269 | 1.072 | 1.091 | 1.036 | 1.066 | 0.019 | 0.345 |
| pm9-pm19 | 270 | 1.067 | 1.106 | 1.038 | 1.096 | 0 | 0.794 |
| pm9-pm20 | 271 | 1.058 | 1.095 | 0.998 | 1.048 | -0.004 | 0.806 |
| pm9-pm21 | 272 | 1.623 | 1.205 | 1.888 | 1.263 | 0.026 | 0.243 |
| pm9-pm22 | 273 | 1.044 | 1.155 | 1.024 | 1.018 | 0.032 | 0.232 |
| pm9-pm23 | 274 | 1.078 | 1.13 | 1.029 | 1.029 | 0.042 | 0.193 |
| pm9-pm24 | 275 | 1.052 | 1.136 | 1.002 | 1.027 | 0.01 | 0.386 |
| pm9-pm25 | 276 | 1.072 | 1.09 | 1.043 | 1.012 | 0.018 | 0.373 |
| pm9-pm26 | 277 | 1.043 | 1.079 | 1.019 | 1.039 | 0.009 | 0.526 |
| pm9-pm27 | 278 | 1.081 | 1.145 | 1.058 | 1.042 | 0.012 | 0.394 |
| pm9-pm28 | 279 | 1.081 | 1.107 | 1.005 | 1.034 | 0.005 | 0.799 |
| pm9-pm29 | 280 | 1.066 | 1.146 | 1.053 | 1.021 | 0.028 | 0.2 |
| pm9-pm30 | 281 | 1.088 | 1.129 | 1.022 | 1.047 | 0.023 | 0.297 |
| pm9-pm31 | 282 | 1.057 | 1.194 | 1.06 | 1.046 | 0.016 | 0.311 |
| pm9-pm32 | 283 | 1.063 | 1.098 | 1.011 | 1.116 | 0.013 | 0.329 |
| pm9-pm33 | 284 | 1.022 | 1.164 | 1.005 | 1.165 | -0.032 | 0.206 |
| pm9-pm34 | 285 | 1.029 | 1.125 | 1.007 | 1.082 | 0.013 | 0.355 |
| pm9-pm35 | 286 | 1.062 | 1.152 | 0.966 | 1.107 | 0.009 | 0.409 |
| pm9-pm36 | 287 | 1.051 | 1.079 | 1.039 | 1.031 | 0.013 | 0.303 |
| pm9-pm37 | 288 | 1.049 | 1.061 | 1.019 | 1.034 | 0.005 | 0.448 |
| pm10-pm11 | 289 | 1.481 | 1.517 | 1.272 | 1.501 | -0.012 | 0.307 |
|   | pm10-pm12 | pm10-pm13 | pm10-pm14 | pm10-pm15 | pm10-pm16 | pm10-pm17 | pm10-pm18 | pm10-pm19 | pm10-pm20 | pm10-pm21 | pm10-pm22 | pm10-pm23 | pm10-pm24 | pm10-pm25 | pm10-pm26 | pm10-pm27 | pm10-pm28 | pm10-pm29 | pm10-pm30 | pm10-pm31 | pm10-pm32 | pm10-pm33 | pm10-pm34 | pm10-pm35 | pm10-pm36 | pm10-pm37 | pm11-pm12 | pm11-pm13 | pm11-pm14 | pm11-pm15 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 290| 1.43    | 1.596   | 1.275   | 1.531   | -0.012  | 0.334   |
| 291| 1.298   | 1.318   | 1.187   | 1.273   | -0.048  | 0.186   |
| 292| 1.518   | 1.489   | 1.39    | 1.49    | 0.115   | 0.008   |
| 293| 1.573   | 1.81    | 1.389   | 1.544   | -0.043  | 0.163   |
| 294| 1.594   | 1.709   | 1.435   | 1.576   | -0.037  | 0.224   |
| 295| 1.64    | 1.68    | 1.488   | 1.54    | -0.047  | 0.173   |
| 296| 1.398   | 1.493   | 1.247   | 1.53    | -0.05   | 0.029   |
| 297| 1.435   | 1.61    | 1.303   | 1.536   | -0.025  | 0.216   |
| 298| 1.434   | 1.52    | 1.264   | 1.46    | -0.054  | 0.037   |
| 299| 1.997   | 1.582   | 2.133   | 1.677   | -0.04   | 0.193   |
| 300| 1.368   | 1.63    | 1.281   | 1.447   | -0.016  | 0.39    |
| 301| 1.435   | 1.475   | 1.281   | 1.455   | -0.032  | 0.294   |
| 302| 1.43    | 1.54    | 1.278   | 1.494   | -0.027  | 0.247   |
| 303| 1.461   | 1.488   | 1.251   | 1.505   | -0.029  | 0.218   |
| 304| 1.394   | 1.505   | 1.245   | 1.454   | -0.056  | 0.039   |
| 305| 1.462   | 1.604   | 1.299   | 1.509   | -0.02   | 0.281   |
| 306| 1.464   | 1.569   | 1.293   | 1.546   | -0.004  | 0.681   |
| 307| 1.435   | 1.541   | 1.289   | 1.47    | -0.029  | 0.245   |
| 308| 1.382   | 1.555   | 1.239   | 1.517   | -0.044  | 0.153   |
| 309| 1.476   | 1.632   | 1.284   | 1.514   | -0.017  | 0.313   |
| 310| 1.406   | 1.565   | 1.235   | 1.608   | -0.024  | 0.243   |
| 311| 1.438   | 1.603   | 1.266   | 1.718   | -0.034  | 0.204   |
| 312| 1.446   | 1.521   | 1.213   | 1.572   | -0.029  | 0.28    |
| 313| 1.447   | 1.537   | 1.179   | 1.62    | -0.036  | 0.264   |
| 314| 1.398   | 1.477   | 1.267   | 1.484   | -0.049  | 0.166   |
| 315| 1.419   | 1.454   | 1.267   | 1.456   | -0.056  | 0.033   |
| 316| 0.998   | 1.002   | 0.987   | 0.983   | -0.016  | 0.344   |
| 317| 0.91    | 0.858   | 0.903   | 0.819   | 0.018   | 0.366   |
| 318| 0.932   | 0.834   | 0.907   | 0.879   | -0.007  | 0.476   |
| 319| 1.095   | 1.198   | 1.141   | 1.051   | -0.039  | 0.285   |
| pm11-pm16 | 1.195 | 1.159 | 1.177 | 1.088 | 0.001 | 0.666 |
| pm11-pm17 | 1.167 | 1.175 | 1.24  | 1.033 | -0.019 | 0.395 |
| pm11-pm18 | 1.011 | 1.009 | 1.013 | 1.015 | 0.006  | 0.591 |
| pm11-pm19 | 0.996 | 1.035 | 1.004 | 1.031 | -0.018 | 0.382 |
| pm11-pm20 | 1.025 | 1.024 | 1.009 | 1.03  | 0.01   | 0.373 |
| pm11-pm21 | 1.518 | 1.124 | 1.808 | 1.204 | -0.012 | 0.384 |
| pm11-pm22 | 1.023 | 1.046 | 0.989 | 0.992 | 0.027  | 0.262 |
| pm11-pm23 | 1.024 | 1.058 | 1.003 | 1.026 | 0.046  | 0.161 |
| pm11-pm24 | 0.997 | 1.051 | 1.008 | 0.989 | 0.01   | 0.523 |
| pm11-pm25 | 0.997 | 0.991 | 1.001 | 0.994 | 0.002  | 0.725 |
| pm11-pm26 | 1.004 | 0.99  | 1.017 | 1    | 0.009  | 0.51  |
| pm11-pm27 | 1.006 | 1.022 | 1.002 | 1.005 | -0.019 | 0.343 |
| pm11-pm28 | 1.031 | 1.055 | 0.981 | 1.029 | 0.014  | 0.35  |
| pm11-pm29 | 0.988 | 1.02  | 1.008 | 0.979 | -0.003 | 0.632 |
| pm11-pm30 | 1.026 | 1.023 | 0.996 | 1.013 | 0.008  | 0.42  |
| pm11-pm31 | 1.005 | 1.062 | 1.04  | 1.008 | -0.003 | 0.961 |
| pm11-pm32 | 1.005 | 1.02  | 0.98  | 1.061 | 0     | 0.771 |
| pm11-pm33 | 0.994 | 1.102 | 0.986 | 1.205 | -0.007 | 0.586 |
| pm11-pm34 | 0.986 | 1.063 | 0.907 | 1.06  | -0.002 | 0.69  |
| pm11-pm35 | 1.023 | 1.051 | 0.932 | 1.114 | 0.009  | 0.41  |
| pm11-pm36 | 0.985 | 1.006 | 0.998 | 1.008 | 0.005  | 0.626 |
| pm11-pm37 | 0.979 | 0.998 | 0.978 | 1.002 | -0.004 | 0.798 |
| pm11-pm38 | 0.879 | 0.916 | 0.915 | 0.831 | 0.015  | 0.359 |
| pm11-pm39 | 0.924 | 0.939 | 0.926 | 0.864 | 0.003  | 0.648 |
| pm11-pm40 | 1.082 | 1.177 | 1.124 | 1.041 | -0.07  | 0.04  |
| pm11-pm41 | 1.171 | 1.192 | 1.137 | 1.099 | -0.02  | 0.371 |
| pm11-pm42 | 1.185 | 1.105 | 1.209 | 1.043 | -0.052 | 0.023 |
| pm11-pm43 | 1.037 | 1.023 | 1.004 | 1.006 | -0.003 | 0.794 |
| pm11-pm44 | 0.995 | 1.032 | 1.029 | 1.049 | -0.024 | 0.291 |
| pm11-pm45 | 1.038 | 1.036 | 1.004 | 1.025 | -0.001 | 0.87  |
|   | pm12-pm21 | pm12-pm22 | pm12-pm23 | pm12-pm24 | pm12-pm25 | pm12-pm26 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 350| 1.524     | 1.144     | 1.781     | 1.21      | -0.027    | 0.28      |
| 351| 1.008     | 1.026     | 0.985     | 1.016     | 0.008     | 0.51      |
| 352| 1.031     | 1.069     | 0.996     | 1.026     | 0.033     | 0.286     |
| 353| 0.996     | 1.048     | 1.004     | 1.003     | -0.004    | 0.933     |
| 354| 1.008     | 0.998     | 0.992     | 1.006     | -0.008    | 0.504     |
| 355| 1.016     | 1.016     | 1.017     | 1.024     | 0.009     | 0.478     |
| 356| 1.054     | 1.088     | 1.047     | 1.028     | 0.011     | 0.342     |
| 357| 1.024     | 1.049     | 0.97      | 1.016     | -0.011    | 0.366     |
| 358| 1.027     | 1.035     | 0.996     | 1.01      | 0         | 0.718     |
| 359| 1.077     | 1.052     | 0.992     | 1.04      | 0.019     | 0.341     |
| 360| 1.02      | 1.101     | 1.045     | 1.001     | -0.005    | 0.596     |
| 361| 1.01      | 1.058     | 0.982     | 1.096     | 0.005     | 0.659     |
| 362| 1.007     | 1.153     | 1.035     | 1.15      | -0.006    | 0.557     |
| 363| 0.987     | 1.032     | 0.927     | 1.061     | -0.019    | 0.356     |
| 364| 1.04      | 1.07      | 0.941     | 1.147     | 0.013     | 0.318     |
| 365| 1.021     | 1.031     | 0.986     | 1.004     | 0.001     | 0.674     |
| 366| 0.997     | 1.004     | 1.004     | 1.013     | -0.004    | 0.821     |
| 367| 0.831     | 0.816     | 0.834     | 0.842     | 0.073     | 0.063     |
| 368| 0.973     | 1.041     | 1.009     | 0.849     | -0.054    | 0.044     |
| 369| 1.047     | 0.947     | 1.067     | 0.877     | -0.031    | 0.288     |
| 370| 0.947     | 1.03      | 1.073     | 0.863     | -0.056    | 0.041     |
| 371| 0.873     | 0.913     | 0.922     | 0.848     | 0.021     | 0.229     |
| 372| 0.9       | 0.888     | 0.964     | 0.853     | 0.004     | 0.885     |
| 373| 0.888     | 0.902     | 0.906     | 0.851     | 0.013     | 0.327     |
| 374| 1.405     | 0.925     | 1.654     | 1.011     | -0.039    | 0.254     |
| 375| 0.875     | 0.853     | 0.882     | 0.816     | 0.009     | 0.458     |
| 376| 0.887     | 0.859     | 0.88      | 0.816     | 0.017     | 0.381     |
| 377| 0.888     | 0.889     | 0.903     | 0.876     | 0.026     | 0.257     |
| 378| 0.879     | 0.853     | 0.913     | 0.864     | 0.022     | 0.258     |
| 379| 0.885     | 0.872     | 0.904     | 0.83      | 0.017     | 0.345     |
| pm13-pm27 | 0.907 | 0.89 | 0.906 | 0.857 | 0 | 0.859 |
| pm13-pm28 | 0.931 | 0.882 | 0.955 | 0.843 | 0.016 | 0.384 |
| pm13-pm29 | 0.839 | 0.89 | 0.903 | 0.864 | 0.011 | 0.361 |
| pm13-pm30 | 0.881 | 0.881 | 0.893 | 0.859 | 0.011 | 0.337 |
| pm13-pm31 | 0.899 | 0.932 | 0.962 | 0.979 | 0.025 | 0.232 |
| pm13-pm32 | 0.921 | 0.855 | 0.873 | 0.893 | 0.007 | 0.55 |
| pm13-pm33 | 0.935 | 0.923 | 0.9 | 0.927 | -0.019 | 0.368 |
| pm13-pm34 | 0.868 | 0.926 | 0.816 | 0.891 | 0.007 | 0.597 |
| pm13-pm35 | 0.881 | 0.888 | 0.853 | 0.948 | 0.01 | 0.523 |
| pm13-pm36 | 0.88 | 0.85 | 0.888 | 0.845 | 0.009 | 0.586 |
| pm13-pm37 | 0.902 | 0.859 | 0.878 | 0.832 | 0.013 | 0.369 |
| pm13-pm38 | 0.994 | 1.114 | 1.042 | 0.915 | -0.046 | 0.188 |
| pm14-pm16 | 1.044 | 1 | 1.035 | 0.922 | -0.056 | 0.02 |
| pm14-pm17 | 1.021 | 0.993 | 1.106 | 0.925 | -0.064 | 0.039 |
| pm14-pm18 | 0.912 | 0.921 | 0.908 | 0.878 | -0.003 | 0.733 |
| pm14-pm19 | 0.891 | 0.947 | 0.92 | 0.908 | -0.021 | 0.292 |
| pm14-pm20 | 0.937 | 0.908 | 0.938 | 0.884 | 0.002 | 0.872 |
| pm14-pm21 | 1.43 | 0.971 | 1.716 | 1.101 | -0.024 | 0.255 |
| pm14-pm22 | 0.919 | 0.911 | 0.951 | 0.856 | 0.022 | 0.273 |
| pm14-pm23 | 0.895 | 0.954 | 0.9 | 0.89 | 0.025 | 0.288 |
| pm14-pm24 | 0.938 | 0.88 | 0.923 | 0.878 | 0.001 | 0.798 |
| pm14-pm25 | 0.928 | 0.849 | 0.915 | 0.875 | -0.005 | 0.984 |
| pm14-pm26 | 0.918 | 0.932 | 0.912 | 0.903 | 0.02 | 0.345 |
| pm14-pm27 | 0.911 | 0.968 | 0.963 | 0.91 | 0.008 | 0.466 |
| pm14-pm28 | 0.927 | 0.837 | 0.899 | 0.889 | -0.024 | 0.295 |
| pm14-pm29 | 0.908 | 0.892 | 0.909 | 0.85 | -0.014 | 0.365 |
| pm14-pm30 | 0.925 | 0.879 | 0.903 | 0.89 | -0.009 | 0.577 |
| pm14-pm31 | 0.946 | 0.924 | 0.992 | 0.926 | 0.013 | 0.382 |
| pm14-pm32 | 0.905 | 0.945 | 0.958 | 0.943 | 0.019 | 0.322 |
| pm14-pm33 | 0.909 | 0.968 | 0.936 | 0.958 | -0.038 | 0.223 |
|   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| 410| pm14-pm34 | 0.947 | 0.894 | 0.869 | 0.906 | -0.004 | 0.891 |
| 411| pm14-pm35 | 0.902 | 0.885 | 0.923 | 0.952 | -0.008 | 0.582 |
| 412| pm14-pm36 | 0.925 | 0.858 | 0.922 | 0.877 | -0.001 | 0.915 |
| 413| pm14-pm37 | 0.944 | 0.876 | 0.905 | 0.869 | 0.003 | 0.657 |
| 414| pm15-pm16 | 1.278 | 1.381 | 1.206 | 1.114 | -0.077 | 0.016 |
| 415| pm15-pm17 | 1.219 | 1.426 | 1.287 | 1.075 | -0.088 | 0.013 |
| 416| pm15-pm18 | 1.16 | 1.191 | 1.115 | 1.042 | -0.045 | 0.171 |
| 417| pm15-pm19 | 1.118 | 1.262 | 1.186 | 1.079 | -0.041 | 0.167 |
| 418| pm15-pm20 | 1.112 | 1.245 | 1.135 | 1.008 | -0.054 | 0.036 |
| 419| pm15-pm21 | 1.694 | 1.307 | 2.104 | 1.292 | 0.006 | 0.434 |
| 420| pm15-pm22 | 1.092 | 1.224 | 1.098 | 1.03 | -0.041 | 0.185 |
| 421| pm15-pm23 | 1.065 | 1.256 | 1.146 | 1.006 | -0.031 | 0.213 |
| 422| pm15-pm24 | 1.11 | 1.255 | 1.118 | 1.017 | -0.044 | 0.174 |
| 423| pm15-pm25 | 1.134 | 1.24 | 1.128 | 1.056 | -0.021 | 0.288 |
| 424| pm15-pm26 | 1.133 | 1.19 | 1.107 | 1.062 | -0.038 | 0.21 |
| 425| pm15-pm27 | 1.148 | 1.298 | 1.126 | 1.011 | -0.049 | 0.159 |
| 426| pm15-pm28 | 1.1 | 1.208 | 1.124 | 1.077 | -0.05 | 0.172 |
| 427| pm15-pm29 | 1.101 | 1.178 | 1.077 | 1.057 | -0.065 | 0.035 |
| 428| pm15-pm30 | 1.136 | 1.251 | 1.157 | 1.081 | -0.017 | 0.351 |
| 429| pm15-pm31 | 1.138 | 1.302 | 1.155 | 1.048 | -0.038 | 0.224 |
| 430| pm15-pm32 | 1.097 | 1.288 | 1.095 | 1.091 | -0.041 | 0.174 |
| 431| pm15-pm33 | 1.089 | 1.389 | 1.136 | 1.152 | -0.054 | 0.032 |
| 432| pm15-pm34 | 1.144 | 1.255 | 1.038 | 1.076 | -0.044 | 0.199 |
| 433| pm15-pm35 | 1.112 | 1.222 | 1.051 | 1.154 | -0.053 | 0.042 |
| 434| pm15-pm36 | 1.094 | 1.212 | 1.133 | 1.027 | -0.045 | 0.176 |
| 435| pm15-pm37 | 1.103 | 1.197 | 1.118 | 1.034 | -0.047 | 0.176 |
| 436| pm16-pm17 | 1.502 | 1.518 | 1.551 | 1.361 | 0.149 | 0.006 |
| 437| pm16-pm18 | 1.161 | 1.211 | 1.169 | 1.051 | -0.018 | 0.347 |
| 438| pm16-pm19 | 1.162 | 1.258 | 1.183 | 1.112 | -0.017 | 0.371 |
| 439| pm16-pm20 | 1.169 | 1.173 | 1.16 | 1.067 | -0.031 | 0.253 |
|   | pm16-pm21 | 1.77 | 1.241 | 2.145 | 1.295 | 0.026 | 0.276 |
|---|-----------|------|-------|-------|-------|-------|-------|
| 441| pm16-pm22 | 1.15  | 1.237 | 1.138 | 1.021 | -0.01 | 0.457 |
| 442| pm16-pm23 | 1.108 | 1.228 | 1.143 | 1.054 | -0.01 | 0.398 |
| 443| pm16-pm24 | 1.121 | 1.216 | 1.159 | 1.079 | -0.019| 0.359 |
| 444| pm16-pm25 | 1.169 | 1.125 | 1.132 | 1.039 | -0.039| 0.291 |
| 445| pm16-pm26 | 1.163 | 1.162 | 1.141 | 1.076 | -0.019| 0.306 |
| 446| pm16-pm27 | 1.145 | 1.165 | 1.189 | 1.05  | -0.052| 0.038 |
| 447| pm16-pm28 | 1.168 | 1.184 | 1.156 | 1.122 | -0.014| 0.353 |
| 448| pm16-pm29 | 1.178 | 1.183 | 1.176 | 1.087 | -0.007| 0.537 |
| 449| pm16-pm30 | 1.158 | 1.171 | 1.138 | 1.044 | -0.039| 0.236 |
| 450| pm16-pm31 | 1.197 | 1.285 | 1.166 | 1.05  | -0.018| 0.392 |
| 451| pm16-pm32 | 1.147 | 1.146 | 1.169 | 1.155 | -0.023| 0.23  |
| 452| pm16-pm33 | 1.22  | 1.283 | 1.174 | 1.228 | -0.013| 0.365 |
| 453| pm16-pm34 | 1.172 | 1.249 | 1.129 | 1.135 | 0.004 | 0.89  |
| 454| pm16-pm35 | 1.162 | 1.244 | 1.119 | 1.224 | 0.005 | 0.488 |
| 455| pm16-pm36 | 1.141 | 1.145 | 1.159 | 1.092 | -0.022| 0.241 |
| 456| pm16-pm37 | 1.169 | 1.16  | 1.138 | 1.055 | -0.024| 0.264 |
| 457| pm17-pm18 | 1.204 | 1.153 | 1.199 | 1.034 | -0.038| 0.253 |
| 458| pm17-pm19 | 1.139 | 1.231 | 1.244 | 1.115 | -0.032| 0.228 |
| 459| pm17-pm20 | 1.151 | 1.157 | 1.205 | 1.067 | -0.046| 0.197 |
| 460| pm17-pm21 | 1.584 | 1.351 | 2.236 | 1.265 | 0.004 | 0.96  |
| 461| pm17-pm22 | 1.177 | 1.188 | 1.187 | 1.008 | -0.025| 0.259 |
| 462| pm17-pm23 | 1.149 | 1.245 | 1.194 | 0.988 | -0.018| 0.309 |
| 463| pm17-pm24 | 1.152 | 1.177 | 1.188 | 1.004 | -0.051| 0.026 |
| 464| pm17-pm25 | 1.151 | 1.151 | 1.185 | 1.027 | -0.045| 0.158 |
| 465| pm17-pm26 | 1.129 | 1.184 | 1.179 | 1.035 | -0.041| 0.184 |
| 466| pm17-pm27 | 1.141 | 1.215 | 1.252 | 1.046 | -0.044| 0.174 |
| 467| pm17-pm28 | 1.181 | 1.181 | 1.174 | 1.055 | -0.042| 0.171 |
| 468| pm17-pm29 | 1.164 | 1.172 | 1.249 | 1.021 | -0.03  | 0.291 |
| 469| pm17-pm30 | 1.149 | 1.167 | 1.206 | 1.047 | -0.043| 0.17  |
|   | pm17-pm31 | 1.166 | 1.262 | 1.229 | 1.076 | -0.028 | 0.298 |
|---|-----------|--------|--------|--------|--------|--------|-------|
|   | pm17-pm32 | 1.124  | 1.157  | 1.198  | 1.131  | -0.043 | 0.164 |
|   | pm17-pm33 | 1.146  | 1.296  | 1.215  | 1.2     | -0.044 | 0.169 |
|   | pm17-pm34 | 1.145  | 1.206  | 1.142  | 1.091  | -0.039 | 0.252 |
|   | pm17-pm35 | 1.158  | 1.193  | 1.133  | 1.168  | -0.037 | 0.247 |
|   | pm17-pm36 | 1.131  | 1.174  | 1.217  | 1.022  | -0.038 | 0.228 |
|   | pm17-pm37 | 1.159  | 1.12   | 1.221  | 1.079  | -0.028 | 0.282 |
|   | pm18-pm19 | 1.004  | 1.012  | 1.016  | 1.06   | -0.024 | 0.297 |
|   | pm18-pm20 | 1.05   | 1.015  | 0.991  | 1.025  | -0.004 | 0.705 |
|   | pm18-pm21 | 1.534  | 1.128  | 1.808  | 1.251  | -0.008 | 0.473 |
|   | pm18-pm22 | 1.043  | 1.038  | 0.991  | 1.024  | 0.026  | 0.249 |
|   | pm18-pm23 | 1.014  | 1.07   | 0.978  | 1.043  | 0.032  | 0.296 |
|   | pm18-pm24 | 1.024  | 1.04   | 0.995  | 1.028  | 0.007  | 0.564 |
|   | pm18-pm25 | 1.039  | 1.007  | 1.006  | 1.02   | 0.012  | 0.315 |
|   | pm18-pm26 | 1.013  | 0.996  | 1.007  | 1.044  | 0.009  | 0.406 |
|   | pm18-pm27 | 1.024  | 1.082  | 1.001  | 1.009  | -0.011 | 0.381 |
|   | pm18-pm28 | 1.045  | 1.048  | 0.98   | 1.022  | 0.001  | 0.632 |
|   | pm18-pm29 | 1.052  | 1.036  | 0.993  | 1.022  | 0.012  | 0.342 |
|   | pm18-pm30 | 1.051  | 1.043  | 1.008  | 1.042  | 0.017  | 0.385 |
|   | pm18-pm31 | 1.029  | 1.119  | 1.031  | 1.044  | 0.012  | 0.333 |
|   | pm18-pm32 | 1.042  | 1.071  | 0.985  | 1.091  | 0.018  | 0.352 |
|   | pm18-pm33 | 1.036  | 1.137  | 0.992  | 1.192  | -0.002 | 0.709 |
|   | pm18-pm34 | 1.029  | 1.007  | 0.894  | 1.127  | -0.004 | 0.87 |
|   | pm18-pm35 | 1.066  | 1.056  | 0.939  | 1.166  | 0.023  | 0.208 |
|   | pm18-pm36 | 1.008  | 1.015  | 0.982  | 1.022  | 0     | 0.79 |
|   | pm18-pm37 | 1.033  | 1.007  | 0.992  | 1.024  | 0.008  | 0.42 |
