Networks, Dynamic Factors, and the Volatility Analysis of High-Dimensional Financial Series

COMPLEMENTARY APPENDIX

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A Spectral measures of dependence

**Figure 1:** Spectral densities at frequency $\theta = \pi$.

Colour code. Grey: entries with absolute value below the median of absolute values. Red: positive entries with absolute value above the median of absolute values. Blue: negative entries with absolute value above the median of absolute values.

**Figure 2:** Spectral densities at frequency $\theta = \frac{\pi}{2}$.

Colour code. Grey: entries with absolute value below the median of absolute values. Red: positive entries with absolute value above the median of absolute values. Blue: negative entries with absolute value above the median of absolute values.
Figure 3: Spectral densities at frequency $\theta = 0$.

Colour code. Grey: entries with absolute value below the median of absolute values.
Red: positive entries with absolute value above the median of absolute values.
There are no negative entries with absolute value above the median.

Figure 4: Squared PSCs - Averaged over frequencies.

Colour code. Grey: entries below the 90th percentile of entries.
Red: entries above the 90th percentile of entries.
B Additional results for the elastic net approach

B.1 LVDNs for $h = 20$

Figure 5: Thresholded $\xi_{\tau_{\omega,n}}$ LVDNs for various values of the threshold $\tau$. 2000-2013

$\tau = 0.1$  \hspace{2cm} $\tau = 0.5$  \hspace{2cm} $\tau = 1$

Colour code. Blue: weights below 1. Red: weights above or equal to 1.

2007-2008

$\tau = 0.1$  \hspace{2cm} $\tau = 0.5$  \hspace{2cm} $\tau = 1$
B.2 LVDNs for $h = 5$

Figure 6: $\xi_{\omega,n}^F$ LVDNs.

Colour code. Grey: entries below the 95th percentile of entries.
Blue: entries between the 95th and 97.5th percentile of entries.
Yellow: entries between the 97.5th and 99th percentile of entries.
Red: entries above the 99th percentile of entries.
**Figure 7:** Thresholded $\xi_{\omega,n}^T$ LVDNs with optimal $\tau$.

2000-2013

optimal $\tau$ is 1.90

2007-2008

optimal $\tau$ is 1.88
Table 1: From- and To-degree sectoral averages in the $\xi_{\omega,n}^T$ LVDNs.

| Sector                   | 2000-2013 |  | 2007-2008 |  | 2000-2013 |  | 2007-2008 |  |
|--------------------------|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                          |  |  |  |  |  |  |  |  |
| Consumer Discretionary   | 3.96      | 2.20             | 22.78            | 22.68            | 0.24             | 0.24             | 1.65             | 1.92             |
| Consumer Staples         | 3.57      | 4.49             | 24.03            | 18.84            | 0.00             | 0.25             | 0.89             | 0.90             |
| Energy                   | 5.28      | 7.80             | 18.57            | 30.22            | 1.59             | 1.38             | 3.07             | 4.04             |
| Financials               | 4.42      | 6.07             | 20.44            | 31.89            | 0.50             | 0.50             | 3.73             | 3.39             |
| Health Care              | 4.63      | 2.12             | 24.38            | 18.98            | 0.00             | 0.00             | 2.48             | 0.74             |
| Industrials              | 4.04      | 2.81             | 23.61            | 21.98            | 0.21             | 0.21             | 0.68             | 2.03             |
| Information Technology   | 4.54      | 4.30             | 26.03            | 16.43            | 0.00             | 0.00             | 1.90             | 1.13             |
| Materials                | 2.90      | 3.62             | 23.65            | 23.21            | 0.00             | 0.00             | 0.00             | 0.00             |
| Telecommunications Services| 6.12    | 5.99             | 24.37            | 13.57            | 1.89             | 1.89             | 0.00             | 0.00             |
| Utilities                | 4.73      | 6.93             | 26.09            | 18.38            | 0.00             | 0.00             | 1.60             | 1.15             |
| Total degree             | 4.36      | 22.92            | 0.39             | 1.95             |                  |                  |                  |                  |
B.3 LVDNs for $h = 10$

**Figure 8**: $\xi_{\omega,n}^T$ LVDNs.

Colour code. Grey: entries below the 95\textsuperscript{th} percentile of entries.
Blue: entries between the 95\textsuperscript{th} and 97.5\textsuperscript{th} percentile of entries.
Yellow: entries between the 97.5\textsuperscript{th} and 99\textsuperscript{th} percentile of entries.
Red: entries above the 99\textsuperscript{th} percentile of entries.
Figure 9: Thresholded $\xi_{T_{\omega,n}}^{\tau}$ LVDNs with optimal $\tau$. 