|   | pm19-pm20 | 0.979  | 1.079  | 1.013  | 1.029  | -0.028 | 0.221 |
|   | pm19-pm21 | 1.544  | 1.143  | 1.9    | 1.237  | -0.012 | 0.389 |
|   | pm19-pm22 | 1.009  | 1.019  | 1.046  | 1.047  | 0.003  | 0.902 |
|   | pm19-pm23 | 1.001  | 1.052  | 0.997  | 1.05   | 0.001  | 0.937 |
|     | pm19-pm24 | 0.993 | 1.046 | 1.059 | 1.012 | -0.016 | 0.379 |
|---|----------|------|-------|-------|-------|--------|------|
| 501 | pm19-pm25 | 0.987 | 1.068 | 1.014 | 1.03  | -0.011 | 0.307 |
| 502 | pm19-pm26 | 0.986 | 1.083 | 1.016 | 1.047 | -0.003 | 0.947 |
| 503 | pm19-pm27 | 0.991 | 1.119 | 1.055 | 1.082 | -0.008 | 0.508 |
| 504 | pm19-pm28 | 1.019 | 1.079 | 1.047 | 1.092 | 0.007  | 0.549 |
| 505 | pm19-pm29 | 0.986 | 1.082 | 1.019 | 1.051 | -0.009 | 0.547 |
| 506 | pm19-pm30 | 0.989 | 1.045 | 1.001 | 1.07  | -0.022 | 0.246 |
| 507 | pm19-pm31 | 1.033 | 1.132 | 1.059 | 1.044 | -0.006 | 0.508 |
| 508 | pm19-pm32 | 1.003 | 1.044 | 1.041 | 1.116 | -0.007 | 0.538 |
| 509 | pm19-pm33 | 0.983 | 1.179 | 1.049 | 1.171 | -0.025 | 0.293 |
| 510 | pm19-pm34 | 0.992 | 1.051 | 0.935 | 1.09  | -0.031 | 0.286 |
| 511 | pm19-pm35 | 1.036 | 1.116 | 0.968 | 1.124 | -0.001 | 0.668 |
| 512 | pm19-pm36 | 1.013 | 1.023 | 1.022 | 1.062 | -0.006 | 0.482 |
| 513 | pm19-pm37 | 1.002 | 1.081 | 1.024 | 0.999 | -0.009 | 0.545 |
| 514 | pm20-pm21 | 1.564 | 1.154 | 1.846 | 1.199 | -0.004 | 0.731 |
| 515 | pm20-pm22 | 1.032 | 1.101 | 1.019 | 1.006 | 0.035  | 0.207 |
| 516 | pm20-pm23 | 1.029 | 1.09  | 0.988 | 1.035 | 0.035  | 0.276 |
| 517 | pm20-pm24 | 1.006 | 1.055 | 0.991 | 1.019 | -0.003 | 0.952 |
| 518 | pm20-pm25 | 1.01  | 1.051 | 0.995 | 1.016 | 0.006  | 0.503 |
| 519 | pm20-pm26 | 1.03  | 1.075 | 0.98  | 0.998 | 0.008  | 0.559 |
| 520 | pm20-pm27 | 1.021 | 1.042 | 1.037 | 1.019 | -0.017 | 0.39  |
| 521 | pm20-pm28 | 1.045 | 1.072 | 1.024 | 1.021 | 0.012  | 0.314 |
| 522 | pm20-pm29 | 0.978 | 1.015 | 0.975 | 1.016 | -0.024 | 0.222 |
| 523 | pm20-pm30 | 1.041 | 1.069 | 0.978 | 1.055 | 0.011  | 0.343 |
| 524 | pm20-pm31 | 1.016 | 1.126 | 1.028 | 1.039 | 0.002  | 0.614 |
| 525 | pm20-pm32 | 1.033 | 1.016 | 1.012 | 1.085 | 0.001  | 0.795 |
| 526 | pm20-pm33 | 1.046 | 1.102 | 1.025 | 1.15  | -0.017 | 0.37  |
| 527 | pm20-pm34 | 1.004 | 1.072 | 0.934 | 1.084 | -0.001 | 0.68  |
| 528 | pm20-pm35 | 1.019 | 1.048 | 0.944 | 1.117 | -0.008 | 0.488 |
| 529 | pm20-pm36 | 1.027 | 0.986 | 0.978 | 1.025 | -0.009 | 0.531 |
| 530  | pm20-pm37  | 1.023   | 1.044   | 0.996   | 1.021   | 0.009   | 0.581   |
|------|------------|---------|---------|---------|---------|---------|---------|
| 531  | pm21-pm22  | 1.49    | 1.126   | 1.819   | 1.182   | -0.014  | 0.393   |
| 532  | pm21-pm23  | 1.568   | 1.148   | 1.849   | 1.183   | 0.022   | 0.251   |
| 533  | pm21-pm24  | 1.551   | 1.147   | 1.821   | 1.205   | -0.004  | 0.665   |
| 534  | pm21-pm25  | 1.559   | 1.088   | 1.819   | 1.122   | -0.007  | 0.511   |
| 535  | pm21-pm26  | 1.506   | 1.125   | 1.825   | 1.22    | -0.008  | 0.436   |
| 536  | pm21-pm27  | 1.525   | 1.199   | 1.835   | 1.23    | -0.013  | 0.331   |
| 537  | pm21-pm28  | 1.549   | 1.141   | 1.837   | 1.234   | -0.003  | 0.841   |
| 538  | pm21-pm29  | 1.557   | 1.094   | 1.802   | 1.184   | -0.025  | 0.295   |
| 539  | pm21-pm30  | 1.514   | 1.092   | 1.834   | 1.187   | -0.032  | 0.269   |
| 540  | pm21-pm31  | 1.532   | 1.164   | 1.817   | 1.23    | -0.029  | 0.242   |
| 541  | pm21-pm32  | 1.501   | 1.146   | 1.783   | 1.249   | -0.03   | 0.226   |
| 542  | pm21-pm33  | 1.542   | 1.201   | 1.907   | 1.369   | -0.007  | 0.599   |
| 543  | pm21-pm34  | 1.566   | 1.154   | 1.765   | 1.238   | -0.008  | 0.572   |
| 544  | pm21-pm35  | 1.524   | 1.185   | 1.779   | 1.363   | 0.009   | 0.578   |
| 545  | pm21-pm36  | 1.505   | 1.123   | 1.832   | 1.195   | -0.014  | 0.347   |
| 546  | pm21-pm37  | 1.497   | 1.139   | 1.851   | 1.2     | -0.005  | 0.835   |
| 547  | pm22-pm23  | 0.971   | 1.05    | 0.999   | 1.004   | 0.032   | 0.284   |
| 548  | pm22-pm24  | 0.991   | 1.073   | 0.993   | 0.971   | 0.013   | 0.394   |
| 549  | pm22-pm25  | 0.987   | 1.036   | 1.017   | 1.006   | 0.025   | 0.291   |
| 550  | pm22-pm26  | 1.003   | 1.018   | 0.975   | 0.992   | 0.011   | 0.367   |
| 551  | pm22-pm27  | 1.027   | 1.082   | 1.02    | 1.031   | 0.02    | 0.344   |
| 552  | pm22-pm28  | 0.996   | 1.056   | 1.032   | 1.006   | 0.02    | 0.244   |
| 553  | pm22-pm29  | 0.989   | 1.1     | 1.002   | 0.999   | 0.028   | 0.247   |
| 554  | pm22-pm30  | 0.996   | 1.105   | 0.99    | 0.976   | 0.018   | 0.327   |
| 555  | pm22-pm31  | 1.035   | 1.104   | 1.025   | 0.983   | 0.012   | 0.363   |
| 556  | pm22-pm32  | 0.994   | 1.072   | 0.984   | 1.056   | 0.018   | 0.36    |
| 557  | pm22-pm33  | 1.014   | 1.154   | 0.985   | 1.161   | 0.008   | 0.415   |
| 558  | pm22-pm34  | 0.975   | 1.051   | 0.925   | 1.054   | 0.003   | 0.993   |
| 559  | pm22-pm35  | 0.989   | 1.081   | 0.947   | 1.114   | 0.02    | 0.399   |
| Row | Column       | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 |
|-----|--------------|--------|--------|--------|--------|--------|--------|
| 560 | pm22-pm36    | 1.002  | 1.005  | 0.989  | 0.972  | 0.005  | 0.51   |
| 561 | pm22-pm37    | 0.98   | 1.05   | 0.976  | 1.019  | 0.021  | 0.218  |
| 562 | pm23-pm24    | 1.025  | 1.027  | 0.991  | 1.009  | 0.022  | 0.227  |
| 563 | pm23-pm25    | 1.001  | 1.049  | 0.99   | 1.013  | 0.031  | 0.249  |
| 564 | pm23-pm26    | 1.003  | 1.05   | 1.005  | 0.993  | 0.03   | 0.235  |
| 565 | pm23-pm27    | 1.016  | 1.163  | 1.036  | 0.974  | 0.031  | 0.25   |
| 566 | pm23-pm28    | 1.022  | 1.087  | 1.003  | 1.017  | 0.033  | 0.225  |
| 567 | pm23-pm29    | 1.003  | 1.039  | 1.004  | 0.987  | 0.018  | 0.332  |
| 568 | pm23-pm30    | 1.002  | 1.052  | 0.957  | 1.011  | 0.01   | 0.32   |
| 569 | pm23-pm31    | 1.033  | 1.166  | 1.023  | 1.014  | 0.039  | 0.267  |
| 570 | pm23-pm32    | 1.002  | 1.074  | 0.973  | 1.07   | 0.024  | 0.254  |
| 571 | pm23-pm33    | 1.002  | 1.161  | 0.98   | 1.138  | 0.003  | 0.812  |
| 572 | pm23-pm34    | 0.95   | 1.096  | 0.959  | 1.038  | 0.016  | 0.326  |
| 573 | pm23-pm35    | 1.034  | 1.074  | 0.9    | 1.094  | 0.016  | 0.354  |
| 574 | pm23-pm36    | 0.993  | 1.077  | 0.986  | 0.999  | 0.03   | 0.297  |
| 575 | pm23-pm37    | 0.998  | 1.049  | 1.024  | 0.997  | 0.035  | 0.294  |
| 576 | pm24-pm25    | 1.002  | 1.064  | 1.012  | 0.99   | 0.015  | 0.39   |
| 577 | pm24-pm26    | 1.01   | 1.043  | 1.016  | 1.005  | 0.016  | 0.305  |
| 578 | pm24-pm27    | 0.976  | 1.115  | 1.053  | 0.994  | -0.002 | 0.713  |
| 579 | pm24-pm28    | 1.006  | 1.025  | 0.993  | 1.033  | -0.004 | 0.948  |
| 580 | pm24-pm29    | 0.981  | 1.083  | 1.005  | 0.983  | 0.003  | 0.98   |
| 581 | pm24-pm30    | 1.024  | 1.04   | 1.014  | 1.002  | 0.005  | 0.588  |
| 582 | pm24-pm31    | 1.019  | 1.149  | 1.019  | 1.025  | 0.013  | 0.348  |
| 583 | pm24-pm32    | 0.999  | 1.086  | 1.002  | 1.093  | 0.02   | 0.399  |
| 584 | pm24-pm33    | 1.014  | 1.148  | 1.003  | 1.146  | -0.009 | 0.52   |
| 585 | pm24-pm34    | 0.992  | 1.06   | 0.906  | 1.091  | -0.002 | 0.676  |
| 586 | pm24-pm35    | 1.022  | 1.105  | 0.909  | 1.096  | 0.004  | 0.624  |
| 587 | pm24-pm36    | 0.993  | 1.021  | 0.991  | 1.002  | -0.001 | 0.732  |
| 588 | pm24-pm37    | 0.999  | 1.015  | 0.976  | 1.008  | -0.002 | 0.939  |
| 589 | pm25-pm26    | 0.993  | 1.001  | 1.02   | 1.007  | 0.011  | 0.317  |
|   | pm25-pm27  | 0.997 | 1.037 | 1.018 | 0.986 | -0.019 | 0.36 |
|---|------------|-------|-------|-------|-------|--------|------|
| 591| pm25-pm28  | 1.016 | 1.042 | 1.007 | 1.027 | 0.013  | 0.399 |
| 592| pm25-pm29  | 1.009 | 1.048 | 0.996 | 0.991 | 0.009  | 0.488 |
| 593| pm25-pm30  | 1.039 | 1.064 | 0.998 | 1.005 | 0.02   | 0.214 |
| 594| pm25-pm31  | 1.04  | 1.11  | 1.003 | 1.015 | 0.01   | 0.519 |
| 595| pm25-pm32  | 0.997 | 1.04  | 0.99  | 1.082 | 0.01   | 0.379 |
| 596| pm25-pm33  | 0.997 | 1.126 | 1.007 | 1.119 | -0.017 | 0.356 |
| 597| pm25-pm34  | 0.992 | 1.034 | 0.921 | 1.054 | -0.006 | 0.457 |
| 598| pm25-pm35  | 1.032 | 1.097 | 0.936 | 1.151 | 0.033  | 0.278 |
| 599| pm25-pm36  | 1.005 | 1.023 | 0.991 | 0.987 | 0.006  | 0.469 |
| 600| pm25-pm37  | 1.018 | 0.982 | 0.998 | 0.988 | 0.002  | 0.663 |
| 601| pm26-pm27  | 0.998 | 1.031 | 1.04  | 0.99  | -0.013 | 0.387 |
| 602| pm26-pm28  | 0.996 | 0.965 | 1.01  | 1.04  | -0.008 | 0.401 |
| 603| pm26-pm29  | 0.991 | 1.075 | 1.015 | 1.008 | 0.02   | 0.304 |
| 604| pm26-pm30  | 1.039 | 0.999 | 1.004 | 1.021 | 0.009  | 0.418 |
| 605| pm26-pm31  | 1.046 | 1.099 | 1.031 | 0.994 | 0.01   | 0.467 |
| 606| pm26-pm32  | 1.006 | 1.005 | 0.982 | 1.09  | 0.003  | 0.761 |
| 607| pm26-pm33  | 1.048 | 1.125 | 0.988 | 1.148 | -0.002 | 0.774 |
| 608| pm26-pm34  | 1.01  | 1.036 | 0.922 | 1.065 | 0.002  | 0.774 |
| 609| pm26-pm35  | 1.013 | 1.005 | 0.929 | 1.124 | -0.004 | 0.761 |
| 610| pm26-pm36  | 0.978 | 1.006 | 0.988 | 1.008 | 0     | 0.882 |
| 611| pm26-pm37  | 1    | 1.001 | 1.015 | 0.991 | 0.008  | 0.495 |
| 612| pm27-pm28  | 1.03  | 1.081 | 1.034 | 0.996 | -0.01  | 0.55  |
| 613| pm27-pm29  | 0.99 | 1.111 | 1.008 | 1.031 | -0.001 | 0.628 |
| 614| pm27-pm30  | 1.003 | 1.061 | 1.013 | 1.017 | -0.017 | 0.313 |
| 615| pm27-pm31  | 1.056 | 1.166 | 1.084 | 1.03  | 0.018  | 0.389 |
| 616| pm27-pm32  | 1.01  | 1.118 | 1.015 | 1.096 | 0.009  | 0.497 |
| 617| pm27-pm33  | 1.023 | 1.162 | 1.043 | 1.185 | -0.01  | 0.48  |
| 618| pm27-pm34  | 1.006 | 1.102 | 0.974 | 1.068 | -0.003 | 0.902 |
| 619| pm27-pm35  | 1.031 | 1.094 | 0.989 | 1.108 | 0     | 0.616 |
|   | pm27-pm36 |   | pm27-pm37 |   | pm28-pm29 |   | pm28-pm30 |   | pm28-pm31 |   | pm28-pm32 |   | pm28-pm33 |   | pm28-pm34 |   | pm28-pm35 |   | pm28-pm36 |   | pm28-pm37 |   | pm29-pm30 |   | pm29-pm31 |   | pm29-pm32 |   | pm29-pm33 |   | pm29-pm34 |   | pm29-pm35 |   | pm29-pm36 |   | pm29-pm37 |   | pm29-pm38 |   | pm30-pm31 |   | pm30-pm32 |   | pm30-pm33 |   | pm30-pm34 |   | pm30-pm35 |   | pm30-pm36 |   | pm30-pm37 |   | pm31-pm32 |   | pm31-pm33 |   | pm31-pm34 |   | pm31-pm35 |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 620 | 0.993 | 1.034 | 1.046 | 1.012 | -0.008 | 0.575 | 0.99 | 1.047 | 1.039 | 1.017 | -0.005 | 0.652 | 1.025 | 1.034 | 1.005 | 1.05 | 0.01 | 0.568 | 1.019 | 1.057 | 0.997 | 1.062 | 0.011 | 0.397 | 1.054 | 1.112 | 1.028 | 1.031 | 0.007 | 0.513 | 1.004 | 1.061 | 0.989 | 1.109 | 0.008 | 0.498 | 1.02 | 1.174 | 0.96 | 1.178 | -0.013 | 0.395 | 1.023 | 1.072 | 0.959 | 1.138 | 0.01 | 0.358 | 1.022 | 1.044 | 0.997 | 1.016 | 0.008 | 0.482 | 1.025 | 1.025 | 0.99 | 1.036 | 0.009 | 0.597 | 1.006 | 1.033 | 0.99 | 1.027 | -0.001 | 0.899 | 1.034 | 1.153 | 1.041 | 1.026 | 0.023 | 0.234 | 1.012 | 1.02 | 0.985 | 1.066 | -0.004 | 0.773 | 1.012 | 1.154 | 1.014 | 1.188 | 0.005 | 0.899 | 0.971 | 1.103 | 0.907 | 1.073 | -0.001 | 0.843 | 1.028 | 1.057 | 0.922 | 1.144 | 0.008 | 0.505 | 1.01 | 1.028 | 1.011 | 0.984 | 0.005 | 0.444 | 1.005 | 1.053 | 0.989 | 0.988 | 0.007 | 0.507 | 1.068 | 1.107 | 1.037 | 1.005 | 0.01 | 0.433 | 1.03 | 1.068 | 0.986 | 1.077 | 0.011 | 0.335 | 1.063 | 1.134 | 1.009 | 1.167 | 0.002 | 0.82 | 0.977 | 1.021 | 0.91 | 1.078 | -0.022 | 0.289 | 1.041 | 1.045 | 0.947 | 1.181 | 0.02 | 0.325 | 1.039 | 1.033 | 1.027 | 0.993 | 0.015 | 0.385 | 1.006 | 1.004 | 1.02 | 1.031 | 0.009 | 0.426 | 1.013 | 1.175 | 0.999 | 1.079 | 0.012 | 0.374 | 1.041 | 1.189 | 1.03 | 1.158 | -0.013 | 0.388 | 1.032 | 1.162 | 0.979 | 1.078 | 0.018 | 0.358 | 1.039 | 1.167 | 0.956 | 1.166 | 0.023 | 0.207 | 301
3c) Result of two-distribution perturbation analysis for hypertrophy when each response function was separately applied (100 million parameter sets)

| No. | Pair of perturbed parameter distributions | Lin   | Hill  | Sat   | Acc   | Synergistic effect | p-value |
|-----|------------------------------------------|-------|-------|-------|-------|-------------------|---------|
| 1   | pm1-pm2                                  | 1.01  | 1.01  | 1.003 | 0.981 | -0.012            | 0.334   |
| 2   | pm1-pm3                                  | 1.036 | 1.044 | 0.984 | 1.019 | -0.004            | 0.895   |
| 3   | pm1-pm4                                  | 0.997 | 1.082 | 1.006 | 1.01  | -0.01             | 0.342   |
| 4   | pm1-pm5                                  | 1.009 | 1.025 | 1.028 | 0.985 | -0.004            | 0.883   |
| 5   | pm1-pm6                                  | 1.001 | 1.001 | 0.998 | 1.009 | -0.008            | 0.484   |
| 6 | pm1-pm7 | 2.814 | 2.048 | 2.691 | 2.244 | -0.111 | 0.006 |
|---|---------|-------|-------|-------|-------|--------|------|
| 7 | pm1-pm8 | 1.053 | 1.024 | 1.025 | 1.073 | 0.012  | 0.328 |
| 8 | pm1-pm9 | 1.071 | 1.068 | 1.013 | 1.054 | -0.001 | 0.963 |
| 9 | pm1-pm10| 1.456 | 1.542 | 1.267 | 1.452 | -0.042 | 0.186 |
| 10| pm1-pm11| 1.014 | 0.98  | 0.99  | 0.997 | -0.015 | 0.389 |
| 11| pm1-pm12| 1.005 | 1.061 | 0.985 | 1.016 | -0.008 | 0.405 |
| 12| pm1-pm13| 0.924 | 0.906 | 0.893 | 0.836 | 0.018  | 0.343 |
| 13| pm1-pm14| 0.942 | 0.908 | 0.966 | 0.883 | 0.012  | 0.35  |
| 14| pm1-pm15| 1.083 | 1.225 | 1.121 | 0.987 | -0.073 | 0.012 |
| 15| pm1-pm16| 1.202 | 1.205 | 1.187 | 1.039 | -0.013 | 0.336 |
| 16| pm1-pm17| 1.189 | 1.214 | 1.183 | 1.063 | -0.027 | 0.245 |
| 17| pm1-pm18| 1.044 | 1.003 | 1.002 | 1.002 | -0.01  | 0.306 |
| 18| pm1-pm19| 0.989 | 1.077 | 1.048 | 1.022 | -0.018 | 0.341 |
| 19| pm1-pm20| 1.015 | 1.074 | 1.011 | 1.024 | 0.002  | 0.701 |
| 20| pm1-pm21| 1.532 | 1.1   | 1.834 | 1.229 | -0.019 | 0.388 |
| 21| pm1-pm22| 1.016 | 1.041 | 1.031 | 0.955 | 0.008  | 0.522 |
| 22| pm1-pm23| 1.012 | 1.047 | 1.038 | 0.978 | 0.019  | 0.306 |
| 23| pm1-pm24| 1.021 | 1.068 | 0.995 | 0.99  | 0      | 0.644 |
| 24| pm1-pm25| 1.008 | 1.022 | 1.003 | 1.012 | 0      | 0.782 |
| 25| pm1-pm26| 0.988 | 1.028 | 0.987 | 1.01  | -0.007 | 0.592 |
| 26| pm1-pm27| 1.008 | 1.056 | 1.038 | 0.997 | -0.02  | 0.229 |
| 27| pm1-pm28| 1.028 | 1.042 | 1.035 | 1.02  | 0.004  | 0.824 |
| 28| pm1-pm29| 1.035 | 1.059 | 1.003 | 1.007 | 0.007  | 0.525 |
| 29| pm1-pm30| 1.062 | 1.01  | 1.017 | 0.994 | -0.002 | 0.934 |
| 30| pm1-pm31| 1.02 | 1.103 | 1.062 | 0.995 | -0.004 | 0.634 |
| 31| pm1-pm32| 1.027 | 1.04  | 1.029 | 1.055 | 0.004  | 0.975 |
| 32| pm1-pm33| 1.02 | 1.144 | 1.152 | 1.152 | -0.016 | 0.394 |
| 33| pm1-pm34| 0.977 | 1.058 | 0.961 | 1.097 | 0      | 0.87  |
| 34| pm1-pm35| 1.014 | 1.072 | 0.972 | 1.083 | -0.003 | 0.603 |
| 35| pm1-pm36| 1.014 | 1.022 | 0.979 | -0.003 | 0.868 |
|    | pm1-pm37 | pm2-pm3  | pm2-pm4  | pm2-pm5  | pm2-pm6  | pm2-pm7  | pm2-pm8  | pm2-pm9  | pm2-pm10 | pm2-pm11 | pm2-pm12 | pm2-pm13 | pm2-pm14 | pm2-pm15 | pm2-pm16 | pm2-pm17 | pm2-pm18 | pm2-pm19 | pm2-pm20 | pm2-pm21 | pm2-pm22 | pm2-pm23 | pm2-pm24 | pm2-pm25 | pm2-pm26 | pm2-pm27 | pm2-pm28 | pm2-pm29 | pm2-pm30 | pm2-pm31 |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 36 | 1.014    | 1.025    | 1.021    | 0.989    | 0.002    | 0.845    |
| 37 | 0.983    | 0.972    | 0.997    | 1.036    | -0.014   | 0.304    |
| 38 | 0.963    | 1.077    | 1.01     | 1.023    | -0.002   | 0.61     |
| 39 | 1.018    | 0.978    | 1.024    | 1.019    | 0.008    | 0.545    |
| 40 | 1.025    | 1.004    | 0.987    | 0.995    | 0.006    | 0.566    |
| 41 | 2.865    | 1.992    | 2.614    | 2.238    | -0.119   | 0.008    |
| 42 | 0.997    | 0.991    | 0.998    | 1.031    | -0.014   | 0.336    |
| 43 | 1.035    | 1.082    | 1.02     | 1.047    | 0.008    | 0.504    |
| 44 | 1.432    | 1.495    | 1.296    | 1.495    | -0.028   | 0.294    |
| 45 | 0.982    | 0.994    | 0.976    | 1.007    | -0.006   | 0.552    |
| 46 | 0.986    | 1.011    | 0.982    | 0.972    | -0.024   | 0.293    |
| 47 | 0.881    | 0.834    | 0.905    | 0.871    | 0.015    | 0.396    |
| 48 | 0.879    | 0.86     | 0.933    | 0.862    | -0.015   | 0.315    |
| 49 | 1.07     | 1.193    | 1.114    | 1.032    | -0.061   | 0.026    |
| 50 | 1.14     | 1.151    | 1.174    | 1.053    | -0.028   | 0.203    |
| 51 | 1.148    | 1.171    | 1.19     | 1.032    | -0.04    | 0.158    |
| 52 | 1.025    | 1.015    | 1.015    | 1.008    | 0.007    | 0.496    |
| 53 | 0.981    | 1.053    | 1.01     | 1.026    | -0.021   | 0.219    |
| 54 | 1.023    | 1.027    | 1.006    | 1.027    | 0.006    | 0.536    |
| 55 | 1.548    | 1.106    | 1.862    | 1.235    | 0.009    | 0.51     |
| 56 | 1.016    | 1.048    | 1.017    | 0.977    | 0.026    | 0.29     |
| 57 | 0.995    | 1.071    | 1.004    | 0.999    | 0.032    | 0.291    |
| 58 | 1.003    | 1.016    | 1.015    | 0.995    | 0.002    | 0.897    |
| 59 | 1.02     | 1.022    | 0.991    | 0.998    | 0.011    | 0.385    |
| 60 | 1.02     | 0.975    | 1.018    | 1.011    | 0.009    | 0.437    |
| 61 | 1.004    | 1.069    | 1.034    | 0.989    | -0.007   | 0.441    |
| 62 | 1.019    | 1.036    | 0.998    | 1.017    | 0.004    | 0.668    |
| 63 | 1.014    | 1.013    | 0.997    | 1.008    | 0.003    | 0.793    |
| 64 | 1.039    | 1.032    | 1.022    | 1.024    | 0.02     | 0.234    |
| 65 | 1.052    | 1.088    | 1.044    | 1.02     | 0.016    | 0.352    |
|    | pm2-pm32 | pm2-pm33 | pm2-pm34 | pm2-pm35 | pm2-pm36 | pm2-pm37 | pm2-pm38 |
|----|----------|----------|----------|----------|----------|----------|----------|
| 66 | 1.014    | 1.032    | 1.002    | 1.09     | 0.015    | 0.399    |          |
| 67 | 1.01     | 1.156    | 1        | 1.147    | -0.004   | 0.814    |          |
| 68 | 1        | 1.026    | 0.97     | 1.089    | 0.012    | 0.37     |          |
| 69 | 1.025    | 1.015    | 0.937    | 1.143    | 0.006    | 0.495    |          |
| 70 | 0.988    | 1.035    | 1.007    | 0.991    | 0.008    | 0.407    |          |
| 71 | 1.013    | 1.001    | 0.982    | 0.999    | 0.002    | 0.715    |          |
| 72 | 1.029    | 1.098    | 1.017    | 1.014    | 0.008    | 0.415    |          |
| 73 | 0.998    | 0.997    | 0.997    | 1.045    | -0.004   | 0.748    |          |
| 74 | 1.013    | 0.976    | 1.009    | 1.029    | -0.001   | 0.988    |          |
| 75 | 2.876    | 1.964    | 2.669    | 2.258    | -0.115   | 0.008    |          |
| 76 | 1.002    | 1.042    | 0.983    | 1.068    | -0.005   | 0.43     |          |
| 77 | 1.043    | 1.055    | 1.035    | 1.048    | -0.004   | 0.981    |          |
| 78 | 1.471    | 1.517    | 1.252    | 1.565    | -0.018   | 0.335    |          |
| 79 | 1.017    | 1.103    | 1.007    | 1.02     | 0.011    | 0.388    |          |
| 80 | 1.028    | 1.03     | 1.018    | 1.011    | -0.001   | 0.788    |          |
| 81 | 0.932    | 0.899    | 0.894    | 0.851    | 0.024    | 0.212    |          |
| 82 | 0.915    | 0.961    | 0.912    | 0.889    | 0.01     | 0.523    |          |
| 83 | 1.108    | 1.217    | 1.096    | 1.071    | -0.052   | 0.039    |          |
| 84 | 1.164    | 1.156    | 1.149    | 1.111    | -0.024   | 0.26     |          |
| 85 | 1.175    | 1.199    | 1.14     | 1.067    | -0.042   | 0.165    |          |
| 86 | 1.022    | 1.025    | 0.973    | 1.022    | -0.009   | 0.534    |          |
| 87 | 0.98     | 1.048    | 1.041    | 1.049    | -0.02    | 0.333    |          |
| 88 | 1.022    | 0.988    | 1.009    | 1.03     | -0.014   | 0.305    |          |
| 89 | 1.53     | 1.16     | 1.827    | 1.194    | -0.013   | 0.37     |          |
| 90 | 0.998    | 1.059    | 0.978    | 0.992    | 0.007    | 0.555    |          |
| 91 | 1.022    | 1.089    | 1.004    | 1.029    | 0.04     | 0.241    |          |
| 92 | 0.998    | 1.049    | 1.009    | 1.033    | 0.006    | 0.513    |          |
| 93 | 1.013    | 0.972    | 1.001    | 1.023    | -0.006   | 0.584    |          |
| 94 | 1.025    | 1.01     | 1.009    | 1.039    | 0.013    | 0.381    |          |
| 95 | 1.023    | 1.075    | 1.032    | 1.03     | -0.002   | 0.782    |          |
|    | pm3-pm28  | pm3-pm29  | pm3-pm30  | pm3-pm31  | pm3-pm32  | pm3-pm33  |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 96| 1.024     | 1.03      | 0.97      | 1.047     | -0.007    | 0.54      |
| 97| 1.003     | 1.065     | 1.013     | 1.048     | 0.016     | 0.307     |
| 98| 1.016     | 1.055     | 0.992     | 1.022     | 0.001     | 0.92      |
| 99| 1.057     | 1.06      | 1.035     | 1.033     | 0         | 0.94      |
|100| 0.987     | 1.03      | 0.987     | 1.118     | 0         | 0.982     |
|101| 1.015     | 1.086     | 1.021     | 1.197     | -0.013    | 0.335     |
|102| 1.029     | 1.025     | 0.941     | 1.087     | 0.001     | 0.88      |
|103| 1.043     | 1.022     | 0.934     | 1.118     | -0.006    | 0.599     |
|104| 0.986     | 1.018     | 0.99      | 1.017     | -0.006    | 0.541     |
|105| 1.002     | 1.031     | 0.98      | 1.013     | -0.001    | 0.981     |
|106| 1.044     | 1.119     | 0.983     | 1.036     | 0.023     | 0.27      |
|107| 1.013     | 1.082     | 0.994     | 1.009     | 0.007     | 0.45      |
|108| 2.82      | 2.111     | 2.629     | 2.299     | -0.102    | 0.006     |
|109| 1.016     | 1.095     | 1.006     | 1.056     | 0.004     | 0.621     |
|110| 1.05      | 1.152     | 1.029     | 1.051     | 0.011     | 0.355     |
|111| 1.474     | 1.551     | 1.267     | 1.522     | -0.025    | 0.272     |
|112| 1.027     | 1.049     | 1.014     | 1.023     | 0.011     | 0.314     |
|113| 1.012     | 1.101     | 0.997     | 1.028     | 0.002     | 0.958     |
|114| 0.87      | 0.953     | 0.922     | 0.891     | 0.03      | 0.282     |
|115| 0.938     | 0.903     | 0.95      | 0.875     | -0.003    | 0.917     |
|116| 1.1       | 1.298     | 1.116     | 1.024     | -0.05     | 0.15      |
|117| 1.147     | 1.264     | 1.158     | 1.099     | -0.011    | 0.329     |
|118| 1.163     | 1.238     | 1.221     | 1.058     | -0.026    | 0.248     |
|119| 1.015     | 1.108     | 1.028     | 1.025     | 0.014     | 0.357     |
|120| 0.973     | 1.122     | 1.011     | 1.053     | -0.019    | 0.312     |
|121| 1.025     | 1.094     | 0.991     | 1.04      | 0.002     | 0.892     |
|122| 1.503     | 1.19      | 1.805     | 1.205     | -0.024    | 0.281     |
|123| 1.035     | 1.143     | 0.997     | 1.017     | 0.038     | 0.231     |
|124| 1.009     | 1.158     | 1.001     | 1.012     | 0.039     | 0.252     |
|125| 0.995     | 1.121     | 1.015     | 1.017     | 0.011     | 0.31      |
|    | pm4-pm25 | 1.012 | 1.089 | 1.007 | 1.003 | 0.01  | 0.515 |
|----|----------|-------|-------|-------|-------|-------|-------|
| 126| pm4-pm26 | 0.984 | 1.107 | 0.996 | 1.004 | 0.005 | 0.776 |
| 127| pm4-pm27 | 1.01 | 1.147 | 1.038 | 1.025 | 0.003 | 0.798 |
| 128| pm4-pm28 | 1.033 | 1.111 | 0.996 | 1.047 | 0.013 | 0.377 |
| 129| pm4-pm29 | 0.984 | 1.174 | 1.002 | 1.037 | 0.024 | 0.232 |
| 130| pm4-pm30 | 1.047 | 1.079 | 1.024 | 1.061 | 0.023 | 0.291 |
| 131| pm4-pm31 | 1.035 | 1.205 | 1.04  | 1.026 | 0.021 | 0.207 |
| 132| pm4-pm32 | 0.997 | 1.091 | 1.006 | 1.039 | -0.007| 0.492 |
| 133| pm4-pm33 | 1.03 | 1.161 | 0.972 | 1.179 | -0.017| 0.355 |
| 134| pm4-pm34 | 1.009 | 1.153 | 0.93  | 1.086 | 0.015 | 0.359 |
| 135| pm4-pm35 | 1.028 | 1.118 | 0.936 | 1.116 | 0.005 | 0.909 |
| 136| pm4-pm36 | 1.014 | 1.065 | 1.006 | 1.001 | 0.003 | 0.875 |
| 137| pm4-pm37 | 1.016 | 1.083 | 1.014 | 1.015 | 0.015 | 0.398 |
| 138| pm4-pm38 | 0.987 | 1.011 | 0.999 | 0.989 | -0.002| 0.68  |
| 139| pm4-pm39 | 1.027 | 0.993 | 1.007 | 1.079 | 0.006 | 0.598 |
| 140| pm4-pm40 | 1.069 | 1.077 | 1.012 | 1.017 | 0.003 | 0.787 |
| 141| pm4-pm41 | 1.424 | 1.475 | 1.238 | 1.496 | -0.052| 0.021 |
| 142| pm4-pm42 | 1.011 | 1.011 | 0.989 | 1.012 | 0.007 | 0.595 |
| 143| pm4-pm43 | 1.035 | 1.024 | 1.017 | 1.046 | 0.017 | 0.352 |
| 144| pm4-pm44 | 0.899 | 0.824 | 0.909 | 0.831 | 0.005 | 0.501 |
| 145| pm4-pm45 | 0.944 | 0.898 | 0.948 | 0.915 | 0.025 | 0.232 |
| 146| pm4-pm46 | 1.138 | 1.15  | 1.13  | 1.003 | -0.06 | 0.039 |
| 147| pm4-pm47 | 1.149 | 1.163 | 1.119 | 1.068 | -0.035| 0.203 |
| 148| pm4-pm48 | 1.187 | 1.169 | 1.235 | 1.032 | -0.022| 0.218 |
| 149| pm4-pm49 | 1.032 | 1.011 | 1.013 | 1.025 | 0.009 | 0.536 |
| 150| pm4-pm50 | 1.009 | 1.001 | 1.018 | 1.045 | -0.022| 0.298 |
| 151| pm4-pm51 | 1.034 | 1.013 | 1.019 | 1.029 | 0.007 | 0.465 |
| 152| pm4-pm52 | 1.547 | 1.13  | 1.84  | 1.232 | 0.006 | 0.532 |
| 153| pm4-pm53 | 1.009 | 1.004 | 0.999 | 1.003 | 0.013 | 0.381 |
| 154| pm5-pm6  | 0.987 | 1.011 | 0.999 | 0.989 | -0.002| 0.68  |
| 155| pm5-pm7  | 1.028 | 1.118 | 0.936 | 1.116 | 0.005 | 0.909 |
| 156| pm5-pm8  | 1.069 | 1.077 | 1.012 | 1.017 | 0.003 | 0.787 |
| 157| pm5-pm9  | 1.424 | 1.475 | 1.238 | 1.496 | -0.052| 0.021 |
| 158| pm5-pm10 | 1.011 | 1.011 | 0.989 | 1.012 | 0.007 | 0.595 |
| 159| pm5-pm11 | 1.035 | 1.024 | 1.017 | 1.046 | 0.017 | 0.352 |
| 160| pm5-pm12 | 0.899 | 0.824 | 0.909 | 0.831 | 0.005 | 0.501 |
| 161| pm5-pm13 | 0.944 | 0.898 | 0.948 | 0.915 | 0.025 | 0.232 |
| 162| pm5-pm14 | 1.138 | 1.15  | 1.13  | 1.003 | -0.06 | 0.039 |
| 163| pm5-pm15 | 1.149 | 1.163 | 1.119 | 1.068 | -0.035| 0.203 |
| 164| pm5-pm16 | 1.187 | 1.169 | 1.235 | 1.032 | -0.022| 0.218 |
| 165| pm5-pm17 | 1.032 | 1.011 | 1.013 | 1.025 | 0.009 | 0.536 |
| 166| pm5-pm18 | 1.009 | 1.001 | 1.018 | 1.045 | -0.022| 0.298 |
| 167| pm5-pm19 | 1.034 | 1.013 | 1.019 | 1.029 | 0.007 | 0.465 |
| 168| pm5-pm20 | 1.547 | 1.13  | 1.84  | 1.232 | 0.006 | 0.532 |
| 169| pm5-pm21 | 1.009 | 1.004 | 0.999 | 1.003 | 0.013 | 0.381 |
| pm5-pm23 | 1.005 | 1.062 | 1.012 | 1.028 | 0.039 | 0.208 |
|----------|-------|-------|-------|-------|-------|-------|
| pm5-pm24 | 0.994 | 1.046 | 0.993 | 1.009 | 0.004 | 0.97  |
| pm5-pm25 | 1.005 | 0.983 | 1     | 1.006 | -0.001| 0.978 |
| pm5-pm26 | 0.99   | 1.003 | 1.02   | 1.028 | 0.011 | 0.369 |
| pm5-pm27 | 0.996 | 1.074 | 1.043 | 1.015 | -0.001| 0.909 |
| pm5-pm28 | 1.022 | 1.013 | 1.003 | 1.037 | 0.003 | 0.831 |
| pm5-pm29 | 1.012 | 1.034 | 1.004 | 1.049 | 0.018 | 0.359 |
| pm5-pm30 | 1.053 | 1.024 | 1.009 | 1     | 0.01  | 0.374 |
| pm5-pm31 | 1.044 | 1.087 | 1.019 | 1.015 | 0.004 | 0.777 |
| pm5-pm32 | 0.999 | 1.01   | 0.999 | 1.1   | 0.005 | 0.507 |
| pm5-pm33 | 1.013 | 1.154 | 0.978 | 1.175 | -0.004| 0.701 |
| pm5-pm34 | 1     | 1.025 | 0.925 | 1.086 | -0.002| 0.685 |
| pm5-pm35 | 1.017 | 1.039 | 0.923 | 1.132 | 0.002 | 0.8   |
| pm5-pm36 | 1.014 | 1.005 | 1.02   | 0.995 | 0.008 | 0.44  |
| pm5-pm37 | 1.007 | 0.988 | 0.997 | 1.03  | 0.007 | 0.486 |
| pm6-pm7  | 2.809 | 2.011 | 2.659 | 2.239 | -0.114| 0.01  |
| pm6-pm8  | 1.033 | 1.012 | 0.992 | 1.038 | 0.004 | 0.91  |
| pm6-pm9  | 1.066 | 1.085 | 1.024 | 1.024 | 0.014 | 0.397 |
| pm6-pm10 | 1.43  | 1.45  | 1.255 | 1.527 | -0.039| 0.271 |
| pm6-pm11 | 1.008 | 0.993 | 1.004 | 1.017 | 0.012 | 0.327 |
| pm6-pm12 | 1.025 | 1.023 | 0.987 | 1.026 | 0.006 | 0.54  |
| pm6-pm13 | 0.875 | 0.841 | 0.913 | 0.84  | 0.012 | 0.389 |
| pm6-pm14 | 0.918 | 0.877 | 0.919 | 0.855 | -0.003| 0.72  |
| pm6-pm15 | 1.108 | 1.216 | 1.134 | 1.03  | -0.038| 0.235 |
| pm6-pm16 | 1.183 | 1.176 | 1.185 | 1.046 | -0.007| 0.58  |
| pm6-pm17 | 1.153 | 1.177 | 1.194 | 1.021 | -0.036| 0.271 |
| pm6-pm18 | 1.024 | 1.009 | 0.986 | 1.015 | 0.003 | 0.787 |
| pm6-pm19 | 1.004 | 1.102 | 1.027 | 1.021 | 0.003 | 0.965 |
| pm6-pm20 | 1.033 | 1.043 | 0.986 | 1.004 | 0.004 | 0.85  |
| pm6-pm21 | 1.526 | 1.176 | 1.884 | 1.239 | 0.03  | 0.238 |
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| pm7-pm22 | 2.752 | 2.065 | 2.663 | 2.289 | -0.093 | 0.011 |
|-------|-------|-------|-------|-------|--------|-------|
| pm7-pm23 | 2.826 | 2.102 | 2.643 | 2.255 | -0.076 | 0.016 |
| pm7-pm24 | 2.873 | 2.011 | 2.63 | 2.23 | -0.115 | 0.008 |
| pm7-pm25 | 2.796 | 2.057 | 2.626 | 2.237 | -0.115 | 0.005 |
| pm7-pm26 | 2.736 | 1.991 | 2.619 | 2.267 | -0.141 | 0.006 |
| pm7-pm27 | 2.829 | 2.072 | 2.689 | 2.234 | -0.122 | 0.01 |
| pm7-pm28 | 2.863 | 2.053 | 2.659 | 2.292 | -0.093 | 0.01 |
| pm7-pm29 | 2.875 | 1.982 | 2.639 | 2.274 | -0.109 | 0.005 |
| pm7-pm30 | 2.822 | 2.035 | 2.634 | 2.273 | -0.115 | 0.005 |
| pm7-pm31 | 2.87 | 2.16 | 2.704 | 2.302 | -0.072 | 0.017 |
| pm7-pm32 | 2.84 | 2.044 | 2.626 | 2.359 | -0.099 | 0.017 |
| pm7-pm33 | 2.785 | 2.239 | 2.734 | 2.489 | -0.067 | 0.042 |
| pm7-pm34 | 2.877 | 2.055 | 2.533 | 2.326 | -0.108 | 0.006 |
| pm7-pm35 | 2.912 | 2.104 | 2.53 | 2.483 | -0.063 | 0.043 |
| pm7-pm36 | 2.832 | 1.91 | 2.682 | 2.254 | -0.125 | 0.009 |
| pm7-pm37 | 2.808 | 1.98 | 2.683 | 2.203 | -0.125 | 0.005 |
| pm8-pm9 | 1.06 | 1.085 | 1.028 | 1.1 | 0.011 | 0.309 |
| pm8-pm10 | 1.461 | 1.482 | 1.264 | 1.543 | -0.039 | 0.212 |
| pm8-pm11 | 1.018 | 0.99 | 1.021 | 1.04 | 0.002 | 0.684 |
| pm8-pm12 | 1.025 | 1.037 | 0.987 | 1.015 | -0.014 | 0.302 |
| pm8-pm13 | 0.917 | 0.899 | 0.93 | 0.883 | 0.031 | 0.298 |
| pm8-pm14 | 0.916 | 0.853 | 0.942 | 0.923 | -0.009 | 0.43 |
| pm8-pm15 | 1.102 | 1.164 | 1.089 | 1.1 | -0.068 | 0.027 |
| pm8-pm16 | 1.167 | 1.16 | 1.16 | 1.129 | -0.022 | 0.3 |
| pm8-pm17 | 1.197 | 1.203 | 1.203 | 1.093 | -0.02 | 0.228 |
| pm8-pm18 | 1.026 | 1.033 | 1.01 | 1.054 | 0.003 | 0.956 |
| pm8-pm19 | 0.989 | 1.074 | 1.036 | 1.1 | -0.007 | 0.422 |
| pm8-pm20 | 1.05 | 1.042 | 1 | 1.039 | -0.001 | 0.966 |
| pm8-pm21 | 1.544 | 1.092 | 1.837 | 1.251 | -0.017 | 0.392 |
| pm8-pm22 | 1.049 | 1.073 | 1.004 | 1.036 | 0.033 | 0.273 |
| pm8-pm23 | 1.004 | 1.071 | 0.981 | 1.019 | 0.015 | 0.349 |
| pm8-pm24 | 1.004 | 1.028 | 0.993 | 1.03 | -0.01 | 0.532 |
| pm8-pm25 | 1.031 | 1.022 | 0.993 | 1.049 | 0.009 | 0.565 |
| pm8-pm26 | 1.005 | 1.005 | 1.01 | 1.054 | 0.003 | 0.972 |
| pm8-pm27 | 1.042 | 1.069 | 1 | 1.046 | -0.01 | 0.307 |
| pm8-pm28 | 1.007 | 1.031 | 0.994 | 1.082 | -0.003 | 0.745 |
| pm8-pm29 | 1.02 | 1.098 | 1.018 | 1.054 | 0.024 | 0.203 |
| pm8-pm30 | 1.057 | 1.007 | 1.015 | 1.043 | 0.003 | 0.851 |
| pm8-pm31 | 1.054 | 1.104 | 1.056 | 1.048 | 0.012 | 0.314 |
| pm8-pm32 | 1.008 | 1.06 | 1.005 | 1.136 | 0.014 | 0.397 |
| pm8-pm33 | 0.994 | 1.144 | 0.997 | 1.218 | -0.012 | 0.398 |
| pm8-pm34 | 1.002 | 1 | 0.919 | 1.113 | -0.019 | 0.355 |
| pm8-pm35 | 1.008 | 1.044 | 0.966 | 1.178 | 0.007 | 0.54 |
| pm8-pm36 | 1.011 | 1.014 | 1.007 | 1.047 | 0.003 | 0.84 |
| pm8-pm37 | 1.013 | 1.003 | 1.015 | 1.075 | 0.011 | 0.386 |
| pm9-pm10 | 1.459 | 1.552 | 1.289 | 1.528 | -0.04 | 0.234 |
| pm9-pm11 | 1.087 | 1.063 | 1.007 | 1.047 | 0.016 | 0.344 |
| pm9-pm12 | 1.059 | 1.118 | 1.05 | 1.032 | 0.014 | 0.35 |
| pm9-pm13 | 0.937 | 0.918 | 0.95 | 0.904 | 0.03 | 0.297 |
| pm9-pm14 | 0.975 | 0.921 | 0.918 | 0.922 | -0.004 | 0.653 |
| pm9-pm15 | 1.168 | 1.293 | 1.167 | 1.064 | -0.029 | 0.275 |
| pm9-pm16 | 1.224 | 1.248 | 1.193 | 1.08 | -0.01 | 0.325 |
| pm9-pm17 | 1.222 | 1.227 | 1.244 | 1.104 | -0.016 | 0.354 |
| pm9-pm18 | 1.058 | 1.111 | 1.014 | 1.044 | 0.009 | 0.53 |
| pm9-pm19 | 1.069 | 1.094 | 1.035 | 1.09 | -0.005 | 0.414 |
| pm9-pm20 | 1.067 | 1.079 | 1.015 | 1.038 | -0.004 | 0.77 |
| pm9-pm21 | 1.633 | 1.18 | 1.869 | 1.285 | 0.024 | 0.284 |
| pm9-pm22 | 1.06 | 1.138 | 1.04 | 1.027 | 0.039 | 0.224 |
| pm9-pm23 | 1.075 | 1.121 | 1.005 | 1.031 | 0.034 | 0.287 |
| pm9-pm24 | 1.074 | 1.139 | 1.03 | 1.036 | 0.026 | 0.215 |
|   | pm9-pm25 | pm9-pm26 | pm9-pm27 | pm9-pm28 | pm9-pm29 | pm9-pm30 |
|---|---------|---------|---------|---------|---------|---------|
| 276| 1.084   | 1.083   | 1.015   | 1.022   | 0.015   | 0.322   |
| 277| 1.059   | 1.063   | 1.023   | 1.058   | 0.015   | 0.331   |
| 278| 1.091   | 1.167   | 1.051   | 1.074   | 0.026   | 0.279   |
| 279| 1.067   | 1.119   | 1.03    | 1.035   | 0.01    | 0.353   |
| 280| 1.043   | 1.14    | 1.037   | 1.032   | 0.019   | 0.4     |
| 281| 1.099   | 1.097   | 1.037   | 1.048   | 0.022   | 0.249   |
| 282| 1.058   | 1.169   | 1.042   | 1.038   | 0.003   | 0.799   |
| 283| 1.036   | 1.12    | 1.005   | 1.102   | 0.007   | 0.554   |
| 284| 1.037   | 1.152   | 1.042   | 1.035   | 0.003   | 0.249   |
| 285| 1.028   | 1.11    | 0.997   | 1.109   | 0.009   | 0.576   |
| 286| 1.053   | 1.153   | 0.997   | 1.124   | 0.019   | 0.319   |
| 287| 1.077   | 1.076   | 1.031   | 1.015   | 0.013   | 0.346   |
| 288| 1.057   | 1.081   | 1.025   | 1.002   | 0.006   | 0.549   |
| 289| 1.445   | 1.546   | 1.255   | 1.472   | -0.025  | 0.226   |
| 290| 1.457   | 1.576   | 1.29    | 1.518   | -0.009  | 0.572   |
| 291| 1.283   | 1.298   | 1.199   | 1.25    | -0.059  | 0.023   |
| 292| 1.513   | 1.524   | 1.419   | 1.498   | 0.013   | 0.007   |
| 293| 1.587   | 1.833   | 1.382   | 1.556   | -0.032  | 0.211   |