2000-2013
optimal $\tau$ is 1.89

2007-2008
optimal $\tau$ is 1.54
Table 2: From- and To-degree sectoral averages in the $\xi^{T}_{\omega,n}$ LVDNs.

| Sector                  | 2000-2013 | 2007-2008 | 2000-2013 | 2007-2008 |
|-------------------------|-----------|-----------|-----------|-----------|
|                         | from      | to        | from      | to        |
| Consumer Discretionary  | 4.28      | 2.35      | 26.05     | 26.15     |
|                         | 0.24      | 0.24      | 1.95      | 3.29      |
| Consumer Staples        | 3.92      | 4.64      | 27.18     | 22.43     |
|                         | 0.00      | 0.25      | 2.79      | 1.36      |
| Energy                  | 5.50      | 7.91      | 21.70     | 33.49     |
|                         | 1.59      | 1.38      | 4.00      | 6.09      |
| Financials              | 4.71      | 6.21      | 24.13     | 35.34     |
|                         | 0.50      | 0.50      | 5.22      | 6.67      |
| Health Care             | 4.94      | 2.47      | 27.78     | 22.16     |
|                         | 0.00      | 0.00      | 4.25      | 1.83      |
| Industrials             | 4.38      | 3.16      | 26.96     | 25.46     |
|                         | 0.21      | 0.21      | 2.42      | 3.52      |
| Information Technology  | 4.96      | 4.81      | 29.62     | 19.65     |
|                         | 0.00      | 0.00      | 3.34      | 1.57      |
| Materials               | 3.21      | 4.51      | 26.63     | 26.53     |
|                         | 0.00      | 0.00      | 2.99      | 0.81      |
| Telecommunications Services | 6.43   | 7.07      | 27.24     | 16.34     |
|                         | 1.91      | 1.91      | 0.00      | 0.00      |
| Utilities               | 5.09      | 8.41      | 29.26     | 21.20     |
|                         | 0.00      | 0.00      | 4.93      | 2.37      |
| Total degree            | 4.68      | 26.27     | 0.39      | 3.38      |
B.4 Results for eigenvector centrality for signed PCN

Table 3: Eigenvector centrality in the PCN for $\mathbf{\nu}^T_{\omega,n}$.

| 2000-2013                  | 2007-2008                  |
|----------------------------|----------------------------|
| BAC Bank of America Corp.  | BAC Bank of America Corp.  |
| C Citigroup Inc.           | USB US Bancorp             |
| WFC Wells Fargo            | JPM JP Morgan Chase & Co.  |
| JPM JP Morgan Chase & Co.  | MS Morgan Stanley          |
| AIG American International Group Inc. | AIG American International Group Inc. |
| USB US Bancorp             | C Citigroup Inc.           |
| MS Morgan Stanley          | COF Capital One Financial Corp. |
| AXP American Express Inc.  | WFC Wells Fargo            |
| ORCL Oracle Corp.          | GS Goldman Sachs           |
| COF Capital One Financial Corp. | AXP American Express Inc.  |

Figure 10: Thresholded $\xi^T_{\omega,n}$ LVDNs with optimal $\tau$

2000-2013
optimal $\tau$ is 1.41

2007-2008
optimal $\tau$ is 1.86
### Table 4: Eigenvector centrality in the $\xi_{\omega,n}^T$ thresholded LVDN.

| 2000-2013                      | 2007-2008                      |
|--------------------------------|--------------------------------|
| BAC Bank of America Corp.      | BAC Bank of America Corp.      |
| WFC Wells Fargo                | USB US Bancorp                 |
| JPM JP Morgan Chase & Co.     | WFC Wells Fargo                |
| C Citigroup Inc.               | AXP American Express Inc.      |
| USB US Bancorp                 | UNH United Health Group Inc.   |
| -                              | AIG American International Group Inc. |
| -                              | C Citigroup Inc.               |
| -                              | MCD McDonalds Corp.            |
| -                              | JPM JP Morgan Chase & Co.      |
| -                              | OXY Occidental Petroleum Corp. |
Results for the group lasso approach

C.1 LGCNs and PCNs of VAR residuals

Figure 11: $\xi^T_{\omega,n}$ LGCNs.

Colour code. Red: positive entries. Blue: negative entries.

Figure 12: $\nu^T_{\omega,n}$ PCNs.