| 294| 1.577   | 1.704   | 1.422   | 1.563   | -0.049  | 0.154   |
| 295| 1.656   | 1.718   | 1.48    | 1.518   | -0.041  | 0.188   |
| 296| 1.43    | 1.511   | 1.262   | 1.538   | -0.032  | 0.247   |
| 297| 1.427   | 1.609   | 1.325   | 1.546   | -0.02   | 0.347   |
| 298| 1.448   | 1.547   | 1.274   | 1.451   | -0.043  | 0.18    |
| 299| 2.018   | 1.598   | 2.144   | 1.705   | -0.021  | 0.243   |
| 300| 1.369   | 1.618   | 1.28    | 1.454   | -0.017  | 0.307   |
| 301| 1.406   | 1.509   | 1.256   | 1.463   | -0.035  | 0.278   |
| 302| 1.417   | 1.511   | 1.29    | 1.498   | -0.034  | 0.281   |
| 303| 1.431   | 1.502   | 1.255   | 1.487   | -0.037  | 0.294   |
| 304| 1.394   | 1.493   | 1.234   | 1.435   | -0.066  | 0.04    |
| 305| 1.429   | 1.585   | 1.303   | 1.522   | -0.029  | 0.209   |
| pm10-pm28 | pm10-pm29 | pm10-pm30 | pm10-pm31 | pm10-pm32 | pm10-pm33 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 1.453     | 1.423     | 1.399     | 1.462     | 1.414     | 1.459     |
| 1.56      | 1.55      | 1.547     | 1.637     | 1.562     | 1.614     |
| 1.288     | 1.287     | 1.233     | 1.294     | 1.233     | 1.251     |
| 1.549     | 1.444     | 1.528     | 1.515     | 1.613     | 1.705     |
| -0.009    | -0.037    | -0.041    | -0.016    | -0.022    | -0.033    |
| 0.446     | 0.236     | 0.173     | 0.376     | 0.206     | 0.284     |

| pm10-pm34 | pm10-pm35 | pm10-pm36 | pm10-pm37 | pm11-pm12 | pm11-pm13 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 1.424     | 1.433     | 1.385     | 1.42      | 0.999     | 0.899     |
| 1.544     | 1.533     | 1.462     | 1.462     | 1.024     | 0.864     |
| 1.201     | 1.186     | 1.259     | 1.287     | 1.019     | 0.897     |
| 1.579     | 1.595     | 1.5  | 1.491     | 1.01      | 0.829     |
| -0.03     | -0.045    | -0.055    | -0.04     | 0.005     | 0.017     |
| 0.229     | 0.194     | 0.04      | 0.246     | 0.699     | 0.314     |

| pm11-pm14 | pm11-pm15 | pm11-pm16 | pm11-pm17 | pm11-pm18 | pm11-pm19 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.912     | 1.094     | 1.187     | 1.162     | 1.028     | 1.028     |
| 0.848     | 1.203     | 1.142     | 1.183     | 0.991     | 1.023     |
| 0.909     | 1.113     | 1.153     | 1.221     | 0.979     | 1.023     |
| 0.895     | 1.027     | 1.071     | 1.031     | 1.022     | 1.011     |
| -0.005    | -0.051    | -0.016    | -0.023    | -0.001    | -0.006    |
| 0.851     | 0.025     | 0.318     | 0.291     | 0.883     | 0.599     |

| pm11-pm20 | pm11-pm21 | pm11-pm22 | pm11-pm23 | pm11-pm24 | pm11-pm25 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 1.023     | 1.529     | 1 | 0.994     | 0.981     | 1.001     |
| 1.031     | 1.104     | 1.031     | 1.076     | 1.026     | 0.983     |
| 0.987     | 1.811     | 1.001     | 1.009     | 1.006     | 1.015     |
| 1.005     | 1.199     | 0.999     | 1.009     | 0.987     | 1.01     |
| 0  | -0.015    | 0.022     | 0.04      | -0.002    | 0.009     |
| 0.314     | 0.28      | 0.192     | 0.854     | 0.484     | 0.361     |

| pm11-pm26 | pm11-pm27 | pm11-pm28 | pm11-pm29 | pm11-pm30 | pm11-pm31 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 1.017     | 1.002     | 0.995     | 0.973     | 1.013     | 1.026     |
| 1.012     | 1.036     | 1.057     | 1.041     | 1.028     | 1.062     |
| 1.015     | 1.005     | 1.005     | 1.012     | 1.007     | 1.04      |
| 0.998     | 1.02      | 1.003     | 0.972     | 1.011     | 0.995     |
| 0.017     | -0.012    | 0.005     | -0.002    | 0.009     | -0.001    |
| 0.361     | 0.393     | 0.699     | 0.666     | 0.526     | 0.931     |
|   | pm11-pm32 | pm11-pm33 | pm11-pm34 | pm11-pm35 | pm11-pm36 | pm11-pm37 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 336 | 0.986 | 1.05 | 0.977 | 1.067 | 0.003 | 0.732 |
| 337 | 1.031 | 1.117 | 0.994 | 1.206 | 0.008 | 0.486 |
| 338 | 0.957 | 1.038 | 0.92 | 1.042 | -0.016 | 0.311 |
| 339 | 1.007 | 1.056 | 0.941 | 1.123 | 0.011 | 0.338 |
| 340 | 0.984 | 1.015 | 0.98 | 0.99 | -0.002 | 0.701 |
| 341 | 1.017 | 0.993 | 0.99 | 1.016 | 0.011 | 0.35 |
| 342 | 0.879 | 0.899 | 0.917 | 0.803 | 0.004 | 0.638 |
| 343 | 0.949 | 0.91 | 0.934 | 0.865 | 0.004 | 0.676 |
| 344 | 1.106 | 1.211 | 1.115 | 1.052 | -0.054 | 0.028 |
| 345 | 1.167 | 1.217 | 1.147 | 1.081 | -0.016 | 0.373 |
| 346 | 1.164 | 1.12 | 1.186 | 1.056 | -0.056 | 0.043 |
| 347 | 1.056 | 1.025 | 0.989 | 1.013 | 0 | 0.978 |
| 348 | 1.006 | 1.056 | 1.001 | 1.034 | -0.026 | 0.218 |
| 349 | 1.046 | 1.017 | 1 | 0.989 | -0.014 | 0.342 |
| 350 | 1.529 | 1.142 | 1.815 | 1.236 | -0.011 | 0.314 |
| 351 | 1.006 | 1.052 | 1.012 | 0.992 | 0.015 | 0.368 |
| 352 | 1 | 1.077 | 1.022 | 1.004 | 0.029 | 0.292 |
| 353 | 0.999 | 1.034 | 1.02 | 1.013 | 0 | 0.996 |
| 354 | 1.005 | 1.013 | 0.989 | 1.014 | -0.004 | 0.741 |
| 355 | 1.003 | 1.022 | 1.014 | 1.012 | 0.004 | 0.75 |
| 356 | 1.046 | 1.109 | 1.062 | 1.028 | 0.018 | 0.356 |
| 357 | 1.019 | 1.03 | 0.993 | 1.027 | -0.008 | 0.453 |
| 358 | 0.994 | 1.032 | 1.013 | 1.023 | -0.002 | 0.988 |
| 359 | 1.076 | 1.025 | 1.021 | 1.043 | 0.02 | 0.368 |
| 360 | 1.023 | 1.112 | 1.03 | 0.992 | -0.007 | 0.505 |
| 361 | 1.033 | 1.037 | 0.978 | 1.1 | 0.005 | 0.439 |
| 362 | 1.012 | 1.181 | 1.026 | 1.177 | 0.005 | 0.561 |
| 363 | 0.989 | 1.031 | 0.921 | 1.025 | -0.029 | 0.257 |
| 364 | 1.037 | 1.052 | 0.95 | 1.118 | 0.003 | 0.83 |
| 365 | 0.997 | 1.042 | 0.983 | 1.002 | -0.004 | 0.992 |
|   | pm12-pm37 | 1.02 | 0.997 | 1.009 | 1.013 | 0.001 | 0.644 |
|---|-----------|------|-------|-------|-------|-------|-------|
| 366| pm13-pm14 | 0.858| 0.797 | 0.848 | 0.851 | 0.081 | 0.063 |
| 367| pm13-pm15 | 0.989| 1.034 | 0.987 | 0.872 | -0.052| 0.026 |
| 368| pm13-pm16 | 1.078| 0.972 | 1.055 | 0.894 | -0.016| 0.359 |
| 369| pm13-pm17 | 0.951| 0.994 | 1.09  | 0.876 | -0.057| 0.024 |
| 370| pm13-pm18 | 0.895| 0.929 | 0.899 | 0.867 | 0.03  | 0.247 |
| 371| pm13-pm19 | 0.924| 0.894 | 0.941 | 0.851 | 0.006 | 0.58  |
| 372| pm13-pm20 | 0.919| 0.913 | 0.897 | 0.835 | 0.017 | 0.393 |
| 373| pm13-pm21 | 1.411| 0.938 | 1.66  | 1.049 | -0.024| 0.278 |
| 374| pm13-pm22 | 0.911| 0.833 | 0.9   | 0.813 | 0.017 | 0.313 |
| 375| pm13-pm23 | 0.887| 0.835 | 0.898 | 0.844 | 0.022 | 0.203 |
| 376| pm13-pm24 | 0.872| 0.891 | 0.932 | 0.858 | 0.025 | 0.295 |
| 377| pm13-pm25 | 0.883| 0.83  | 0.924 | 0.862 | 0.019 | 0.367 |
| 378| pm13-pm26 | 0.911| 0.884 | 0.906 | 0.827 | 0.026 | 0.239 |
| 379| pm13-pm27 | 0.876| 0.919 | 0.932 | 0.855 | 0.006 | 0.5   |
| 380| pm13-pm28 | 0.937| 0.863 | 0.917 | 0.837 | 0.016 | 0.311 |
| 381| pm13-pm29 | 0.868| 0.888 | 0.919 | 0.863 | 0.021 | 0.234 |
| 382| pm13-pm30 | 0.896| 0.871 | 0.894 | 0.843 | 0.008 | 0.591 |
| 383| pm13-pm31 | 0.908| 0.956 | 0.956 | 0.869 | 0.028 | 0.217 |
| 384| pm13-pm32 | 0.936| 0.861 | 0.87  | 0.9   | 0.013 | 0.33  |
| 385| pm13-pm33 | 0.914| 0.923 | 0.882 | 0.931 | -0.028| 0.27  |
| 386| pm13-pm34 | 0.877| 0.897 | 0.826 | 0.872 | 0    | 0.881 |
| 387| pm13-pm35 | 0.899| 0.865 | 0.824 | 0.947 | 0.001 | 0.687 |
| 388| pm13-pm36 | 0.898| 0.833 | 0.882 | 0.818 | 0.001 | 0.997 |
| 389| pm13-pm37 | 0.917| 0.843 | 0.877 | 0.812 | 0.007 | 0.545 |
| 390| pm14-pm15 | 0.999| 1.096 | 1.054 | 0.904 | -0.049| 0.186 |
| 391| pm14-pm16 | 1.019| 1.029 | 1.057 | 0.927 | -0.049| 0.2   |
| 392| pm14-pm17 | 1.024| 0.984 | 1.111 | 0.923 | -0.064| 0.037 |
| 393| pm14-pm18 | 0.918| 0.931 | 0.902 | 0.874 | -0.002| 0.726 |
| 394| pm14-pm19 | 0.912| 0.947 | 0.927 | 0.891 | -0.018| 0.316 |
|    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|
| 396| pm14-pm20 | 0.914 | 0.908 | 0.93 | 0.911 | 0.001 | 0.925 |
| 397| pm14-pm21 | 1.428 | 0.955 | 1.749 | 1.093 | -0.022 | 0.24  |
| 398| pm14-pm22 | 0.923 | 0.927 | 0.953 | 0.868 | 0.03  | 0.25  |
| 399| pm14-pm23 | 0.908 | 0.943 | 0.902 | 0.872 | 0.022 | 0.207 |
| 400| pm14-pm24 | 0.916 | 0.872 | 0.925 | 0.889 | -0.003 | 0.711 |
| 401| pm14-pm25 | 0.934 | 0.858 | 0.948 | 0.857 | 0.003 | 0.959 |
| 402| pm14-pm26 | 0.935 | 0.934 | 0.917 | 0.885 | 0.022 | 0.23  |
| 403| pm14-pm27 | 0.907 | 0.977 | 0.957 | 0.918 | 0.01  | 0.44  |
| 404| pm14-pm28 | 0.939 | 0.86  | 0.904 | 0.921 | -0.007 | 0.468 |
| 405| pm14-pm29 | 0.927 | 0.9   | 0.895 | 0.874 | -0.005 | 0.527 |
| 406| pm14-pm30 | 0.933 | 0.874 | 0.913 | 0.866 | -0.012 | 0.303 |
| 407| pm14-pm31 | 0.939 | 0.946 | 0.996 | 0.927 | 0.018 | 0.305 |
| 408| pm14-pm32 | 0.912 | 0.92  | 0.939 | 0.965 | 0.015 | 0.362 |
| 409| pm14-pm33 | 0.934 | 0.968 | 0.925 | 0.983 | -0.029 | 0.201 |
| 410| pm14-pm34 | 0.942 | 0.899 | 0.895 | 0.921 | 0.006 | 0.591 |
| 411| pm14-pm35 | 0.912 | 0.885 | 0.905 | 0.988 | -0.001 | 0.874 |
| 412| pm14-pm36 | 0.919 | 0.878 | 0.911 | 0.892 | 0.003 | 0.891 |
| 413| pm14-pm37 | 0.946 | 0.877 | 0.938 | 0.887 | 0.016 | 0.378 |
| 414| pm15-pm16 | 1.29  | 1.401 | 1.22  | 1.13  | -0.061 | 0.029 |
| 415| pm15-pm17 | 1.246 | 1.402 | 1.281 | 1.094 | -0.084 | 0.012 |
| 416| pm15-pm18 | 1.17  | 1.195 | 1.097 | 1.019 | -0.052 | 0.034 |
| 417| pm15-pm19 | 1.132 | 1.289 | 1.168 | 1.095 | -0.031 | 0.267 |
| 418| pm15-pm20 | 1.108 | 1.223 | 1.152 | 1.04  | -0.048 | 0.166 |
| 419| pm15-pm21 | 1.705 | 1.3   | 2.1   | 1.267 | 0     | 0.837 |
| 420| pm15-pm22 | 1.092 | 1.245 | 1.118 | 1.041 | -0.029 | 0.293 |
| 421| pm15-pm23 | 1.079 | 1.246 | 1.134 | 1.027 | -0.028 | 0.203 |
| 422| pm15-pm24 | 1.114 | 1.244 | 1.1   | 1.014 | -0.051 | 0.03  |
| 423| pm15-pm25 | 1.126 | 1.25  | 1.123 | 1.052 | -0.023 | 0.239 |
| 424| pm15-pm26 | 1.103 | 1.179 | 1.132 | 1.059 | -0.043 | 0.159 |
| 425| pm15-pm27 | 1.112 | 1.287 | 1.117 | 1.018 | -0.061 | 0.043 |
| pm15-pm28 | 1.1   | 1.234  | 1.139  | 1.044  | -0.048 | 0.151  |
|-----------|-------|--------|--------|--------|--------|--------|
| pm15-pm29 | 1.081 | 1.175  | 1.111  | 1.057  | -0.063 | 0.021  |
| pm15-pm30 | 1.145 | 1.217  | 1.123  | 1.086  | -0.031 | 0.217  |
| pm15-pm31 | 1.106 | 1.278  | 1.159  | 1.04   | -0.053 | 0.038  |
| pm15-pm32 | 1.101 | 1.256  | 1.091  | 1.094  | -0.048 | 0.17   |
| pm15-pm33 | 1.107 | 1.378  | 1.127  | 1.177  | -0.049 | 0.166  |
| pm15-pm34 | 1.139 | 1.238  | 1.039  | 1.084  | -0.048 | 0.187  |
| pm15-pm35 | 1.097 | 1.245  | 1.052  | 1.178  | -0.045 | 0.172  |
| pm15-pm36 | 1.113 | 1.235  | 1.136  | 1.007  | -0.039 | 0.249  |
| pm15-pm37 | 1.106 | 1.165  | 1.109  | 1.026  | -0.059 | 0.025  |
| pm16-pm17 | 1.485 | 1.516  | 1.531  | 1.374  | 0.143  | 0.007  |
| pm16-pm18 | 1.17   | 1.206  | 1.162  | 1.054  | -0.019 | 0.37   |
| pm16-pm19 | 1.126  | 1.266  | 1.204  | 1.11   | -0.02  | 0.319  |
| pm16-pm20 | 1.173  | 1.178  | 1.131  | 1.066  | -0.036 | 0.209  |
| pm16-pm21 | 1.739  | 1.253  | 2.167  | 1.293  | 0.026  | 0.284  |
| pm16-pm22 | 1.163  | 1.224  | 1.152  | 1.055  | 0.002  | 0.739  |
| pm16-pm23 | 1.129  | 1.193  | 1.143  | 1.068  | -0.01  | 0.445  |
| pm16-pm24 | 1.113  | 1.211  | 1.183  | 1.092  | -0.013 | 0.324  |
| pm16-pm25 | 1.159  | 1.155  | 1.152  | 1.065  | -0.022 | 0.213  |
| pm16-pm26 | 1.173  | 1.176  | 1.122  | 1.071  | -0.019 | 0.391  |
| pm16-pm27 | 1.157  | 1.171  | 1.181  | 1.064  | -0.045 | 0.166  |
| pm16-pm28 | 1.157  | 1.211  | 1.134  | 1.089  | -0.023 | 0.26   |
| pm16-pm29 | 1.155  | 1.172  | 1.163  | 1.066  | -0.024 | 0.284  |
| pm16-pm30 | 1.157  | 1.135  | 1.146  | 1.063  | -0.042 | 0.16   |
| pm16-pm31 | 1.199  | 1.257  | 1.179  | 1.079  | -0.014 | 0.349  |
| pm16-pm32 | 1.14   | 1.149  | 1.163  | 1.159  | -0.025 | 0.206  |
| pm16-pm33 | 1.221  | 1.309  | 1.155  | 1.212  | -0.016 | 0.311  |
| pm16-pm34 | 1.164  | 1.209  | 1.117  | 1.124  | -0.013 | 0.307  |
| pm16-pm35 | 1.193  | 1.249  | 1.122  | 1.223  | 0.015  | 0.357  |
| pm16-pm36 | 1.15   | 1.161  | 1.161  | 1.087  | -0.016 | 0.366  |
|     | Time   | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 |
|-----|--------|--------|--------|--------|--------|--------|--------|
| 456 | pm16-pm37 | 1.168  | 1.16   | 1.16   | 1.059  | -0.018 | 0.393  |
| 457 | pm17-pm18 | 1.186  | 1.166  | 1.185  | 1.032  | -0.043 | 0.178  |
| 458 | pm17-pm19 | 1.137  | 1.241  | 1.212  | 1.12   | -0.037 | 0.222  |
| 459 | pm17-pm20 | 1.138  | 1.153  | 1.21   | 1.043  | -0.055 | 0.038  |
| 460 | pm17-pm21 | 1.596  | 1.34   | 2.23   | 1.273  | 0.004  | 0.836  |
| 461 | pm17-pm22 | 1.149  | 1.221  | 1.189  | 1.     | -0.025 | 0.275  |
| 462 | pm17-pm23 | 1.141  | 1.234  | 1.215  | 0.98   | -0.019 | 0.31   |
| 463 | pm17-pm24 | 1.166  | 1.188  | 1.199  | 1.028  | -0.036 | 0.286  |
| 464 | pm17-pm25 | 1.169  | 1.163  | 1.198  | 1.037  | -0.031 | 0.222  |
| 465 | pm17-pm26 | 1.102  | 1.199  | 1.177  | 1.042  | -0.043 | 0.172  |
| 466 | pm17-pm27 | 1.138  | 1.212  | 1.263  | 1.048  | -0.042 | 0.186  |
| 467 | pm17-pm28 | 1.182  | 1.202  | 1.189  | 1.053  | -0.033 | 0.222  |
| 468 | pm17-pm29 | 1.162  | 1.186  | 1.253  | 1.021  | -0.026 | 0.204  |
| 469 | pm17-pm30 | 1.16   | 1.156  | 1.194  | 1.06   | -0.043 | 0.161  |
| 470 | pm17-pm31 | 1.183  | 1.289  | 1.233  | 1.077  | -0.016 | 0.348  |
| 471 | pm17-pm32 | 1.138  | 1.155  | 1.202  | 1.094  | -0.049 | 0.184  |
| 472 | pm17-pm33 | 1.146  | 1.299  | 1.214  | 1.194  | -0.045 | 0.15   |
| 473 | pm17-pm34 | 1.168  | 1.19   | 1.13   | 1.096  | -0.039 | 0.218  |
| 474 | pm17-pm35 | 1.18   | 1.224  | 1.113  | 1.187  | -0.024 | 0.232  |
| 475 | pm17-pm36 | 1.154  | 1.153  | 1.227  | 1.056  | -0.027 | 0.268  |
| 476 | pm17-pm37 | 1.166  | 1.137  | 1.189  | 1.042  | -0.039 | 0.276  |
| 477 | pm18-pm19 | 1.038  | 1.035  | 1.017  | 1.04   | -0.015 | 0.371  |
| 478 | pm18-pm20 | 1.027  | 1.009  | 0.993  | 1.03   | -0.009 | 0.537  |
| 479 | pm18-pm21 | 1.531  | 1.136  | 1.817  | 1.237  | -0.008 | 0.504  |
| 480 | pm18-pm22 | 1.038  | 1.04   | 0.987  | 1.013  | 0.022  | 0.207  |
| 481 | pm18-pm23 | 1.013  | 1.05   | 0.996  | 1.01   | 0.023  | 0.245  |
| 482 | pm18-pm24 | 1.035  | 1.047  | 0.977  | 1.025  | 0.007  | 0.441  |
| 483 | pm18-pm25 | 1.02   | 1.014  | 1.018  | 1.026  | 0.013  | 0.38   |
| 484 | pm18-pm26 | 1.04   | 0.977  | 1.004  | 1.046  | 0.011  | 0.35   |
| 485 | pm18-pm27 | 1.007  | 1.08   | 1.02   | 1.037  | -0.004 | 0.623  |
|   | pm18-pm28 | pm18-pm29 | pm18-pm30 | pm18-pm31 | pm18-pm32 | pm18-pm33 | pm18-pm34 | pm18-pm35 | pm18-pm36 | pm18-pm37 | pm18-pm38 | pm18-pm39 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 486| 1.05      | 1.037     | 1.008     | 1.042     | 0.012     | 0.358     |
| 487| 1.019     | 1.047     | 0.984     | 0.993     | -0.003    | 0.615     |
| 488| 1.075     | 1.023     | 1.025     | 1.01      | 0.014     | 0.303     |
| 489| 1.02      | 1.092     | 0.997     | 1.054     | -0.003    | 0.712     |
| 490| 1.026     | 1.055     | 0.999     | 1.099     | 0.016     | 0.345     |
| 491| 1.027     | 1.152     | 1.185     | 0.015     | 0.359     |
| 492| 1.047     | 1.031     | 0.915     | 1.1       | 0.005     | 0.92      |
| 493| 1.069     | 1.08      | 0.939     | 1.165     | 0.03      | 0.298     |
| 494| 1.037     | 1.007     | 1.045     | 1.045     | 0.015     | 0.359     |
| 495| 1.035     | 1.018     | 0.988     | 1.032     | 0.012     | 0.322     |
| 496| 0.988     | 1.099     | 1.02      | 1.028     | -0.02     | 0.237     |
| 497| 1.536     | 1.135     | 1.886     | 1.26      | -0.014    | 0.395     |
| 498| 0.993     | 1.04      | 1.014     | 1.022     | -0.01     | 0.385     |
| 499| 1.002     | 1.078     | 1.012     | 1.033     | 0.008     | 0.591     |
| 500| 1.007     | 1.037     | 1.022     | 1.028     | -0.02     | 0.256     |
| 501| 1.005     | 1.056     | 1.024     | 1.051     | -0.001    | 0.663     |
| 502| 1.002     | 1.07      | 1.012     | 1.041     | -0.004    | 0.615     |
| 503| 1.002     | 1.117     | 1.051     | 1.086     | -0.005    | 0.535     |
| 504| 0.998     | 1.058     | 1.04      | 1.084     | -0.007    | 0.559     |
| 505| 1.001     | 1.085     | 1.037     | 1.05      | 0         | 0.802     |
| 506| 1.005     | 1.057     | 1.027     | 1.038     | -0.016    | 0.367     |
| 507| 1.028     | 1.133     | 1.035     | 1.025     | -0.018    | 0.339     |
| 508| 1.025     | 1.033     | 1.031     | 1.116     | -0.007    | 0.584     |
| 509| 0.98      | 1.184     | 1.012     | 1.16      | -0.036    | 0.26      |
| 510| 0.991     | 1.059     | 0.929     | 1.102     | -0.027    | 0.202     |
| 511| 1.014     | 1.135     | 0.985     | 1.146     | 0.007     | 0.58      |
| 512| 1.017     | 1.033     | 1.022     | 1.046     | -0.007    | 0.541     |
| 513| 0.984     | 1.068     | 1.044     | 1.003     | -0.01     | 0.353     |
| 514| 1.542     | 1.15      | 1.836     | 1.22      | -0.008    | 0.451     |
| 515| 1.039     | 1.116     | 0.992     | 1.021     | 0.038     | 0.286     |
| 516 | pm20-pm23 | 1.036 | 1.085 | 1.005 | 1.019 | 0.036 | 0.231 |
| 517 | pm20-pm24 | 1.03 | 1.07 | 1.017 | 0.995 | 0.008 | 0.586 |
| 518 | pm20-pm25 | 1.02 | 1.054 | 1.018 | 1.039 | 0.021 | 0.273 |
| 519 | pm20-pm26 | 1.033 | 1.067 | 0.993 | 1.004 | 0.012 | 0.339 |
| 520 | pm20-pm27 | 1.048 | 1.019 | 1.013 | 1.025 | -0.02 | 0.26 |
| 521 | pm20-pm28 | 1.029 | 1.042 | 1.009 | 1.045 | 0.002 | 0.836 |
| 522 | pm20-pm29 | 0.992 | 1.047 | 0.941 | 1.034 | -0.017 | 0.367 |
| 523 | pm20-pm30 | 1.06 | 1.054 | 0.995 | 1.024 | 0.008 | 0.428 |
| 524 | pm20-pm31 | 1.023 | 1.128 | 1.058 | 1.022 | 0.007 | 0.585 |
| 525 | pm20-pm32 | 1.015 | 1.052 | 1.004 | 1.079 | 0.003 | 0.636 |
| 526 | pm20-pm33 | 1.05 | 1.108 | 1.012 | 1.135 | -0.021 | 0.259 |
| 527 | pm20-pm34 | 0.996 | 1.066 | 0.937 | 1.089 | -0.002 | 0.825 |
| 528 | pm20-pm35 | 1.005 | 1.041 | 0.952 | 1.145 | -0.004 | 0.697 |
| 529 | pm20-pm36 | 1.033 | 1.014 | 0.994 | 0.987 | -0.006 | 0.574 |
| 530 | pm20-pm37 | 0.999 | 1.023 | 0.984 | 1.021 | -0.005 | 0.424 |
| 531 | pm21-pm22 | 1.501 | 1.145 | 1.82 | 1.179 | -0.007 | 0.499 |
| 532 | pm21-pm23 | 1.534 | 1.158 | 1.845 | 1.179 | 0.014 | 0.369 |
| 533 | pm21-pm24 | 1.578 | 1.157 | 1.798 | 1.19 | -0.004 | 0.999 |
| 534 | pm21-pm25 | 1.532 | 1.104 | 1.822 | 1.232 | -0.004 | 0.912 |
| 535 | pm21-pm26 | 1.524 | 1.103 | 1.828 | 1.199 | -0.013 | 0.376 |
| 536 | pm21-pm27 | 1.526 | 1.184 | 1.841 | 1.22 | -0.018 | 0.388 |
| 537 | pm21-pm28 | 1.54 | 1.138 | 1.846 | 1.258 | 0.002 | 0.775 |
| 538 | pm21-pm29 | 1.556 | 1.101 | 1.777 | 1.172 | -0.033 | 0.262 |
| 539 | pm21-pm30 | 1.517 | 1.091 | 1.82 | 1.206 | -0.03 | 0.256 |
| 540 | pm21-pm31 | 1.531 | 1.145 | 1.846 | 1.214 | -0.031 | 0.202 |
| 541 | pm21-pm32 | 1.511 | 1.17 | 1.807 | 1.271 | -0.009 | 0.559 |
| 542 | pm21-pm33 | 1.541 | 1.205 | 1.88 | 1.385 | -0.009 | 0.498 |
| 543 | pm21-pm34 | 1.554 | 1.148 | 1.78 | 1.248 | -0.006 | 0.405 |
| 544 | pm21-pm35 | 1.523 | 1.201 | 1.752 | 1.361 | 0.006 | 0.522 |
| 545 | pm21-pm36 | 1.499 | 1.104 | 1.833 | 1.189 | -0.021 | 0.205 |
|     | pm21-pm37 | 1.511   | 1.122   | 1.871   | 1.176  | -0.006 | 0.558  |
|-----|-----------|---------|---------|---------|--------|---------|--------|
| 547 | pm22-pm23 | 0.996   | 1.037   | 1.011   | 0.993  | 0.035   | 0.216  |
| 548 | pm22-pm24 | 0.968   | 1.071   | 1.002   | 0.992  | 0.014   | 0.377  |
| 549 | pm22-pm25 | 0.985   | 1.016   | 1.002   | 1.008  | 0.017   | 0.382  |
| 550 | pm22-pm26 | 1.001   | 1.05    | 1.004   | 0.984  | 0.024   | 0.226  |
| 551 | pm22-pm27 | 1.033   | 1.107   | 1.002   | 1.03   | 0.023   | 0.222  |
| 552 | pm22-pm28 | 1.027   | 1.045   | 1.024   | 1.039  | 0.031   | 0.209  |
| 553 | pm22-pm29 | 0.99    | 1.063   | 1.008   | 0.991  | 0.019   | 0.327  |
| 554 | pm22-pm30 | 0.987   | 1.092   | 0.978   | 0.974  | 0.009   | 0.48   |
| 555 | pm22-pm31 | 1.041   | 1.116   | 1.009   | 0.974  | 0.011   | 0.328  |
| 556 | pm22-pm32 | 1.001   | 1.062   | 1.013   | 1.052  | 0.023   | 0.228  |
| 557 | pm22-pm33 | 1.012   | 1.169   | 1.1     | 1.142  | 0.01    | 0.518  |
| 558 | pm22-pm34 | 0.977   | 1.044   | 0.922   | 1.048  | 0       | 0.618  |
| 559 | pm22-pm35 | 1.02    | 1.08    | 0.965   | 1.098  | 0.028   | 0.234  |
| 560 | pm22-pm36 | 1.01    | 1.023   | 0.979   | 0.976  | 0.01    | 0.492  |
| 561 | pm22-pm37 | 0.973   | 1.03    | 0.969   | 1.01   | 0.01    | 0.382  |
| 562 | pm23-pm24 | 1.033   | 1.127   | 0.981   | 0.99   | 0.042   | 0.159  |
| 563 | pm23-pm25 | 0.992   | 1.058   | 0.996   | 1.036  | 0.038   | 0.211  |
| 564 | pm23-pm26 | 1.026   | 1.053   | 0.993   | 1.02   | 0.04    | 0.167  |
| 565 | pm23-pm27 | 1.033   | 1.134   | 1.031   | 1.004  | 0.034   | 0.248  |
| 566 | pm23-pm28 | 1.018   | 1.058   | 0.969   | 1.031  | 0.02    | 0.209  |
| 567 | pm23-pm29 | 1.003   | 1.036   | 0.981   | 0.98   | 0.009   | 0.458  |
| 568 | pm23-pm30 | 0.999   | 1.059   | 0.972   | 0.978  | 0.007   | 0.523  |
| 569 | pm23-pm31 | 1.025   | 1.168   | 1.012   | 1.019  | 0.036   | 0.292  |
| 570 | pm23-pm32 | 0.992   | 1.092   | 0.971   | 1.079  | 0.028   | 0.233  |
| 571 | pm23-pm33 | 1.021   | 1.185   | 0.973   | 1.138  | 0.012   | 0.324  |
| 572 | pm23-pm34 | 0.971   | 1.096   | 0.965   | 1.006  | 0.015   | 0.348  |
| 573 | pm23-pm35 | 1.033   | 1.077   | 0.914   | 1.099  | 0.021   | 0.295  |
| 574 | pm23-pm36 | 0.995   | 1.056   | 0.978   | 1.005  | 0.025   | 0.267  |
| 575 | pm23-pm37 | 0.972   | 1.073   | 1.03    | 1.005  | 0.038   | 0.236  |
| pm24-pm25 | 0.991 | 1.039 | 0.986 | 0.991 | 0   | 0.973 |
| pm24-pm26 | 0.982 | 1.034 | 1.014 | 0.997 | 0.004 | 0.667 |
| pm24-pm27 | 0.985 | 1.082 | 1.053 | 0.989 | -0.009 | 0.445 |
| pm24-pm28 | 0.975 | 1.043 | 1.002 | 1.014 | -0.01 | 0.325 |
| pm24-pm29 | 0.965 | 1.073 | 1.013 | 0.987 | -0.001 | 0.752 |
| pm24-pm30 | 1.003 | 1.063 | 0.992 | 1.022 | 0.005 | 0.48 |
| pm24-pm31 | 1.013 | 1.127 | 1.021 | 0.996 | -0.001 | 0.687 |
| pm24-pm32 | 0.988 | 1.059 | 1   | 1.073 | 0.005 | 0.533 |
| pm24-pm33 | 1.023 | 1.169 | 0.993 | 1.171 | 0.002 | 0.928 |
| pm24-pm34 | 1.017 | 1.082 | 0.932 | 1.065 | 0.009 | 0.465 |
| pm24-pm35 | 1.024 | 1.102 | 0.927 | 1.106 | 0.01 | 0.336 |
| pm24-pm36 | 0.987 | 1.018 | 0.988 | 0.997 | -0.006 | 0.599 |
| pm24-pm37 | 0.992 | 1   | 0.985 | 0.996 | -0.009 | 0.505 |
| pm25-pm26 | 0.989 | 1.002 | 0.982 | 0.989 | -0.004 | 0.939 |
| pm25-pm27 | 0.998 | 1.065 | 1.023 | 0.982 | -0.011 | 0.339 |
| pm25-pm28 | 1.002 | 1.042 | 1.006 | 1.032 | 0.01 | 0.55 |
| pm25-pm29 | 1.019 | 1.047 | 1.008 | 0.985 | 0.012 | 0.307 |
| pm25-pm30 | 1.022 | 1.04 | 1.03 | 1.003 | 0.017 | 0.351 |
| pm25-pm31 | 1.019 | 1.125 | 1.002 | 0.988 | 0.001 | 0.803 |
| pm25-pm32 | 1.001 | 1.046 | 1.002 | 1.045 | 0.007 | 0.511 |
| pm25-pm33 | 0.998 | 1.1 | 1.017 | 1.145 | -0.014 | 0.341 |
| pm25-pm34 | 0.989 | 1.039 | 0.915 | 1.071 | -0.003 | 0.962 |
| pm25-pm35 | 1.03 | 1.095 | 0.944 | 1.147 | 0.033 | 0.201 |
| pm25-pm36 | 0.989 | 0.987 | 1.001 | 1.0 | 0.002 | 0.629 |
| pm25-pm37 | 0.984 | 0.973 | 0.987 | 1.007 | -0.006 | 0.569 |
| pm26-pm27 | 0.986 | 1.013 | 1.033 | 0.99 | -0.023 | 0.253 |
| pm26-pm28 | 1.009 | 0.992 | 1.029 | 1.039 | 0.007 | 0.413 |
| pm26-pm29 | 0.994 | 1.089 | 1.011 | 0.993 | 0.019 | 0.323 |
| pm26-pm30 | 1.02 | 1.027 | 1.008 | 1.003 | 0.008 | 0.436 |
| pm26-pm31 | 1.016 | 1.093 | 1.028 | 1.009 | 0.004 | 0.919 |
|   | pm26-pm32 | 0.987 | 1.025 | 0.974 | 1.061 | -0.005 | 0.45 |
|---|----------|-------|-------|-------|-------|--------|------|
| 607 | pm26-pm33 | 1.021 | 1.129 | 0.996 | 1.173 | 0 | 0.694 |
| 608 | pm26-pm34 | 0.998 | 1.026 | 0.928 | 1.068 | -0.002 | 0.957 |
| 609 | pm26-pm35 | 1.01 | 1.015 | 0.962 | 1.141 | 0.011 | 0.376 |
| 610 | pm26-pm36 | 1.005 | 0.993 | 0.982 | 0.99 | -0.003 | 0.844 |
| 611 | pm26-pm37 | 1.018 | 1.018 | 1.009 | 0.984 | 0.013 | 0.395 |
| 612 | pm27-pm28 | 1.015 | 1.094 | 1.04 | 1.015 | -0.004 | 0.937 |
| 613 | pm27-pm29 | 1.002 | 1.085 | 1.023 | 1.024 | -0.003 | 0.89 |
| 614 | pm27-pm30 | 1.035 | 1.047 | 1.026 | 1.01 | -0.011 | 0.36 |
| 615 | pm27-pm31 | 1.051 | 1.194 | 1.057 | 1.027 | 0.016 | 0.313 |
| 616 | pm27-pm32 | 1.025 | 1.128 | 1.006 | 1.095 | 0.013 | 0.331 |
| 617 | pm27-pm33 | 1.017 | 1.16 | 1.048 | 1.183 | -0.011 | 0.313 |
| 618 | pm27-pm34 | 1.017 | 1.116 | 0.956 | 1.065 | -0.002 | 0.745 |
| 619 | pm27-pm35 | 1.006 | 1.086 | 0.979 | 1.118 | -0.008 | 0.405 |
| 620 | pm27-pm36 | 1.028 | 1.024 | 1.042 | 0.997 | -0.006 | 0.524 |
| 621 | pm27-pm37 | 1.021 | 1.056 | 1.043 | 1.022 | 0.007 | 0.516 |
| 622 | pm28-pm29 | 1.026 | 1.038 | 0.998 | 1.027 | 0.004 | 0.741 |
| 623 | pm28-pm30 | 1.042 | 1.078 | 0.999 | 1.061 | 0.022 | 0.289 |
| 624 | pm28-pm31 | 1.047 | 1.106 | 1.027 | 1.031 | 0.004 | 0.885 |
| 625 | pm28-pm32 | 1.025 | 1.064 | 1.007 | 1.093 | 0.014 | 0.381 |
| 626 | pm28-pm33 | 1.018 | 1.201 | 0.96 | 1.197 | -0.002 | 0.702 |
| 627 | pm28-pm34 | 0.998 | 1.061 | 0.899 | 1.063 | -0.017 | 0.399 |
| 628 | pm28-pm35 | 1.031 | 1.069 | 0.954 | 1.111 | 0.004 | 0.773 |
| 629 | pm28-pm36 | 0.995 | 1.035 | 1.018 | 1.031 | 0.008 | 0.431 |
| 630 | pm28-pm37 | 1.015 | 1.047 | 1.018 | 1.011 | 0.012 | 0.381 |
| 631 | pm29-pm30 | 1.033 | 1.02 | 1.015 | 1.042 | 0.013 | 0.338 |
| 632 | pm29-pm31 | 1.046 | 1.158 | 1.06 | 1.015 | 0.03 | 0.263 |
| 633 | pm29-pm32 | 0.99 | 1.051 | 1.003 | 1.066 | 0.003 | 0.806 |
| 634 | pm29-pm33 | 1.018 | 1.149 | 1.022 | 1.173 | 0.003 | 0.622 |
| 635 | pm29-pm34 | 1 | 1.073 | 0.904 | 1.081 | 0 | 0.69 |
|   | pm29-pm35 | 1.05 | 1.039 | 0.96 | 1.156 | 0.022 | 0.285 |
|---|-----------|------|-------|------|-------|-------|-------|
| 637| pm29-pm36 | 0.993 | 1.056 | 0.988 | 0.985 | 0.002 | 0.68  |
| 638| pm29-pm37 | 0.973 | 1.033 | 0.962 | 0.995 | -0.011 | 0.319 |
| 639| pm30-pm31 | 1.063 | 1.138 | 1.045 | 1.023 | 0.022 | 0.211 |
| 640| pm30-pm32 | 1.038 | 1.049 | 0.99 | 1.073 | 0.008 | 0.434 |
| 641| pm30-pm33 | 1.064 | 1.161 | 1.001 | 1.166 | 0.006 | 0.434 |
| 642| pm30-pm34 | 0.99 | 1.037 | 0.91 | 1.064 | -0.018 | 0.399 |
| 643| pm30-pm35 | 1.048 | 1.049 | 0.937 | 1.175 | 0.019 | 0.383 |
| 644| pm30-pm36 | 1.026 | 1.022 | 1.004 | 1.008 | 0.007 | 0.585 |
| 645| pm30-pm37 | 1.024 | 0.99 | 1.011 | 1.024 | 0.006 | 0.517 |
| 646| pm31-pm32 | 1.038 | 1.171 | 1.005 | 1.061 | 0.014 | 0.35  |
| 647| pm31-pm33 | 1.061 | 1.174 | 1.03 | 1.193 | -0.003 | 0.865 |
| 648| pm31-pm34 | 1.042 | 1.164 | 0.973 | 1.067 | 0.017 | 0.317 |
| 649| pm31-pm35 | 1.035 | 1.17 | 0.983 | 1.152 | 0.026 | 0.202 |
| 650| pm31-pm36 | 1.028 | 1.07 | 1.019 | 1.008 | -0.002 | 0.734 |
| 651| pm31-pm37 | 1.049 | 1.123 | 1.04 | 1.004 | 0.022 | 0.295 |
| 652| pm32-pm33 | 1.014 | 1.181 | 1.015 | 1.218 | 0.005 | 0.508 |
| 653| pm32-pm34 | 1.016 | 1.078 | 0.931 | 1.129 | 0.009 | 0.427 |
| 654| pm32-pm35 | 1.071 | 1.104 | 0.915 | 1.19 | 0.026 | 0.24  |
| 655| pm32-pm36 | 1.015 | 1.034 | 0.973 | 1.049 | 0 | 0.921 |
| 656| pm32-pm37 | 0.988 | 1.037 | 0.97 | 1.057 | -0.004 | 0.755 |
| 657| pm33-pm34 | 1.014 | 1.109 | 0.985 | 1.22 | -0.009 | 0.5  |
| 658| pm33-pm35 | 1.046 | 1.187 | 0.91 | 1.288 | 0.001 | 0.668 |
| 659| pm33-pm36 | 0.987 | 1.121 | 1.003 | 1.17 | -0.01 | 0.574 |
| 660| pm33-pm37 | 1.018 | 1.141 | 1.007 | 1.167 | 0.004 | 0.9  |
| 661| pm34-pm35 | 1.018 | 1.05 | 0.918 | 1.14 | -0.002 | 0.704 |
| 662| pm34-pm36 | 0.988 | 1.031 | 0.942 | 1.069 | 0 | 0.998 |
| 663| pm34-pm37 | 0.99 | 1.039 | 0.93 | 1.044 | -0.005 | 0.476 |
| 664| pm35-pm36 | 1.016 | 1.093 | 0.948 | 1.1 | 0.017 | 0.35  |
| 665| pm35-pm37 | 1.021 | 1.048 | 0.903 | 1.145 | 0.008 | 0.59  |
3d) Result of two-distribution perturbation analysis for hypertrophy when four different response function types were applied in a combined manner (combination of response functions)

| No | Pair of perturbed parameter distributions | 1 million parameter sets | 10 million parameter sets | 100 million parameter sets |
|----|------------------------------------------|--------------------------|---------------------------|---------------------------|
|    |                                          | Synergistic effect | p-value | Synergistic effect | p-value | Synergistic effect | p-value |
| 1  | pm1-pm2                                 | 0                      | 0.968    | 0.004              | 0.792   | -0.012             | 0.324    |
| 2  | pm1-pm3                                 | 0.032                  | 0.29     | 0.019              | 0.346   | 0.003              | 0.69     |
| 3  | pm1-pm4                                 | 0                      | 0.606    | 0.009              | 0.573   | 0.004              | 0.952    |
| 4  | pm1-pm5                                 | 0.025                  | 0.257    | 0.02               | 0.329   | 0.016              | 0.346    |
| 5  | pm1-pm6                                 | -0.029                 | 0.23     | -0.012             | 0.365   | -0.023             | 0.203    |
| 6  | pm1-pm7                                 | -0.032                 | 0.245    | -0.053             | 0.029   | -0.032             | 0.216    |
| 7  | pm1-pm8                                 | 0.016                  | 0.33     | 0.024              | 0.25    | 0.008              | 0.476    |
| 8  | pm1-pm9                                 | 0.035                  | 0.274    | 0.016              | 0.397   | -0.006             | 0.41     |
| 9  | pm1-pm10                                | -0.379                 | <0.001   | -0.399             | <0.001  | -0.417             | <0.001   |
| 10 | pm1-pm11                                | -0.02                  | 0.266    | -0.006             | 0.429   | 0.023              | 0.261    |
| 11 | pm1-pm12                                | 0.017                  | 0.318    | 0.023              | 0.249   | 0.009              | 0.55     |
| 12 | pm1-pm13                                | 0.002                  | 0.976    | 0.021              | 0.264   | 0.013              | 0.372    |
| 13 | pm1-pm14                                | -0.037                 | 0.248    | -0.025             | 0.212   | -0.012             | 0.307    |
| 14 | pm1-pm15                                | -0.063                 | 0.03     | -0.085             | 0.013   | -0.088             | 0.011    |
| 15 | pm1-pm16                                | 0.006                  | 0.465    | -0.001             | 0.832   | -0.028             | 0.256    |
| 16 | pm1-pm17                                | 0.025                  | 0.202    | 0.019              | 0.395   | 0.016              | 0.329    |
| 17 | pm1-pm18                                | 0.003                  | 0.928    | 0.001              | 0.833   | 0.02               | 0.302    |
| 18 | pm1-pm19                                | 0.008                  | 0.531    | -0.011             | 0.311   | -0.021             | 0.209    |
| pm1-pm20 | pm1-pm21 | pm1-pm22 | pm1-pm23 | pm1-pm24 | pm1-pm25 | pm1-pm26 | pm1-pm27 | pm1-pm28 | pm1-pm29 | pm1-pm30 | pm1-pm31 | pm1-pm32 | pm1-pm33 | pm1-pm34 | pm1-pm35 | pm1-pm36 | pm1-pm37 | pm1-pm38 | pm1-pm39 | pm1-pm40 | pm1-pm41 | pm1-pm42 | pm1-pm43 | pm1-pm44 | pm1-pm45 | pm1-pm46 | pm1-pm47 | pm1-pm48 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0.818   | -0.402  | 0.039   | -0.187  | 0       | -0.006  | -0.222  | -0.01   | 0.007   | 0.03    | 0.008   | 0.007   | 0.025   | -0.009  | -0.049  | 0.016   | 0.004   | 0.012   | -0.003  | -0.003  | -0.005  | 0.022   | 0.015   | 0        | 0.003   | -0.427  | -0.915  | -0.021  |
| 0.031   | <0.001  | 0.253   | -0.169  | 0.915   | 0.463   | 0.239   | 0.551   | 0.559   | 0.261   | 0.495   | 0.26    | 0.577   | -0.033  | 0.341   | -0.02   | 0.962   | 0.37    | 0.697   | 0.861   | 0.986   | 0.202   | 0.357   | 0.938   | 0.73    | <0.001  | 0.365   | 0.019   |
| 0.218   | -0.408  | -0.003  | 0.001   | 0.11    | 0.033   | 0.002   | -0.003  | 0.018   | 0.023   | 0.016   | -0.012  | -0.015  | -0.33   | -0.02   | -0.02   | 0.006   | 0.006   | -0.017  | -0.017  | -0.011  | 0.015   | 0.006   | 0.039   | -0.389  | -0.365  | 0.353   |
| 0.01    | <0.001  | 0.692   | 0.001   | 0.388   | 0.206   | 0.601   | 0.968   | 0.335   | 0.243   | 0.332   | 0.392   | 0.39    | 0.369   | 0.212   | 0.205   | 0.968   | 0.404   | 0.263   | 0.381   | 0.363   | 0.305   | 0.238   | 0.381   | 0.224   | 0.257   | 0.353   |
| 0.397   | -0.377  | 0.01    | -0.185  | 0.008   | 0.024   | -0.005  | 0.016   | -0.015  | -0.002  | 0.033   | 0.724   | -0.008  | 0.254   | 0.267   | 0.502   | 0.292   | 0.238   | 0.724   | 0.023   | 0.322   | 0.002   | 0.648   | 0.223   | 0.224   | 0.213   | 0.213   | 0.213   |
|   | pm2-pm15 |   | pm2-pm16 |   | pm2-pm17 |   | pm2-pm18 |   | pm2-pm19 |   | pm2-pm20 |   | pm2-pm21 |   | pm2-pm22 |   | pm2-pm23 |   | pm2-pm24 |   | pm2-pm25 |   |