Colour code. Red: positive entries. Blue: negative entries.
| 2000-2013                  | 2007-2008                      |
|---------------------------|-------------------------------|
| C Citigroup Inc.          | COF Capital One Financial Corp. |
| BAC Bank of America Corp. | OXY Occidental Petroleum Corp. |
| JPM JP Morgan Chase & Co. | C Citigroup Inc.              |
| WFC Wells Fargo           | SO Southern Company           |
| MS Morgan Stanley         | BAC Bank of America Corp.     |
| COP Conoco Phillips       | MS Morgan Stanley             |
| AIG American International Group Inc. | GS Goldman Sachs     |
| USB US Bancorp            | DVN Devon Energy              |
| SLB Schlumberger          | COP Conoco Phillips           |
| DVN Devon Energy          | EXC Exelon                    |
C.2 LVDNs for $h = 20$

**Table 6: Weight percentiles in $\xi^T_{\omega,n}$ LVDNs.**

| Percentiles | 50th | 90th | 95th | 97.5th | 99th | Max |
|-------------|------|------|------|--------|------|-----|
| 2000-2013   | 0.04 | 0.24 | 0.34 | 0.46   | 0.69 | 4.36|
| 2007-2008   | 0.49 | 1.18 | 1.51 | 1.75   | 2.13 | 4.82|

**Figure 13: $\xi^T_{\omega,n}$ LVDNs.**

2000-2013

Colour code. Grey: entries below the 95th percentile of entries. Blue: entries between the 95th and 97.5th percentile of entries. Yellow: entries between the 97.5th and 99th percentile of entries. Red: entries above the 99th percentile of entries.

2007-2008
Figure 14: Thresholded $\xi^T_{\omega,n}$ LVDNs with optimal $\tau$.

2000-2013 optimal $\tau$ is 1.85

2007-2008 optimal $\tau$ is 1.77
Figure 15: Thresholded $\xi_{\omega,n}^T$ LVDNs for various values of $\tau$.

2000-2013

$\tau = 0.1$  \hspace{2cm} $\tau = 0.5$  \hspace{2cm} $\tau = 1$

2007-2008

$\tau = 0.1$  \hspace{2cm} $\tau = 0.5$  \hspace{2cm} $\tau = 1$

Colour code. Blue: weights below 1.
Red: weights above or equal to 1.
Table 7: From- and To-degree sectoral averages in the $\xi^{T}_{\omega,n}$ LVDNs.

| Sector               | 2000-2013 from | 2000-2013 to | 2007-2008 from | 2007-2008 to | non-thresholded LVDNs | thresholded LVDNs |
|----------------------|---------------|-------------|---------------|-------------|-----------------------|-------------------|
| Consumer Discretionary | 7.56          | 4.45        | 53.62         | 51.43       | 0.25                  | 0.25              | 8.89                | 6.21            |
| Consumer Staples     | 8.45          | 6.15        | 54.51         | 42.37       | 0.00                  | 0.00              | 8.98                | 2.57            |
| Energy               | 7.97          | 10.20       | 54.29         | 40.18       | 1.65                  | 1.65              | 10.19               | 4.77            |
| Financials           | 7.83          | 13.00       | 54.77         | 72.71       | 0.65                  | 0.65              | 10.96               | 21.48           |
| Health Care          | 8.05          | 11.45       | 53.81         | 74.29       | 0.00                  | 0.00              | 9.16                | 26.44           |
| Industrials          | 8.36          | 4.87        | 54.23         | 49.43       | 0.21                  | 0.21              | 9.85                | 4.45            |
| Information Technology | 8.64         | 6.86        | 55.06         | 52.39       | 0.00                  | 0.00              | 7.48                | 5.71            |
| Materials            | 6.67          | 6.43        | 47.86         | 48.32       | 0.00                  | 0.00              | 6.39                | 2.60            |
| Telecommunications Services | 10.23   | 7.76        | 43.48         | 47.51       | 1.73                  | 1.73              | 4.70                | 1.47            |
| Utilities            | 9.67          | 10.35       | 66.05         | 39.19       | 0.00                  | 0.00              | 26.78               | 0.00            |
| Total degree         | 8.16          |             | 54.14         |             | 0.41                  |                   | 9.59                |                 |

Table 8: Eigenvector centrality in $\xi_{\omega,n}^{T}$ LVDNs.