|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|---|
| 49| -0.119   | 0.009 | -0.108   | 0.01 | -0.095   | 0.014 |
| 50| -0.093   | 0.014 | -0.097   | 0.02 | -0.077   | 0.017 |
| 51| -0.01    | 0.36  | 0.001    | 0.632| -0.023   | 0.235 |
| 52| 0.045    | 0.184 | 0.016    | 0.35 | 0.039    | 0.222 |
| 53| -0.003   | 0.825 | -0.004   | 0.726| -0.016   | 0.376 |
| 54| 0.008    | 0.477 | -0.008   | 0.416| 0.016    | 0.36  |
| 55| -0.327   | <0.001| -0.366   | <0.001| -0.342   | <0.001|
| 56| 0.025    | 0.235 | -0.002   | 0.783| 0.022    | 0.233 |
| 57| 0.007    | 0.451 | 0.018    | 0.363| 0.003    | 0.796 |
| 58| 0.006    | 0.476 | -0.006   | 0.506| -0.026   | 0.227 |
| 59| 0.006    | 0.544 | 0.002    | 0.851| -0.013   | 0.302 |
| 60| -0.007   | 0.576 | 0.013    | 0.324| 0.028    | 0.212 |
| 61| -0.001   | 0.616 | 0.015    | 0.384| 0.021    | 0.217 |
| 62| -0.023   | 0.257 | -0.023   | 0.263| 0.01     | 0.338 |
| 63| -0.001   | 0.77  | -0.019   | 0.326| -0.003   | 0.768 |
| 64| 0.003    | 0.743 | 0.022    | 0.239| -0.012   | 0.389 |
| 65| -0.466   | <0.001| -0.48    | <0.001| -0.473   | <0.001|
| 66| 0.021    | 0.211 | 0.022    | 0.299| -0.011   | 0.387 |
| 67| -0.016   | 0.313 | -0.001   | 0.897| 0.012    | 0.314 |
| 68| -0.026   | 0.254 | -0.012   | 0.39 | -0.026   | 0.222 |
| 69| 0.012    | 0.364 | -0.004   | 0.953| -0.005   | 0.679 |
| 70| 0.024    | 0.235 | -0.012   | 0.335| 0.008    | 0.546 |
| 71| 0.005    | 0.492 | 0.013    | 0.384| 0.024    | 0.256 |
| 72| 0.015    | 0.317 | 0.003    | 0.817| -0.012   | 0.368 |
| 73| 0.017    | 0.341 | 0.016    | 0.305| 0.021    | 0.252 |
| 74| 0.027    | 0.204 | 0.018    | 0.365| -0.009   | 0.504 |
| 75| 0.03     | 0.245 | 0.046    | 0.168| 0.001    | 0.825 |
| 76| 0.012    | 0.368 | 0.006    | 0.442| -0.01    | 0.532 |
| 77| 0.016    | 0.38  | 0.042    | 0.188| 0.031    | 0.257 |
| 78| -0.394   | <0.001| -0.394   | <0.001| -0.37    | <0.001|
|    | pm3-pm11 | -0.02 | 0.304 | -0.007 | 0.541 | 0.016 | 0.377 |
|----|----------|-------|-------|--------|-------|-------|-------|
| 80 | pm3-pm12 | 0.016 | 0.372 | 0.025  | 0.251 | 0.004 | 0.807 |
| 81 | pm3-pm13 | 0.02  | 0.298 | 0.022  | 0.237 | 0.03  | 0.286 |
| 82 | pm3-pm14 | -0.025 | 0.268 | -0.028 | 0.269 | -0.026 | 0.237 |
| 83 | pm3-pm15 | -0.066 | 0.028 | -0.063 | 0.044 | -0.067 | 0.031 |
| 84 | pm3-pm16 | -0.029 | 0.29 | -0.038 | 0.216 | -0.065 | 0.032 |
| 85 | pm3-pm17 | 0.005 | 0.618 | 0.007  | 0.416 | -0.001 | 0.982 |
| 86 | pm3-pm18 | 0.005 | 0.973 | 0.044  | 0.201 | 0.001 | 0.694 |
| 87 | pm3-pm19 | -0.018 | 0.328 | 0.004  | 0.946 | -0.006 | 0.477 |
| 88 | pm3-pm20 | -0.008 | 0.419 | 0.022  | 0.268 | 0.033 | 0.296 |
| 89 | pm3-pm21 | -0.388 | <0.001 | -0.404 | <0.001 | -0.378 | <0.001 |
| 90 | pm3-pm22 | -0.007 | 0.516 | -0.027 | 0.269 | -0.012 | 0.37 |
| 91 | pm3-pm23 | -0.01  | 0.546 | 0.009  | 0.414 | 0.034 | 0.225 |
| 92 | pm3-pm24 | -0.016 | 0.366 | 0.008  | 0.528 | -0.019 | 0.302 |
| 93 | pm3-pm25 | 0.002 | 0.736 | -0.001 | 0.934 | 0.005 | 0.508 |
| 94 | pm3-pm26 | 0.02  | 0.225 | 0.008  | 0.443 | 0.024 | 0.255 |
| 95 | pm3-pm27 | -0.011 | 0.332 | -0.007 | 0.571 | 0.013 | 0.335 |
| 96 | pm3-pm28 | 0.017 | 0.342 | 0.02   | 0.325 | -0.007 | 0.586 |
| 97 | pm3-pm29 | 0.02  | 0.342 | 0.02   | 0.355 | 0.02  | 0.347 |
| 98 | pm3-pm30 | 0.005 | 0.433 | 0.018  | 0.332 | 0.032 | 0.273 |
| 99 | pm3-pm31 | 0.015 | 0.378 | 0.05   | 0.17  | 0.048 | 0.18  |
| 100| pm3-pm32 | -0.002 | 0.61  | -0.002 | 0.744 | -0.017 | 0.356 |
| 101| pm3-pm33 | -0.009 | 0.507 | -0.039 | 0.254 | -0.03  | 0.284 |
| 102| pm3-pm34 | -0.01  | 0.494 | 0.024  | 0.223 | 0.031 | 0.275 |
| 103| pm3-pm35 | -0.478 | <0.001 | -0.443 | <0.001 | -0.472 | <0.001 |
| 104| pm3-pm36 | -0.009 | 0.566 | 0.003  | 0.973 | -0.011 | 0.376 |
| 105| pm3-pm37 | 0.029 | 0.294 | 0.019  | 0.303 | -0.004 | 0.903 |
| 106| pm4-pm5  | 0.008 | 0.462 | 0.012  | 0.331 | 0.008 | 0.579 |
| 107| pm4-pm6  | -0.017 | 0.324 | -0.016 | 0.386 | -0.007 | 0.44  |
| 108| pm4-pm7  | -0.007 | 0.559 | -0.039 | 0.294 | -0.012 | 0.371 |
|   | pm4-pm8 |   | pm4-pm9 |   | pm4-pm10 |   | pm4-pm11 |   | pm4-pm12 |   | pm4-pm13 |   | pm4-pm14 |   | pm4-pm15 |   | pm4-pm16 |   | pm4-pm17 |   | pm4-pm18 |   | pm4-pm19 |   | pm4-pm20 |   | pm4-pm21 |   | pm4-pm22 |   | pm4-pm23 |   | pm4-pm24 |   | pm4-pm25 |   | pm4-pm26 |   | pm4-pm27 |   | pm4-pm28 |   | pm4-pm29 |   | pm4-pm30 |   | pm4-pm31 |   | pm4-pm32 |   | pm4-pm33 |   | pm4-pm34 |   | pm4-pm35 |   | pm4-pm36 |   | pm4-pm37 |   |
|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|
| 109| -0.032 | 0.209 | -0.019 | 0.388 | -0.017 | 0.304 |
| 110| 0.032 | 0.285 | 0.049 | 0.189 | 0.03 | 0.205 |
| 111| -0.038 | <0.001 | -0.036 | <0.001 | -0.365 | <0.001 |
| 112| 0.029 | 0.262 | 0.011 | 0.318 | 0.031 | 0.293 |
| 113| 0 | 0.996 | 0.003 | 0.869 | -0.016 | 0.375 |
| 114| -0.047 | 0.174 | -0.061 | 0.039 | -0.029 | 0.24 |
| 115| -0.031 | 0.21 | -0.023 | 0.258 | -0.019 | 0.378 |
| 116| -0.097 | 0.015 | -0.083 | 0.019 | -0.085 | 0.018 |
| 117| -0.048 | 0.163 | -0.04 | 0.189 | -0.054 | 0.038 |
| 118| 0.008 | 0.514 | 0.008 | 0.571 | -0.013 | 0.304 |
| 119| 0.015 | 0.324 | -0.013 | 0.346 | 0.03 | 0.261 |
| 120| -0.042 | 0.194 | -0.033 | 0.207 | -0.037 | 0.266 |
| 121| 0.009 | 0.528 | -0.016 | 0.339 | -0.005 | 0.53 |
| 122| -0.387 | <0.001 | -0.403 | <0.001 | -0.393 | <0.001 |
| 123| 0.018 | 0.326 | 0.033 | 0.21 | 0.045 | 0.167 |
| 124| 0.048 | 0.169 | 0.009 | 0.582 | 0.016 | 0.38 |
| 125| -0.006 | 0.427 | -0.007 | 0.52 | 0.011 | 0.361 |
| 126| 0.011 | 0.323 | -0.007 | 0.565 | -0.001 | 0.979 |
| 127| -0.009 | 0.482 | -0.005 | 0.532 | -0.018 | 0.304 |
| 128| -0.025 | 0.286 | 0.018 | 0.384 | -0.016 | 0.313 |
| 129| 0.006 | 0.431 | 0.016 | 0.385 | 0.028 | 0.292 |
| 130| 0 | 0.844 | -0.009 | 0.466 | -0.011 | 0.398 |
| 131| 0.042 | 0.181 | 0.001 | 0.791 | 0.033 | 0.272 |
| 132| 0.026 | 0.222 | 0.007 | 0.557 | 0.028 | 0.287 |
| 133| 0.008 | 0.428 | -0.022 | 0.237 | 0.012 | 0.396 |
| 134| 0 | 0.839 | -0.008 | 0.585 | -0.011 | 0.338 |
| 135| -0.008 | 0.423 | -0.022 | 0.292 | -0.03 | 0.271 |
| 136| -0.018 | 0.308 | -0.022 | 0.299 | 0.016 | 0.304 |
| 137| 0.005 | 0.826 | -0.007 | 0.432 | 0.001 | 0.662 |
| 138| 0.009 | 0.408 | 0.017 | 0.355 | 0.001 | 0.984 |
| pm5-pm6  | -0.025 | 0.283 | -0.012 | 0.356 | 0.015 | 0.317 |
|---------|--------|-------|--------|-------|-------|-------|
| pm5-pm7 | -0.003 | 0.692 | -0.003 | 0.635 | -0.003 | 0.972 |
| pm5-pm8 | 0.033  | 0.2    | 0.006  | 0.459 | 0.008 | 0.463 |
| pm5-pm9 | -0.083 | 0.017  | -0.06  | 0.034 | -0.071 | 0.013 |
| pm5-pm10| -0.383 | <0.001 | -0.381 | <0.001 | -0.382 | <0.001|
| pm5-pm11| 0.018  | 0.374  | 0.027  | 0.281 | 0.019 | 0.307 |
| pm5-pm12| 0.023  | 0.274  | 0.017  | 0.4   | 0.007 | 0.554 |
| pm5-pm13| 0.011  | 0.314  | -0.013 | 0.303 | 0.021 | 0.244 |
| pm5-pm14| -0.029 | 0.2    | 0.003  | 0.953 | 0    | 0.827 |
| pm5-pm15| -0.065 | 0.032  | -0.029 | 0.253 | -0.05 | 0.192 |
| pm5-pm16| -0.1   | 0.006  | -0.075 | 0.011 | -0.079 | 0.015 |
| pm5-pm17| -0.001 | 0.603  | 0.016  | 0.358 | 0.039 | 0.273 |
| pm5-pm18| -0.059 | 0.038  | -0.077 | 0.013 | -0.059 | 0.034 |
| pm5-pm19| 0.027  | 0.239  | -0.007 | 0.5   | -0.007 | 0.594 |
| pm5-pm20| -0.018 | 0.337  | 0.004  | 0.693 | -0.016 | 0.375 |
| pm5-pm21| -0.369 | <0.001 | -0.358 | <0.001 | -0.33 | <0.001|
| pm5-pm22| -0.006 | 0.482  | 0.018  | 0.3   | -0.001 | 0.795 |
| pm5-pm23| 0.005  | 0.509  | 0.024  | 0.214 | 0.02  | 0.32  |
| pm5-pm24| -0.029 | 0.224  | -0.022 | 0.249 | 0.002 | 0.983 |
| pm5-pm25| -0.014 | 0.31   | 0.011  | 0.395 | -0.02 | 0.256 |
| pm5-pm26| -0.02  | 0.269  | -0.01  | 0.44  | 0.014 | 0.319 |
| pm5-pm27| 0.014  | 0.371  | -0.024 | 0.23  | -0.021 | 0.229 |
| pm5-pm28| 0.005  | 0.843  | 0.017  | 0.379 | 0.001 | 0.976 |
| pm5-pm29| 0.002  | 0.692  | -0.008 | 0.56  | -0.002 | 0.614 |
| pm5-pm30| -0.041 | 0.151  | 0.006  | 0.503 | -0.021 | 0.274 |
| pm5-pm31| 0.034  | 0.2    | 0.032  | 0.214 | -0.004 | 0.913 |
| pm5-pm32| 0.005  | 0.588  | 0.025  | 0.274 | 0.023 | 0.297 |
| pm5-pm33| 0.005  | 0.687  | -0.019 | 0.37  | 0.004 | 0.661 |
| pm5-pm34| -0.007 | 0.483  | -0.022 | 0.266 | -0.049 | 0.153 |
| pm5-pm35| -0.004 | 0.885  | 0.005  | 0.711 | 0.016 | 0.397 |
|      | pm5-pm36 | -0.004 | 0.918 | 0 | 0.875 | -0.024 | 0.211 |
|------|----------|--------|-------|---|-------|--------|-------|
| 169  | pm5-pm37 | -0.002 | 0.815 | 0.006 | 0.512 | -0.012 | 0.38  |
| 170  | pm6-pm7  | -0.05  | 0.031 | -0.018 | 0.335 | -0.022 | 0.245 |
| 171  | pm6-pm8  | 0.033 | 0.28  | 0.026 | 0.286 | 0.002 | 0.865 |
| 172  | pm6-pm9  | -0.443 | <0.001 | -0.444 | <0.001 | -0.461 | <0.001 |
| 173  | pm6-pm10 | -0.393 | <0.001 | -0.415 | <0.001 | -0.416 | <0.001 |
| 174  | pm6-pm11 | -0.021 | 0.256 | 0.007 | 0.518 | 0.001 | 0.794 |
| 175  | pm6-pm12 | 0.006 | 0.579 | 0.015 | 0.388 | -0.001 | 0.683 |
| 176  | pm6-pm13 | -0.06 | 0.045 | -0.058 | 0.023 | -0.049 | 0.173 |
| 177  | pm6-pm14 | 0.008 | 0.445 | -0.004 | 0.842 | 0.012 | 0.387 |
| 178  | pm6-pm15 | -0.081 | 0.013 | -0.084 | 0.013 | -0.043 | 0.198 |
| 179  | pm6-pm16 | -0.032 | 0.211 | -0.058 | 0.045 | -0.052 | 0.022 |
| 180  | pm6-pm17 | 0.014 | 0.308 | -0.009 | 0.559 | -0.015 | 0.387 |
| 181  | pm6-pm18 | 0.025 | 0.25  | 0.03  | 0.206 | 0.01  | 0.431 |
| 182  | pm6-pm19 | 0.012 | 0.318 | 0.009 | 0.451 | 0.019 | 0.327 |
| 183  | pm6-pm20 | 0.01  | 0.317 | 0.012 | 0.376 | 0.017 | 0.318 |
| 184  | pm6-pm21 | -0.373 | <0.001 | -0.368 | <0.001 | -0.354 | <0.001 |
| 185  | pm6-pm22 | 0.002 | 0.714 | 0.009 | 0.591 | -0.02 | 0.293 |
| 186  | pm6-pm23 | 0.011 | 0.321 | -0.013 | 0.39  | -0.01 | 0.51  |
| 187  | pm6-pm24 | 0.01  | 0.38  | -0.028 | 0.284 | 0.001 | 0.866 |
| 188  | pm6-pm25 | 0.019 | 0.322 | 0.007 | 0.444 | 0.022 | 0.235 |
| 189  | pm6-pm26 | -0.017 | 0.398 | -0.013 | 0.323 | -0.015 | 0.323 |
| 190  | pm6-pm27 | 0.037 | 0.264 | 0.013 | 0.321 | 0.025 | 0.276 |
| 191  | pm6-pm28 | -0.004 | 0.859 | 0.031 | 0.25  | 0.028 | 0.261 |
| 192  | pm6-pm29 | 0.013 | 0.331 | -0.024 | 0.239 | 0.017 | 0.394 |
| 193  | pm6-pm30 | 0.028 | 0.282 | -0.007 | 0.528 | 0.029 | 0.288 |
| 194  | pm6-pm31 | 0.041 | 0.175 | 0.045 | 0.186 | 0.033 | 0.216 |
| 195  | pm6-pm32 | -0.015 | 0.329 | 0.021 | 0.275 | -0.012 | 0.366 |
| 196  | pm6-pm33 | -0.019 | 0.31  | -0.025 | 0.206 | 0.017 | 0.357 |
| 197  | pm6-pm34 | -0.018 | 0.356 | -0.006 | 0.538 | -0.019 | 0.394 |
|   | pm6-pm35 | pm6-pm36 | pm6-pm37 | pm7-pm8 | pm7-pm9 | pm7-pm10 | pm7-pm11 | pm7-pm12 | pm7-pm13 | pm7-pm14 | pm7-pm15 | pm7-pm16 | pm7-pm17 | pm7-pm18 | pm7-pm19 | pm7-pm20 | pm7-pm21 | pm7-pm22 | pm7-pm23 | pm7-pm24 | pm7-pm25 | pm7-pm26 | pm7-pm27 | pm7-pm28 | pm7-pm29 | pm7-pm30 | pm7-pm31 | pm7-pm32 | pm7-pm33 | pm7-pm34 |
|---|----------|----------|----------|---------|---------|----------|----------|----------|---------|---------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 199 | -0.017   | 0.379    | 0.001    | 0.943   | 0.015   | 0.395    | 200 | -0.021   | 0.261    | -0.014   | 0.33    | 0.013    | 0.336    | 201 | 0.017    | 0.334    | 0.019    | 0.348   | 0.004   | 0.645    | 202 | 0.007    | 0.459    | -0.017   | 0.376   | -0.008   | 0.488    | 203 | -0.425   | <0.001   | -0.432   | <0.001   | -0.462   | <0.001    | 204 | 0.379    | <0.001   | 0.361    | <0.001   | 0.333    | <0.001    | 205 | 0.004    | 0.749    | -0.01    | 0.488   | -0.004   | 0.967    | 206 | -0.024   | 0.218    | -0.035   | 0.2     | -0.035   | 0.298    | 207 | 0.195    | 0.005    | 0.147    | 0.007   | 0.155    | 0.003    | 208 | 0.147    | 0.007    | 0.141    | 0.007   | 0.127    | 0.007    | 209 | 0.045    | 0.17     | 0.035    | 0.247   | 0.028    | 0.253    | 210 | -0.115   | 0.007    | -0.119   | 0.006   | -0.091   | 0.016    | 211 | -0.006   | 0.592    | 0.002    | 0.929   | -0.006   | 0.597    | 212 | -0.009   | 0.428    | -0.024   | 0.281   | -0.023   | 0.204    | 213 | -0.066   | 0.037    | -0.034   | 0.22    | -0.063   | 0.036    | 214 | -0.013   | 0.346    | 0.006    | 0.532   | -0.013   | 0.39     | 215 | 0.405    | <0.001   | 0.434    | <0.001   | 0.359    | <0.001    | 216 | -0.252   | <0.001   | -0.292   | <0.001   | -0.293   | <0.001    | 217 | -0.248   | <0.001   | -0.253   | <0.001   | -0.23    | <0.001    | 218 | -0.182   | 0.002    | -0.196   | 0.003   | -0.202   | <0.001    | 219 | -0.25    | <0.001   | -0.275   | <0.001   | -0.27    | <0.001    | 220 | -0.314   | <0.001   | -0.314   | <0.001   | -0.274   | <0.001    | 221 | -0.222   | <0.001   | -0.236   | <0.001   | -0.213   | <0.001    | 222 | -0.2    | 0.003    | -0.21    | <0.001   | -0.196   | 0.002    | 223 | -0.207   | <0.001   | -0.216   | <0.001   | -0.207   | <0.001    | 224 | -0.249   | <0.001   | -0.222   | <0.001   | -0.254   | <0.001    | 225 | -0.177   | 0.002    | -0.204   | <0.001   | -0.2    | 0.002    | 226 | -0.21    | <0.001   | -0.19    | 0.004   | -0.215   | <0.001    | 227 | -0.252   | <0.001   | -0.287   | <0.001   | -0.248   | <0.001    | 228 | -0.209   | <0.001   | -0.179   | 0.005   | -0.182   | 0.002    |
| pm7-pm35 | -0.14 | 0.01 | -0.144 | 0.009 | -0.167 | 0.003 |
| pm7-pm36 | -0.19 | 0.004 | -0.198 | 0.004 | -0.203 | <0.001 |
| pm7-pm37 | -0.257 | <0.001 | -0.24 | <0.001 | -0.263 | <0.001 |
| pm8-pm9  | 0.017 | 0.358 | 0.011 | 0.379 | -0.008 | 0.421 |
| pm8-pm10 | -0.603 | <0.001 | -0.591 | <0.001 | -0.626 | <0.001 |
| pm8-pm11 | 0.003 | 0.836 | 0.008 | 0.483 | 0.006 | 0.436 |
| pm8-pm12 | -0.012 | 0.337 | -0.003 | 0.814 | 0.027 | 0.247 |
| pm8-pm13 | -0.016 | 0.395 | 0.007 | 0.489 | -0.018 | 0.366 |
| pm8-pm14 | -0.021 | 0.252 | -0.014 | 0.326 | -0.043 | 0.198 |
| pm8-pm15 | -0.076 | 0.016 | -0.098 | 0.019 | -0.061 | 0.029 |
| pm8-pm16 | -0.062 | 0.023 | -0.038 | 0.28 | -0.05 | 0.176 |
| pm8-pm17 | 0.022 | 0.287 | 0.003 | 0.798 | 0.039 | 0.233 |
| pm8-pm18 | 0.015 | 0.341 | 0.015 | 0.346 | 0.001 | 0.913 |
| pm8-pm19 | -0.021 | 0.257 | 0.007 | 0.472 | -0.033 | 0.209 |
| pm8-pm20 | 0.002 | 0.856 | 0.004 | 0.75 | 0.001 | 0.736 |
| pm8-pm21 | -0.576 | <0.001 | -0.536 | <0.001 | -0.562 | <0.001 |
| pm8-pm22 | -0.463 | <0.001 | -0.463 | <0.001 | -0.443 | <0.001 |
| pm8-pm23 | 0.001 | 0.652 | 0.008 | 0.518 | -0.017 | 0.394 |
| pm8-pm24 | 0 | 0.808 | 0.024 | 0.255 | -0.002 | 0.766 |
| pm8-pm25 | 0.003 | 0.71 | -0.016 | 0.329 | 0.016 | 0.337 |
| pm8-pm26 | -0.009 | 0.504 | -0.018 | 0.33 | -0.025 | 0.266 |
| pm8-pm27 | 0.001 | 0.99 | 0.047 | 0.201 | 0.005 | 0.481 |
| pm8-pm28 | -0.014 | 0.352 | 0.008 | 0.422 | 0.012 | 0.382 |
| pm8-pm29 | 0.019 | 0.399 | 0.009 | 0.569 | 0.025 | 0.275 |
| pm8-pm30 | 0.026 | 0.282 | 0.005 | 0.502 | 0.022 | 0.219 |
| pm8-pm31 | -0.446 | <0.001 | -0.473 | <0.001 | -0.447 | <0.001 |
| pm8-pm32 | 0.024 | 0.222 | -0.013 | 0.397 | 0.022 | 0.232 |
| pm8-pm33 | -0.036 | 0.232 | -0.007 | 0.405 | -0.029 | 0.265 |
| pm8-pm34 | -0.022 | 0.252 | -0.004 | 0.764 | 0.012 | 0.396 |
| pm8-pm35 | -0.025 | 0.2 | 0.003 | 0.706 | -0.002 | 1 |
|       | pm8-pm36 | pm8-pm37 | pm9-pm10 | pm9-pm11 | pm9-pm12 | pm9-pm13 | pm9-pm14 | pm9-pm15 | pm9-pm16 | pm9-pm17 | pm9-pm18 | pm9-pm19 | pm9-pm20 | pm9-pm21 | pm9-pm22 | pm9-pm23 | pm9-pm24 | pm9-pm25 | pm9-pm26 | pm9-pm27 | pm9-pm28 | pm9-pm29 | pm9-pm30 | pm9-pm31 | pm9-pm32 | pm9-pm33 | pm9-pm34 | pm9-pm35 | pm9-pm36 | pm9-pm37 |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 259   | -0.015   | 0.391    | 0.016    | 0.327    | 0.027    | 0.245    |
| 260   | 0.032    | 0.291    | 0.017    | 0.398    | 0.029    | 0.244    |
| 261   | -0.605   | <0.001   | -0.612   | <0.001   | -0.585   | <0.001   |
| 262   | -0.449   | <0.001   | -0.442   | <0.001   | -0.459   | <0.001   |
| 263   | -0.453   | <0.001   | -0.46    | <0.001   | -0.473   | <0.001   |
| 264   | -0.001   | 0.745    | -0.01    | 0.444    | 0.016    | 0.34     |
| 265   | -0.012   | 0.312    | -0.002   | 0.985    | -0.011   | 0.352    |
| 266   | -0.03    | 0.222    | -0.055   | 0.033    | -0.029   | 0.245    |
| 267   | -0.044   | 0.167    | -0.011   | 0.385    | -0.025   | 0.263    |
| 268   | 0.039    | 0.234    | 0.025    | 0.221    | 0.028    | 0.295    |
| 269   | -0.141   | 0.006    | -0.181   | 0.003    | -0.165   | 0.004    |
| 270   | -0.177   | 0.004    | -0.169   | 0.005    | -0.146   | 0.007    |
| 271   | 0.013    | 0.381    | 0.011    | 0.301    | 0.017    | 0.32     |
| 272   | -0.497   | <0.001   | -0.493   | <0.001   | -0.493   | <0.001   |
| 273   | 0.014    | 0.304    | 0.016    | 0.318    | 0.043    | 0.192    |
| 274   | -0.021   | 0.205    | -0.013   | 0.327    | -0.021   | 0.252    |
| 275   | 0.042    | 0.199    | 0.028    | 0.266    | 0.031    | 0.258    |
| 276   | -0.463   | <0.001   | -0.471   | <0.001   | -0.472   | <0.001   |
| 277   | 0.023    | 0.254    | 0.03     | 0.242    | 0.046    | 0.166    |
| 278   | -0.459   | <0.001   | -0.466   | <0.001   | -0.462   | <0.001   |
| 279   | -0.076   | 0.011    | -0.076   | 0.019    | -0.06    | 0.034    |
| 280   | 0.006    | 0.562    | -0.007   | 0.506    | 0.019    | 0.323    |
| 281   | -0.444   | <0.001   | -0.43    | <0.001   | -0.435   | <0.001   |
| 282   | 0.029    | 0.211    | 0.002    | 0.792    | 0.035    | 0.258    |
| 283   | 0.022    | 0.245    | 0.012    | 0.371    | 0.041    | 0.16     |
| 284   | -0.017   | 0.378    | 0.013    | 0.311    | -0.024   | 0.286    |
| 285   | -0.042   | 0.196    | -0.005   | 0.919    | 0        | 0.668    |
| 286   | 0.046    | 0.2      | 0.043    | 0.164    | 0.017    | 0.358    |
| 287   | -0.479   | <0.001   | -0.473   | <0.001   | -0.45    | <0.001   |
| 288   | 0.021    | 0.228    | 0.021    | 0.217    | 0.006    | 0.424    |
|   | pm10-pm11 | pm10-pm12 | pm10-pm13 | pm10-pm14 | pm10-pm15 | pm10-pm16 | pm10-pm17 | pm10-pm18 | pm10-pm19 | pm10-pm20 | pm10-pm21 | pm10-pm22 | pm10-pm23 | pm10-pm24 | pm10-pm25 | pm10-pm26 | pm10-pm27 | pm10-pm28 | pm10-pm29 | pm10-pm30 | pm10-pm31 | pm10-pm32 | pm10-pm33 | pm10-pm34 | pm10-pm35 | pm10-pm36 | pm10-pm37 | pm11-pm12 | pm11-pm13 | pm11-pm14 |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|----------|----------|----------|
| 289 | -0.365     | <0.001     | -0.353     | <0.001     | -0.362     | <0.001     | -0.392     | <0.001     | -0.391     | <0.001     | -0.372     | <0.001     | -0.442     | <0.001     | 0.144      | 0.009      | 0.166      | 0.003      | 0.095      | 0.017      | -0.424     | <0.001     | -0.422     | <0.001     | -0.447     | <0.001     | 0.01      | 0.368     | 0.032     | 0.218     | 0.012     | 0.326     |
| 290 | -0.392     | <0.001     | -0.391     | <0.001     | -0.372     | <0.001     | -0.392     | <0.001     | -0.422     | <0.001     | -0.447     | <0.001     | -0.445     | <0.001     | -0.421     | <0.001     | -0.444     | <0.001     | -0.415     | <0.001     | -0.386     | <0.001     | -0.404     | <0.001     | 0.012     | 0.365     | 0.006     | 0.49      | -0.04     | 0.232     |
| Time  | Duration | Distance | Vel. | Speed | Acceleration | Heading |
|-------|----------|----------|------|-------|--------------|---------|
| pm11-pm15 | -0.076 | 0.018 | -0.073 | 0.02 | -0.078 | 0.015 |
| pm11-pm16 | -0.053 | 0.036 | -0.009 | 0.522 | -0.042 | 0.158 |
| pm11-pm17 | 0.029 | 0.218 | 0.015 | 0.386 | -0.008 | 0.45 |
| pm11-pm18 | 0.017 | 0.355 | 0.024 | 0.206 | 0.01 | 0.335 |
| pm11-pm19 | -0.003 | 0.85 | 0.014 | 0.345 | -0.005 | 0.652 |
| pm11-pm20 | 0.015 | 0.305 | 0.007 | 0.593 | 0.001 | 0.6 |
| pm11-pm21 | -0.387 | <0.001 | -0.368 | <0.001 | -0.371 | <0.001 |
| pm11-pm22 | 0.048 | 0.2 | 0.034 | 0.257 | 0.032 | 0.247 |
| pm11-pm23 | 0.044 | 0.191 | 0 | 0.973 | 0.006 | 0.576 |
| pm11-pm24 | 0.003 | 0.933 | -0.021 | 0.214 | -0.001 | 0.781 |
| pm11-pm25 | -0.015 | 0.37 | 0.015 | 0.305 | -0.004 | 0.638 |
| pm11-pm26 | -0.011 | 0.393 | -0.017 | 0.376 | -0.013 | 0.359 |
| pm11-pm27 | 0.024 | 0.284 | 0.028 | 0.258 | 0.007 | 0.534 |
| pm11-pm28 | 0.027 | 0.216 | 0.001 | 0.852 | -0.001 | 0.696 |
| pm11-pm29 | -0.022 | 0.3 | -0.033 | 0.235 | -0.007 | 0.459 |
| pm11-pm30 | 0.023 | 0.214 | 0.008 | 0.521 | 0.022 | 0.259 |
| pm11-pm31 | -0.002 | 0.988 | 0.027 | 0.229 | 0.016 | 0.306 |
| pm11-pm32 | 0.004 | 0.795 | -0.007 | 0.556 | -0.003 | 0.808 |
| pm11-pm33 | -0.019 | 0.308 | 0.017 | 0.3 | 0.025 | 0.233 |
| pm11-pm34 | -0.046 | 0.164 | -0.031 | 0.28 | -0.053 | 0.036 |
| pm11-pm35 | -0.003 | 0.651 | 0.019 | 0.331 | 0.032 | 0.233 |
| pm11-pm36 | 0.016 | 0.309 | -0.013 | 0.358 | -0.015 | 0.316 |
| pm11-pm37 | -0.011 | 0.363 | 0.004 | 0.948 | 0.005 | 0.963 |
| pm12-pm13 | -0.017 | 0.348 | -0.047 | 0.165 | -0.036 | 0.201 |
| pm12-pm14 | 0.019 | 0.368 | 0.001 | 0.736 | 0.014 | 0.367 |
| pm12-pm15 | -0.065 | 0.021 | -0.08 | 0.012 | -0.093 | 0.012 |
| pm12-pm16 | -0.065 | 0.028 | -0.041 | 0.197 | -0.054 | 0.024 |
| pm12-pm17 | -0.004 | 0.838 | 0.008 | 0.479 | 0.018 | 0.365 |
| pm12-pm18 | -0.004 | 0.675 | 0.002 | 0.651 | -0.024 | 0.252 |
| pm12-pm19 | -0.008 | 0.53 | 0.002 | 0.709 | 0.022 | 0.298 |
|   | pm12-pm20  | pm12-pm21  | pm12-pm22  | pm12-pm23  | pm12-pm24  | pm12-pm25  |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| 349| 0.023     | 0.272     | 0.02      | 0.295     | 0.021     | 0.265     |
| 350| -0.386    | <0.001    | -0.4      | <0.001    | -0.375    | <0.001    |
| 351| 0.029     | 0.231     | 0.019     | 0.364     | -0.007    | 0.479     |
| 352| 0.007     | 0.503     | 0.027     | 0.272     | 0.034     | 0.244     |
| 353| 0.003     | 0.688     | 0.02      | 0.377     | 0.02      | 0.336     |
| 354| -0.01     | 0.524     | 0.002     | 0.683     | 0.021     | 0.247     |
| 355| -0.013    | 0.398     | -0.01     | 0.419     | 0.009     | 0.592     |
| 356| 0.019     | 0.34      | 0.008     | 0.405     | 0.018     | 0.305     |
| 357| 0.009     | 0.465     | 0.022     | 0.234     | -0.016    | 0.343     |
| 358| -0.004    | 0.976     | 0.03      | 0.259     | 0.021     | 0.224     |
| 359| -0.251    | <0.001    | -0.27     | <0.001    | -0.255    | <0.001    |
| 360| -0.01     | 0.361     | -0.005    | 0.446     | -0.01     | 0.434     |
| 361| 0.027     | 0.229     | 0.016     | 0.349     | -0.002    | 0.895     |
| 362| 0.001     | 0.689     | 0.002     | 0.662     | -0.028    | 0.238     |
| 363| -0.031    | 0.274     | -0.016    | 0.31      | -0.046    | 0.161     |
| 364| -0.002    | 0.955     | -0.007    | 0.475     | -0.028    | 0.295     |
| 365| 0.033     | 0.231     | 0.017     | 0.363     | 0.027     | 0.232     |
| 366| -0.012    | 0.357     | 0.017     | 0.346     | 0.021     | 0.24      |
| 367| 0.022     | 0.154     | 0.019     | 0.252     | 0.0180    | 0.341     |
| 368| -0.101    | 0.01      | -0.137    | 0.01      | -0.129    | 0.009     |
| 369| -0.098    | 0.015     | -0.05     | 0.184     | -0.071    | 0.015     |
| 370| -0.119    | 0.007     | -0.077    | 0.016     | -0.082    | 0.017     |
| 371| -0.012    | 0.348     | -0.016    | 0.376     | -0.056    | 0.043     |
| 372| -0.009    | 0.478     | 0.016     | 0.399     | -0.025    | 0.268     |
| 373| -0.048    | 0.2       | -0.013    | 0.326     | -0.009    | 0.594     |
| 374| -0.407    | <0.001    | -0.388    | <0.001    | -0.378    | <0.001    |
| 375| 0.007     | 0.572     | -0.034    | 0.252     | -0.023    | 0.292     |
| 376| -0.037    | 0.23      | -0.046    | 0.167     | -0.015    | 0.386     |
| 377| -0.011    | 0.313     | -0.004    | 0.97      | -0.047    | 0.167     |
| 378| -0.029    | 0.208     | -0.028    | 0.284     | -0.03     | 0.272     |
|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 379 | pm13-pm26 | -0.024 | 0.214 | -0.013 | 0.33 | -0.037 | 0.251 |
| 380 | pm13-pm27 | -0.01 | 0.4 | -0.048 | 0.159 | -0.043 | 0.178 |
| 381 | pm13-pm28 | -0.026 | 0.283 | -0.022 | 0.226 | -0.017 | 0.309 |
| 382 | pm13-pm29 | -0.054 | 0.026 | -0.071 | 0.012 | -0.076 | 0.013 |
| 383 | pm13-pm30 | -0.034 | 0.253 | -0.057 | 0.023 | -0.036 | 0.246 |
| 384 | pm13-pm31 | -0.029 | 0.289 | -0.032 | 0.243 | -0.003 | 0.725 |
| 385 | pm13-pm32 | 0.015 | 0.351 | 0.008 | 0.442 | 0.008 | 0.477 |
| 386 | pm13-pm33 | 0 | 0.901 | -0.019 | 0.333 | 0.005 | 0.729 |
| 387 | pm13-pm34 | -0.045 | 0.161 | -0.042 | 0.2 | -0.029 | 0.232 |
| 388 | pm13-pm35 | -0.034 | 0.298 | -0.014 | 0.335 | -0.032 | 0.23 |
| 389 | pm13-pm36 | -0.038 | 0.217 | -0.003 | 0.747 | -0.046 | 0.177 |
| 390 | pm13-pm37 | -0.032 | 0.259 | -0.03 | 0.224 | -0.016 | 0.328 |
| 391 | pm14-pm15 | -0.118 | 0.008 | -0.08 | 0.011 | -0.085 | 0.019 |
| 392 | pm14-pm16 | -0.129 | 0.006 | -0.127 | 0.01 | -0.138 | 0.005 |
| 393 | pm14-pm17 | -0.054 | 0.035 | -0.022 | 0.276 | -0.022 | 0.264 |
| 394 | pm14-pm18 | -0.026 | 0.263 | -0.035 | 0.29 | -0.032 | 0.278 |
| 395 | pm14-pm19 | -0.041 | 0.194 | -0.012 | 0.342 | -0.011 | 0.362 |
| 396 | pm14-pm20 | -0.014 | 0.358 | -0.002 | 0.914 | -0.003 | 0.7 |
| 397 | pm14-pm21 | -0.421 | -0.001 | -0.422 | -0.001 | -0.415 | -0.001 |
| 398 | pm14-pm22 | -0.014 | 0.313 | -0.014 | 0.333 | 0.007 | 0.478 |
| 399 | pm14-pm23 | -0.006 | 0.427 | -0.01 | 0.325 | -0.014 | 0.357 |
| 400 | pm14-pm24 | 0.012 | 0.305 | -0.021 | 0.266 | 0.002 | 0.693 |
| 401 | pm14-pm25 | 0.013 | 0.388 | 0.022 | 0.24 | 0.024 | 0.299 |
| 402 | pm14-pm26 | -0.024 | 0.283 | -0.032 | 0.287 | -0.033 | 0.21 |
| 403 | pm14-pm27 | -0.016 | 0.314 | -0.042 | 0.163 | -0.027 | 0.233 |
| 404 | pm14-pm28 | 0.004 | 0.622 | 0.005 | 0.785 | 0.028 | 0.238 |
| 405 | pm14-pm29 | -0.016 | 0.32 | -0.023 | 0.245 | -0.041 | 0.198 |
| 406 | pm14-pm30 | 0.002 | 0.866 | -0.017 | 0.368 | -0.012 | 0.38 |
| 407 | pm14-pm31 | -0.019 | 0.308 | -0.002 | 0.825 | -0.036 | 0.208 |
| 408 | pm14-pm32 | -0.034 | 0.223 | -0.018 | 0.306 | -0.052 | 0.039 |
|        | pm14-pm33 |   | pm14-pm34 |   | pm14-pm35 |   | pm14-pm36 |   | pm14-pm37 |   | pm14-pm38 |   | pm14-pm39 |   | pm14-pm40 |   | pm14-pm41 |   | pm14-pm42 |   |
|--------|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|-----------|---|
| 409    | -0.002    |   | 0.926     |   | -0.004    |   | 0.754     |   | -0.017    |   | 0.323     |   |           |   |           |   |           |   |
| 410    | 0.009     |   | 0.56      |   | -0.007    |   | 0.531     |   | -0.025    |   | 0.292     |   |           |   |           |   |           |   |
| 411    | -0.035    |   | 0.205     |   | -0.024    |   | 0.286     |   | -0.015    |   | 0.381     |   |           |   |           |   |           |   |
| 412    | 0.002     |   | 0.812     |   | 0.012     |   | 0.357     |   | -0.01     |   | 0.599     |   |           |   |           |   |           |   |
| 413    | 0.037     |   | 0.241     |   | 0.012     |   | 0.34      |   | 0.006     |   | 0.535     |   |           |   |           |   |           |   |
| 414    | -0.146    |   | 0.005     |   | -0.143    |   | 0.009     |   | -0.108    |   | 0.009     |   |           |   |           |   |           |   |
| 415    | -0.084    |   | 0.012     |   | -0.111    |   | 0.009     |   | -0.084    |   | 0.014     |   |           |   |           |   |           |   |
| 416    | -0.044    |   | 0.176     |   | -0.044    |   | 0.167     |   | -0.035    |   | 0.222     |   |           |   |           |   |           |   |
| 417    | -0.042    |   | 0.191     |   | -0.072    |   | 0.012     |   | -0.054    |   | 0.023     |   |           |   |           |   |           |   |
| 418    | -0.052    |   | 0.043     |   | -0.067    |   | 0.024     |   | -0.057    |   | 0.042     |   |           |   |           |   |           |   |
| 419    | -0.381    |   | <0.001    |   | -0.365    |   | <0.001    |   | -0.357    |   | <0.001    |   |           |   |           |   |           |   |
| 420    | -0.065    |   | 0.021     |   | -0.076    |   | 0.019     |   | -0.053    |   | 0.022     |   |           |   |           |   |           |   |
| 421    | -0.111    |   | 0.008     |   | -0.085    |   | 0.014     |   | -0.116    |   | 0.009     |   |           |   |           |   |           |   |
| 422    | -0.044    |   | 0.188     |   | -0.044    |   | 0.161     |   | -0.087    |   | 0.01      |   |           |   |           |   |           |   |
| 423    | -0.064    |   | 0.042     |   | -0.053    |   | 0.041     |   | -0.045    |   | 0.151     |   |           |   |           |   |           |   |
| 424    | -0.038    |   | 0.242     |   | -0.055    |   | 0.034     |   | -0.075    |   | 0.013     |   |           |   |           |   |           |   |
| 425    | -0.075    |   | 0.018     |   | -0.04     |   | 0.157     |   | -0.059    |   | 0.037     |   |           |   |           |   |           |   |
| 426    | -0.087    |   | 0.017     |   | -0.085    |   | 0.014     |   | -0.111    |   | 0.007     |   |           |   |           |   |           |   |
| 427    | -0.092    |   | 0.015     |   | -0.103    |   | 0.006     |   | -0.096    |   | 0.019     |   |           |   |           |   |           |   |
| 428    | -0.034    |   | 0.218     |   | -0.042    |   | 0.199     |   | -0.026    |   | 0.263     |   |           |   |           |   |           |   |
| 429    | -0.049    |   | 0.154     |   | -0.071    |   | 0.019     |   | -0.054    |   | 0.033     |   |           |   |           |   |           |   |
| 430    | -0.102    |   | 0.006     |   | -0.067    |   | 0.028     |   | -0.061    |   | 0.034     |   |           |   |           |   |           |   |
| 431    | -0.094    |   | 0.018     |   | -0.067    |   | 0.043     |   | -0.058    |   | 0.03      |   |           |   |           |   |           |   |
| 432    | -0.064    |   | 0.045     |   | -0.058    |   | 0.034     |   | -0.045    |   | 0.173     |   |           |   |           |   |           |   |
| 433    | -0.095    |   | 0.011     |   | -0.082    |   | 0.012     |   | -0.064    |   | 0.021     |   |           |   |           |   |           |   |
| 434    | -0.04     |   | 0.163     |   | -0.061    |   | 0.027     |   | -0.063    |   | 0.02      |   |           |   |           |   |           |   |
| 435    | -0.064    |   | 0.036     |   | -0.054    |   | 0.038     |   | -0.07     |   | 0.027     |   |           |   |           |   |           |   |
| 436    | 0.235     |   | <0.001    |   | 0.256     |   | <0.001    |   | 0.192     |   | 0.001     |   |           |   |           |   |           |   |
| 437    | -0.048    |   | 0.161     |   | -0.057    |   | 0.044     |   | -0.048    |   | 0.186     |   |           |   |           |   |           |   |
| 438    | -0.096    |   | 0.012     |   | -0.068    |   | 0.038     |   | -0.075    |   | 0.014     |   |           |   |           |   |           |   |
|   | pm16-pm20 | 0.19 | -0.098 | 0.033 | -0.075 | 0.016 |
|---|-----------|------|--------|-------|--------|-------|
| 440 | pm16-pm21 | -0.38 | <0.001 | -0.357 | <0.001 | -0.371 | <0.001 |
| 441 | pm16-pm22 | -0.023 | 0.267 | -0.036 | 0.217 | -0.056 | 0.03 |
| 442 | pm16-pm23 | -0.083 | 0.01 | -0.061 | 0.036 | -0.081 | 0.015 |
| 443 | pm16-pm24 | -0.093 | 0.02 | -0.082 | 0.01 | -0.103 | 0.008 |
| 444 | pm16-pm25 | -0.065 | 0.035 | -0.072 | 0.016 | -0.028 | 0.255 |
| 445 | pm16-pm26 | -0.062 | 0.031 | -0.033 | 0.281 | -0.053 | 0.045 |
| 446 | pm16-pm27 | -0.062 | 0.043 | -0.051 | 0.029 | -0.081 | 0.015 |
| 447 | pm16-pm28 | -0.058 | 0.042 | -0.068 | 0.021 | -0.088 | 0.019 |
| 448 | pm16-pm29 | -0.072 | 0.018 | -0.051 | 0.03 | -0.07 | 0.015 |
| 449 | pm16-pm30 | -0.09 | 0.017 | -0.091 | 0.015 | -0.098 | 0.014 |
| 450 | pm16-pm31 | -0.024 | 0.257 | -0.011 | 0.345 | -0.011 | 0.38 |
| 451 | pm16-pm32 | -0.1 | 0.008 | -0.072 | 0.011 | -0.085 | 0.018 |
| 452 | pm16-pm33 | -0.021 | 0.221 | -0.03 | 0.294 | -0.017 | 0.333 |
| 453 | pm16-pm34 | -0.061 | 0.022 | -0.077 | 0.013 | -0.088 | 0.018 |
| 454 | pm16-pm35 | -0.052 | 0.042 | -0.071 | 0.017 | -0.056 | 0.028 |
| 455 | pm16-pm36 | -0.05 | 0.032 | -0.095 | 0.015 | -0.084 | 0.014 |
| 456 | pm16-pm37 | -0.05 | 0.18 | -0.093 | 0.018 | -0.08 | 0.018 |
| 457 | pm17-pm18 | 0.041 | 0.164 | 0.03 | 0.226 | 0.028 | 0.258 |
| 458 | pm17-pm19 | -0.007 | 0.452 | -0.001 | 0.991 | -0.002 | 0.889 |
| 459 | pm17-pm20 | -0.046 | 0.163 | -0.023 | 0.289 | -0.001 | 0.918 |
| 460 | pm17-pm21 | -0.273 | <0.001 | -0.255 | <0.001 | -0.244 | <0.001 |
| 461 | pm17-pm22 | 0.016 | 0.366 | 0.022 | 0.223 | 0.031 | 0.287 |
| 462 | pm17-pm23 | -0.012 | 0.327 | -0.018 | 0.32 | 0.007 | 0.43 |