| 2000-2013 | 2007-2008 |
|-----------|-----------|
| C Citigroup Inc. | BRK.B Berkshire Hathaway |
| BAC Bank of America Corp. | USB US Bancorp |
| APA Apache Corp. | MDT Medtronic Inc. |
| WFC Wells Fargo | LLY Eli Lilly and Company |
| JPM JP Morgan Chase & Co. | GILD Gilead Sciences |
| JNJ Johnson & Johnson Inc. | BK Bank of New York |
| COP Conoco Phillips | JNJ Johnson & Johnson Inc. |
| NOV National Oilwell Varco | BAX Baxter International Inc. |
| DVN Devon Energy | ABT Abbott Laboratories |
| BRK.B Berkshire Hathaway | SPG Simon Property Group |

| 2000-2013 | 2007-2008 |
|-----------|-----------|
| APA Apache Corp. | BRK.B Berkshire Hathaway |
| SLB Schlumberger | GILD Gilead Sciences |
| NOV National Oilwell Varco | LLY Eli Lilly and Company |
| DVN Devon Energy | BAX Baxter International Inc. |
| APC Anadarko Petroleum Corporation | UNP Union Pacific Corp. |
| HAL Halliburton | AEP American Electric Power Co. |
| - | DIS The Walt Disney Company |
| - | ABT Abbott Laboratories |
| - | WFC Wells Fargo |
| - | CVX Chevron |
C.3 LVDNs for $h = 5$

Figure 16: $\xi_{\omega,n}^T$ LVDNs.

Colour code. Grey: entries below the 95th percentile of entries.
Blue: entries between the 95th and 97.5th percentile of entries.
Yellow: entries between the 97.5th and 99th percentile of entries.
Red: entries above the 99th percentile of entries.
Figure 17: Thresholded $\xi^T_{\omega,n}$ LVDNs with optimal $\tau$.

2000-2013
optimal $\tau$ is 1.38

2007-2008
optimal $\tau$ is 1.57
Table 9: From- and To-degree sectoral averages in the $\xi_{w,n}^T$ LVDNs.

| Sector                     | non-thresholded LVDNs | thresholded LVDNs |
|----------------------------|-----------------------|-------------------|
|                            | 2000-2013 | 2007-2008 | 2000-2013 | 2007-2008 |
| Consumer Discretionary     | 5.26      | 5.15      | 37.51   | 39.96     | 0.27    | 0.27    | 8.70    | 8.26     |
| Consumer Staples           | 7.13      | 4.62      | 39.19   | 30.65     | 0.00    | 0.00    | 8.18    | 3.02     |
| Energy                     | 10.80     | 4.81      | 40.74   | 28.73     | 0.60    | 0.60    | 10.16   | 4.66     |
| Financials                 | 8.17      | 9.54      | 41.34   | 51.36     | 0.32    | 0.32    | 11.46   | 19.12    |
| Health Care                | 5.08      | 9.51      | 38.57   | 51.38     | 0.00    | 0.00    | 10.05   | 19.48    |
| Industrials                | 4.99      | 5.69      | 38.98   | 35.36     | 0.23    | 0.23    | 9.90    | 7.35     |
| Information Technology    | 5.97      | 7.15      | 37.54   | 38.91     | 0.13    | 0.13    | 8.62    | 7.38     |
| Materials                  | 4.33      | 6.40      | 34.76   | 33.04     | 0.00    | 0.00    | 5.13    | 7.39     |
| Telecommunications Services| 7.80      | 7.20      | 27.10   | 35.51     | 1.70    | 1.70    | 3.90    | 6.62     |
| Utilities                  | 7.69      | 8.99      | 51.67   | 28.76     | 0.00    | 0.00    | 25.55   | 4.34     |
| Total degree               | 6.74      | 39.04     | 0.25    | 9.73      |
C.4 LVDNs for $h = 10$

Figure 18: $\xi^T_{\omega,n}$ LVDNs.

2000-2013
Colour code. Grey: entries below the 95$^{\text{th}}$ percentile of entries.
Blue: entries between the 95$^{\text{th}}$ and 97.5$^{\text{th}}$ percentile of entries.
Yellow: entries between the 97.5$^{\text{th}}$ and 99$^{\text{th}}$ percentile of entries.
Red: entries above the 99$^{\text{th}}$ percentile of entries.

2007-2008
Figure 19: Thresholded $\xi^T_{\omega,n}$ LVDNs with optimal $\tau$.