| 463 | pm17-pm24 | -0.019 | 0.358 | 0.006 | 0.529 | -0.016 | 0.356 |
| 464 | pm17-pm25 | 0.038 | 0.263 | 0.033 | 0.234 | 0.015 | 0.39 |
| 465 | pm17-pm26 | -0.033 | 0.291 | -0.035 | 0.271 | -0.034 | 0.274 |
| 466 | pm17-pm27 | -0.043 | 0.2 | -0.048 | 0.18 | -0.029 | 0.22 |
| 467 | pm17-pm28 | -0.011 | 0.347 | 0.027 | 0.269 | 0.002 | 0.957 |
| 468 | pm17-pm29 | 0.034 | 0.253 | 0.003 | 0.825 | 0.008 | 0.519 |
|   | pm17-pm30     | -0.025 |    0.259 | -0.018 |    0.365 |    0.014 |    0.369 |
|---|---------------|--------|----------|--------|----------|----------|----------|
| 470| pm17-pm31     | -0.025 |    0.282 | -0.023 |    0.246 | -0.013   |    0.328 |
| 471| pm17-pm32     | -0.045 |    0.154 | -0.041 |    0.176 | -0.008   |    0.517 |
| 472| pm17-pm33     | -0.012 |    0.381 |    0.01  |    0.429 | -0.011   |    0.32  |
| 473| pm17-pm34     | -0.018 |    0.309 | -0.003  |    0.657 | -0.031   |    0.297 |
| 474| pm17-pm35     |    0.026 |    0.227 |      0.02 |    0.318 |    0.026 |    0.26  |
| 475| pm17-pm36     | -0.036 |    0.209 | -0.037  |    0.292 |    0.007 |    0.504 |
| 476| pm17-pm37     |    0.026 |    0.245 |    0.014 |    0.35  |    0.001 |    0.683 |
| 477| pm18-pm19     |    0.035 |    0.239 |    0.004 |    0.969 |    0.021 |    0.226 |
| 478| pm18-pm20     |    0.0  |    0.803 |    0.005 |    0.438 | -0.004   |    0.934 |
| 479| pm18-pm21     | -0.353 | <0.001  |    0.379 | <0.001  | -0.354   | <0.001  |
| 480| pm18-pm22     | -0.443 | <0.001  |    0.465 | <0.001  | -0.462   | <0.001  |
| 481| pm18-pm23     |    0.04  |    0.163 |    0.032 |    0.231 |    0.031 |    0.26  |
| 482| pm18-pm24     | -0.473 | <0.001  |    0.49  | <0.001  | -0.454   | <0.001  |
| 483| pm18-pm25     |    0.045 |    0.196 |    0.022 |    0.21  |    0.028 |    0.209 |
| 484| pm18-pm26     |    0.033 |    0.268 |    0.026 |    0.294 |    0.016 |    0.362 |
| 485| pm18-pm27     |    0.026 |    0.292 |    0.022 |    0.223 |    0.03  |    0.207 |
| 486| pm18-pm28     |    0.028 |    0.225 |    0.01  |    0.516 |    0.006 |    0.559 |
| 487| pm18-pm29     |    0.0  |    0.678 |    0.022 |    0.204 |    0.034 |    0.217 |
| 488| pm18-pm30     | -0.444 | <0.001  |    0.453 | <0.001  | -0.438   | <0.001  |
| 489| pm18-pm31     |    0.013 |    0.343 |      0    |    0.913 |    0.036 |    0.291 |
| 490| pm18-pm32     |    0.026 |    0.288 |    0.019 |    0.39  |    0.019 |    0.317 |
| 491| pm18-pm33     |    0.018 |    0.312 | -0.011  |    0.379 |    0.02  |    0.4   |
| 492| pm18-pm34     |    0.017 |    0.341 |    0.022 |    0.295 |    0.031 |    0.225 |
| 493| pm18-pm35     | -0.484 | <0.001  |    0.487 | <0.001  | -0.46    | <0.001  |
| 494| pm18-pm36     |    0.014 |    0.345 |    0.034 |    0.22  |    0.04  |    0.194 |
| 495| pm18-pm37     |    0.031 |    0.254 |    0.02  |    0.208 |    0.032 |    0.283 |
| 496| pm19-pm20     | -0.027 |    0.272 | -0.017  |    0.359 | -0.038   |    0.211 |
| 497| pm19-pm21     | -0.362 | <0.001  |    0.375 | <0.001  | -0.346   | <0.001  |
| 498| pm19-pm22     |    0.03  |    0.249 |    0.043 |    0.193 |    0.033 |    0.299 |
|    | pm19-pm23 | 0.018 | 0.374 | -0.015 | 0.378 | 0 | 0.669 |
|----|-----------|-------|-------|--------|-------|---|-------|
| 500| pm19-pm24 | 0     | 0.865 | -0.008 | 0.509 | 0.019 | 0.331 |
| 501| pm19-pm25 | -0.001| 0.66  | 0.015  | 0.384 | 0.011 | 0.331 |
| 502| pm19-pm26 | 0.002 | 0.618 | 0.004  | 0.873 | 0.022 | 0.296 |
| 503| pm19-pm27 | 0.017 | 0.36  | 0.021  | 0.233 | 0.012 | 0.359 |
| 504| pm19-pm28 | 0.002 | 0.791 | 0.014  | 0.33  | 0.014 | 0.399 |
| 505| pm19-pm29 | -0.019| 0.355 | -0.006 | 0.434 | 0.001 | 0.605 |
| 506| pm19-pm30 | -0.013| 0.312 | -0.027 | 0.221 | -0.027| 0.249 |
| 507| pm19-pm31 | -0.012| 0.314 | 0.002  | 0.756 | -0.009| 0.449 |
| 508| pm19-pm32 | 0.009 | 0.436 | -0.011 | 0.304 | -0.011| 0.398 |
| 509| pm19-pm33 | -0.01 | 0.346 | -0.032 | 0.262 | 0.007 | 0.456 |
| 510| pm19-pm34 | -0.551| <0.001| -0.536 | <0.001| -0.552| <0.001|
| 511| pm19-pm35 | 0.021 | 0.263 | 0.011  | 0.328 | 0.024 | 0.26  |
| 512| pm19-pm36 | 0.007 | 0.441 | 0.006  | 0.474 | -0.019| 0.365 |
| 513| pm19-pm37 | -0.003| 0.704 | 0.023  | 0.264 | 0.013 | 0.353 |
| 514| pm20-pm21 | -0.349| <0.001| -0.355 | <0.001| -0.385| <0.001|
| 515| pm20-pm22 | 0.024 | 0.234 | 0.025  | 0.212 | 0.005 | 0.586 |
| 516| pm20-pm23 | 0.014 | 0.345 | 0.035  | 0.299 | 0.04  | 0.219 |
| 517| pm20-pm24 | 0.012 | 0.348 | 0.014  | 0.397 | 0.022 | 0.288 |
| 518| pm20-pm25 | 0.02  | 0.22  | 0.015  | 0.368 | -0.008| 0.415 |
| 519| pm20-pm26 | 0.031 | 0.274 | -0.003 | 0.674 | 0.038 | 0.221 |
| 520| pm20-pm27 | 0.022 | 0.231 | -0.003 | 0.669 | 0.033 | 0.238 |
| 521| pm20-pm28 | 0.012 | 0.361 | 0.024  | 0.295 | -0.008| 0.503 |
| 522| pm20-pm29 | 0.004 | 0.739 | -0.044 | 0.178 | -0.013| 0.324 |
| 523| pm20-pm30 | -0.057| 0.027 | -0.092 | 0.018 | -0.071| 0.017 |
| 524| pm20-pm31 | 0.008 | 0.422 | 0.031  | 0.277 | 0.026 | 0.292 |
| 525| pm20-pm32 | 0.004 | 0.663 | -0.009 | 0.466 | -0.006| 0.535 |
| 526| pm20-pm33 | 0.037 | 0.259 | 0.013  | 0.375 | 0.007 | 0.427 |
| 527| pm20-pm34 | -0.034| 0.28  | -0.01  | 0.321 | -0.027| 0.287 |
| 528| pm20-pm35 | -0.016| 0.353 | -0.026 | 0.293 | -0.022| 0.22  |
|   | pm20-pm36   | -0.009 | 0.487 | 0.017 | 0.379 | 0.01 | 0.367 |
|---|-------------|--------|-------|-------|-------|------|-------|
| 530| pm20-pm37   | -0.005 | 0.75  | -0.01 | 0.302 | 0.006| 0.528 |
| 531| pm21-pm22   | -0.067 | 0.045 | -0.067| 0.033 | -0.086| 0.015 |
| 532| pm21-pm23   | -0.056 | 0.038 | -0.015| 0.35  | -0.031| 0.248 |
| 533| pm21-pm24   | -0.041 | 0.193 | -0.053| 0.034 | -0.022| 0.213 |
| 534| pm21-pm25   | -0.046 | 0.168 | -0.031| 0.288 | -0.043| 0.161 |
| 535| pm21-pm26   | -0.079 | 0.011 | -0.058| 0.027 | -0.086| 0.016 |
| 536| pm21-pm27   | -0.062 | 0.039 | -0.091| 0.017 | -0.059| 0.045 |
| 537| pm21-pm28   | -0.032 | 0.293 | -0.056| 0.044 | -0.042| 0.161 |
| 538| pm21-pm29   | -0.065 | 0.04  | -0.062| 0.025 | -0.06 | 0.029 |
| 539| pm21-pm30   | -0.077 | 0.012 | -0.099| 0.011 | -0.086| 0.019 |
| 540| pm21-pm31   | -0.062 | 0.026 | -0.084| 0.016 | -0.08 | 0.014 |
| 541| pm21-pm32   | -0.062 | 0.039 | -0.095| 0.013 | -0.083| 0.015 |
| 542| pm21-pm33   | -0.057 | 0.03  | -0.088| 0.018 | -0.073| 0.013 |
| 543| pm21-pm34   | -0.039 | 0.268 | -0.075| 0.013 | -0.077| 0.012 |
| 544| pm21-pm35   | -0.073 | 0.016 | -0.078| 0.02  | -0.114| 0.007 |
| 545| pm21-pm36   | -0.098 | 0.013 | -0.083| 0.017 | -0.072| 0.019 |
| 546| pm21-pm37   | -0.074 | 0.018 | -0.097| 0.018 | -0.056| 0.038 |
| 547| pm22-pm23   | 0.004  | 0.689 | 0.015 | 0.379 | -0.001| 0.895 |
| 548| pm22-pm24   | -0.008 | 0.449 | -0.02 | 0.212 | 0.002 | 0.932 |
| 549| pm22-pm25   | -0.012 | 0.359 | 0.018 | 0.365 | -0.01 | 0.525 |
| 550| pm22-pm26   | 0.016  | 0.38  | 0.047 | 0.181 | 0.032 | 0.222 |
| 551| pm22-pm27   | 0.045  | 0.173 | 0.037 | 0.208 | 0.018 | 0.328 |
| 552| pm22-pm28   | 0.019  | 0.324 | 0.017 | 0.324 | 0.021 | 0.21  |
| 553| pm22-pm29   | 0.019  | 0.32  | -0.001| 0.781 | -0.019| 0.301 |
| 554| pm22-pm30   | -0.001 | 0.775 | -0.008| 0.411 | -0.006| 0.582 |
| 555| pm22-pm31   | -0.453 | <0.001| -0.467| <0.001| -0.435| <0.001 |
| 556| pm22-pm32   | -0.015 | 0.351 | -0.013| 0.315 | -0.017| 0.371 |
| 557| pm22-pm33   | 0.007  | 0.413 | 0.006 | 0.509 | 0.021 | 0.239 |
| 558| pm22-pm34   | 0.011  | 0.33  | -0.01 | 0.397 | 0.004 | 0.947 |
|     | pm22-pm35 | pm22-pm36 | pm22-pm37 | pm23-pm24 | pm23-pm25 | pm23-pm26 | pm23-pm27 | pm23-pm28 | pm23-pm29 | pm23-pm30 | pm23-pm31 | pm23-pm32 | pm23-pm33 | pm23-pm34 | pm23-pm35 | pm23-pm36 | pm23-pm37 | pm24-pm25 | pm24-pm26 | pm24-pm27 | pm24-pm28 | pm24-pm29 | pm24-pm30 | pm24-pm31 | pm24-pm32 | pm24-pm33 | pm24-pm34 | pm24-pm35 | pm24-pm36 | pm24-pm37 |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 559 | 0.028     | 0.257     | 0.024     | 0.249     | -0.001    | 0.932     |
| 560 | -0.004    | 0.843     | 0.021     | 0.217     | 0.005     | 0.693     |
| 561 | -0.022    | 0.249     | 0.012     | 0.3       | -0.023    | 0.265     |
| 562 | -0.481    | <0.001    | -0.451    | <0.001    | -0.473    | <0.001    |
| 563 | -0.02     | 0.276     | -0.023    | 0.281     | -0.018    | 0.325     |
| 564 | 0.016     | 0.313     | 0.024     | 0.223     | 0.02      | 0.372     |
| 565 | 0.007     | 0.404     | 0.017     | 0.302     | 0.025     | 0.205     |
| 566 | 0.01      | 0.366     | -0.005    | 0.446     | 0.035     | 0.235     |
| 567 | 0.002     | 0.672     | 0.027     | 0.291     | 0.016     | 0.353     |
| 568 | 0.029     | 0.225     | 0.034     | 0.219     | 0.019     | 0.335     |
| 569 | 0.022     | 0.277     | 0.025     | 0.21      | 0.017     | 0.342     |
| 570 | 0.008     | 0.51      | -0.011    | 0.32      | 0.004     | 0.819     |
| 571 | -0.003    | 0.896     | -0.006    | 0.521     | 0.038     | 0.282     |
| 572 | -0.024    | 0.21      | -0.035    | 0.233     | -0.017    | 0.319     |
| 573 | 0.047     | 0.199     | 0.013     | 0.336     | 0.027     | 0.276     |
| 574 | -0.011    | 0.377     | 0.026     | 0.265     | -0.01     | 0.35      |
| 575 | 0.007     | 0.506     | 0.011     | 0.349     | 0.004     | 0.736     |
| 576 | 0.01      | 0.431     | -0.01     | 0.56      | 0.002     | 0.984     |
| 577 | -0.015    | 0.385     | 0.015     | 0.304     | -0.02     | 0.34      |
| 578 | -0.019    | 0.337     | -0.023    | 0.234     | -0.012    | 0.347     |
| 579 | -0.025    | 0.247     | -0.026    | 0.299     | -0.021    | 0.227     |
| 580 | 0.004     | 0.92      | -0.006    | 0.405     | -0.011    | 0.389     |
| 581 | 0.034     | 0.287     | 0.025     | 0.202     | 0.004     | 0.982     |
| 582 | 0.035     | 0.252     | 0.037     | 0.222     | 0.031     | 0.248     |
| 583 | -0.027    | 0.27      | 0.01      | 0.492     | 0.019     | 0.335     |
| 584 | 0.001     | 0.78      | 0.007     | 0.422     | 0.027     | 0.284     |
| 585 | -0.02     | 0.351     | 0.024     | 0.21      | -0.001    | 0.699     |
| 586 | 0.024     | 0.293     | 0.017     | 0.304     | 0.023     | 0.288     |
| 587 | -0.001    | 0.879     | -0.029    | 0.215     | 0.004     | 0.907     |
| 588 | 0.014     | 0.383     | -0.007    | 0.454     | 0.007     | 0.577     |
|   | pm25-pm26 | pm25-pm27 | pm25-pm28 | pm25-pm29 | pm25-pm30 | pm25-pm31 | pm25-pm32 | pm25-pm33 | pm25-pm34 | pm25-pm35 | pm25-pm36 | pm25-pm37 | pm26-pm27 | pm26-pm28 | pm26-pm29 | pm26-pm30 | pm26-pm31 | pm26-pm32 | pm26-pm33 | pm26-pm34 | pm26-pm35 | pm26-pm36 | pm26-pm37 | pm27-pm28 | pm27-pm29 | pm27-pm30 | pm27-pm31 | pm27-pm32 | pm27-pm33 | pm27-pm34 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 589 | 0.022    | 0.201    | 0.021    | 0.288    | 0.018    | 0.376    |
| 590 | -0.019   | 0.373    | -0.031   | 0.225    | 0.001    | 0.682    |
| 591 | -0.015   | 0.339    | -0.029   | 0.255    | 0        | 0.679    |
| 592 | -0.016   | 0.372    | 0.002    | 0.9      | 0.003    | 0.929    |
| 593 | 0.026    | 0.215    | 0.033    | 0.252    | 0.019    | 0.354    |
| 594 | 0.021    | 0.224    | -0.01    | 0.489    | 0.021    | 0.229    |
| 595 | 0.008    | 0.547    | -0.007   | 0.465    | 0.021    | 0.221    |
| 596 | -0.013   | 0.371    | 0.001    | 0.936    | 0.032    | 0.261    |
| 597 | -0.026   | 0.288    | -0.012   | 0.305    | -0.029   | 0.264    |
| 598 | 0.015    | 0.388    | -0.008   | 0.523    | 0.01     | 0.329    |
| 599 | -0.011   | 0.365    | -0.019   | 0.382    | -0.017   | 0.376    |
| 600 | -0.01    | 0.329    | 0.004    | 0.877    | -0.017   | 0.339    |
| 601 | 0.011    | 0.367    | 0        | 0.777    | -0.005   | 0.905    |
| 602 | 0.013    | 0.354    | -0.008   | 0.469    | 0.028    | 0.241    |
| 603 | 0.03     | 0.262    | 0.014    | 0.306    | -0.013   | 0.354    |
| 604 | 0.026    | 0.207    | 0.019    | 0.342    | 0.03     | 0.216    |
| 605 | 0.014    | 0.31     | 0.043    | 0.15     | 0.004    | 0.895    |
| 606 | 0.006    | 0.487    | -0.003   | 0.955    | -0.015   | 0.361    |
| 607 | 0.007    | 0.494    | 0.033    | 0.208    | 0.042    | 0.167    |
| 608 | -0.004   | 0.751    | 0.002    | 0.619    | 0.018    | 0.361    |
| 609 | 0.005    | 0.533    | 0.033    | 0.3      | 0.011    | 0.352    |
| 610 | -0.004   | 0.945    | -0.001   | 0.987    | -0.01    | 0.547    |
| 611 | -0.019   | 0.396    | -0.014   | 0.374    | 0.009    | 0.545    |
| 612 | 0.002    | 0.867    | 0.018    | 0.342    | 0.014    | 0.361    |
| 613 | -0.008   | 0.587    | -0.031   | 0.253    | -0.041   | 0.171    |
| 614 | 0.018    | 0.341    | 0.006    | 0.55     | 0.011    | 0.365    |
| 615 | -0.026   | 0.216    | -0.041   | 0.191    | -0.04    | 0.192    |
| 616 | -0.012   | 0.342    | -0.016   | 0.39     | -0.024   | 0.272    |
| 617 | 0.011    | 0.363    | 0.012    | 0.324    | 0.012    | 0.386    |
| 618 | 0.026    | 0.246    | 0.027    | 0.231    | 0.02     | 0.391    |
|   |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|
|   | pm27-pm35 | -0.007 | 0.548 | 0.007 | 0.575 | 0.017 | 0.387 |
|   | pm27-pm36 | -0.002 | 0.893 | 0.013 | 0.365 | 0.01 | 0.461 |
|   | pm27-pm37 | -0.025 | 0.247 | 0.004 | 0.933 | -0.002 | 0.618 |
|   | pm28-pm29 | 0.018 | 0.377 | -0.023 | 0.223 | 0.02 | 0.265 |
|   | pm28-pm30 | 0.028 | 0.261 | 0.02 | 0.288 | 0 | 0.944 |
|   | pm28-pm31 | 0.037 | 0.221 | 0.029 | 0.296 | 0.039 | 0.219 |
|   | pm28-pm32 | 0.026 | 0.267 | -0.015 | 0.319 | 0.025 | 0.254 |
|   | pm28-pm33 | 0.02 | 0.237 | -0.006 | 0.499 | 0.006 | 0.463 |
|   | pm28-pm34 | -0.011 | 0.315 | -0.036 | 0.291 | -0.045 | 0.174 |
|   | pm28-pm35 | 0.016 | 0.4 | 0.025 | 0.286 | 0.011 | 0.365 |
|   | pm28-pm36 | 0.001 | 0.771 | -0.019 | 0.3 | 0.01 | 0.52 |
|   | pm28-pm37 | 0.032 | 0.26 | 0.027 | 0.296 | 0.028 | 0.207 |
|   | pm29-pm30 | 0.027 | 0.234 | 0.005 | 0.413 | 0.008 | 0.548 |
|   | pm29-pm31 | 0.023 | 0.284 | 0.033 | 0.298 | -0.005 | 0.535 |
|   | pm29-pm32 | 0.008 | 0.482 | 0.01 | 0.45 | 0.015 | 0.335 |
|   | pm29-pm33 | -0.001 | 0.854 | 0.014 | 0.386 | -0.003 | 0.967 |
|   | pm29-pm34 | -0.046 | 0.175 | -0.029 | 0.291 | -0.042 | 0.194 |
|   | pm29-pm35 | 0.017 | 0.336 | 0.045 | 0.156 | 0.023 | 0.202 |
|   | pm29-pm36 | 0.008 | 0.568 | -0.001 | 0.837 | 0.025 | 0.202 |
|   | pm29-pm37 | -0.025 | 0.207 | 0.011 | 0.361 | 0.014 | 0.301 |
|   | pm30-pm31 | 0.006 | 0.465 | 0.002 | 0.804 | -0.029 | 0.279 |
|   | pm30-pm32 | 0.011 | 0.377 | -0.003 | 0.686 | 0.019 | 0.362 |
|   | pm30-pm33 | -0.042 | 0.159 | -0.013 | 0.335 | -0.023 | 0.229 |
|   | pm30-pm34 | -0.009 | 0.56 | -0.032 | 0.29 | -0.038 | 0.203 |
|   | pm30-pm35 | 0.007 | 0.478 | 0.047 | 0.155 | 0.012 | 0.34 |
|   | pm30-pm36 | 0.027 | 0.208 | 0.003 | 0.816 | 0.001 | 0.942 |
|   | pm30-pm37 | 0.017 | 0.379 | -0.013 | 0.349 | -0.012 | 0.37 |
|   | pm31-pm32 | -0.004 | 0.752 | 0.009 | 0.465 | -0.001 | 0.691 |
|   | pm31-pm33 | 0.016 | 0.304 | 0.002 | 0.601 | 0.023 | 0.216 |
|   | pm31-pm34 | 0.003 | 0.781 | 0.01 | 0.361 | -0.001 | 0.923 |
| pm31-pm35 | 0.048 | 0.166 | 0.009 | 0.539 | 0.036 | 0.2 |
| pm31-pm36 | 0.024 | 0.212 | -0.01 | 0.444 | -0.002 | 0.691 |
| pm31-pm37 | -0.171 | 0.001 | -0.159 | 0.003 | -0.151 | 0.005 |
| pm32-pm33 | 0.033 | 0.227 | 0.012 | 0.397 | 0.006 | 0.432 |
| pm32-pm34 | -0.003 | 0.873 | -0.025 | 0.206 | -0.006 | 0.442 |
| pm32-pm35 | -0.134 | 0.009 | -0.164 | 0.004 | -0.182 | 0.001 |
| pm32-pm36 | 0.009 | 0.522 | 0.014 | 0.379 | -0.01 | 0.595 |
| pm32-pm37 | 0 | 0.766 | -0.015 | 0.332 | 0.001 | 0.606 |
| pm33-pm34 | 0.003 | 0.747 | -0.002 | 0.944 | 0.016 | 0.312 |
| pm33-pm35 | 0.011 | 0.305 | 0.033 | 0.215 | 0.029 | 0.225 |
| pm33-pm36 | -0.03 | 0.296 | -0.002 | 0.677 | -0.038 | 0.223 |
| pm33-pm37 | -0.008 | 0.482 | 0.031 | 0.294 | -0.001 | 0.886 |
| pm34-pm35 | 0.006 | 0.59 | -0.02 | 0.364 | -0.02 | 0.355 |
| pm34-pm36 | 0.008 | 0.439 | -0.027 | 0.29 | -0.019 | 0.315 |
| pm34-pm37 | -0.012 | 0.363 | 0.006 | 0.431 | -0.006 | 0.463 |
| pm35-pm36 | -0.002 | 0.839 | -0.014 | 0.377 | 0.029 | 0.249 |
| pm35-pm37 | 0.017 | 0.393 | 0.025 | 0.244 | 0.013 | 0.39 |
| pm36-pm37 | -0.021 | 0.223 | -0.01 | 0.355 | 0.011 | 0.394 |
References for Supplementary Information

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