2000-2013
optimal $\tau$ is 1.34

2007-2008
optimal $\tau$ is 1.87
| Sector                | non-thresholded LVDNs | thresholded LVDNs |       |       |       |       |
|-----------------------|-----------------------|-------------------|-------|-------|-------|-------|
|                       | 2000-2013  | 2007-2008 | 2000-2013 | 2007-2008 |       |       |
|                       | from       | to        | from       | to        | from  | to        |
| Consumer Discretionary| 6.21       | 5.58      | 49.82      | 48.96      | 0.27  | 0.27      |
| Consumer Staples      | 8.52       | 5.21      | 50.77      | 39.86      | 0.00  | 0.00      |
| Energy                | 11.43      | 5.28      | 51.18      | 37.66      | 0.72  | 0.72      |
| Financials            | 9.29       | 11.68     | 51.39      | 67.42      | 0.45  | 0.45      |
| Health Care           | 6.07       | 12.30     | 50.21      | 68.73      | 0.00  | 0.00      |
| Industrials           | 6.62       | 6.27      | 50.61      | 46.12      | 0.23  | 0.23      |
| Information Technology| 7.11       | 8.06      | 51.05      | 48.88      | 0.13  | 0.13      |
| Materials             | 5.28       | 7.71      | 44.78      | 44.48      | 0.00  | 0.00      |
| Telecommunications Services| 9.52  | 8.04      | 39.71      | 44.93      | 1.70  | 1.70      |
| Utilities             | 8.93       | 10.62     | 62.55      | 36.64      | 0.00  | 0.00      |
| Total degree          | 7.88       | 50.56     | 0.29       | 8.15       |       |       |
D Results for the adaptive lasso approach

D.1 LGCNs and PCNs of VAR residuals

Figure 20: $\xi^T_{\omega,n}$ LGCNs.

2000-2013
density 41%

2007-2008
density 73%

Colour code. Red: positive entries.
Blue: negative entries.

Figure 21: $\nu^T_{\omega,n}$ PCNs.

2000-2013
density 6%

2007-2008
density 26%

Colour code. Red: positive entries.
Blue: negative entries.
| 2000-2013                       | 2007-2008                       |
|---------------------------------|---------------------------------|
| BAC Bank of America Corp.       | BAC Bank of America Corp.       |
| C Citigroup Inc.                | USB US Bancorp                  |
| JPM JP Morgan Chase & Co.       | JPM JP Morgan Chase & Co.       |
| WFC Wells Fargo                 | MS Morgan Stanley               |
| MS Morgan Stanley               | WFC Wells Fargo                 |
| AIG American International Group Inc. | DVN Devon Energy              |
| USB US Bancorp                  | OXY Occidental Petroleum Corp.  |
| COF Capital One Financial Corp. | UNH UnitedHealth Group Inc.     |
| AXP American Express Inc.       | GS Goldman Sachs                |
| COP Conoco Phillips             | C Citigroup Inc.                |
D.2 LVDNs for $h = 20$

Table 12: Weight percentiles in LVDNs.

| percentiles | 50$^{th}$ | 90$^{th}$ | 95$^{th}$ | 97.5$^{th}$ | 99$^{th}$ | max |
|-------------|----------|----------|----------|------------|----------|-----|
| 2000-2013   | 0.01     | 0.12     | 0.18     | 0.28       | 0.50     | 5.15|
| 2007-2008   | 0.10     | 0.61     | 0.88     | 1.18       | 1.64     | 4.87|

Figure 22: $\xi_{\omega,n}^T$ LVDNs.

2000-2013
Colour code. Grey: entries below the 95$^{th}$ percentile of entries.
Blue: entries between the 95$^{th}$ and 97.5$^{th}$ percentile of entries.
Yellow: entries between the 97.5$^{th}$ and 99$^{th}$ percentile of entries.
Red: entries above the 99$^{th}$ percentile of entries.

2007-2008
Figure 23: Thresholded $\xi^T_{\omega,n}$ LVDNs with optimal $\tau$. 

2000-2013
optimal $\tau$ is 1.82

2007-2008
optimal $\tau$ is 1.85
Table 13: From- and To-degree sectoral averages in the $\xi_{\omega,n}^T$ LVDNs.

| Sector                  | From 2000-2013 | To 2000-2013 | From 2007-2008 | To 2007-2008 | From 2000-2013 | To 2000-2013 | From 2007-2008 | To 2007-2008 |
|-------------------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|
| Consumer Discretionary  | 3.95 2.22      | 21.19 18.72  | 0.27 0.27      | 1.23 1.61    |                |              |                |              |
| Consumer Staples        | 3.76 3.84      | 19.74 19.49  | 0.00 0.23      | 0.47 1.39    |                |              |                |              |
| Energy                  | 5.25 7.72      | 16.96 26.80  | 2.02 1.83      | 2.45 2.99    |                |              |                |              |
| Financials              | 4.33 6.16      | 19.37 28.25  | 1.01 1.01      | 3.46 3.11    |                |              |                |              |
| Health Care             | 4.48 2.47      | 21.64 17.38  | 0.00 0.00      | 1.84 1.20    |                |              |                |              |
| Industrials             | 4.29 2.89      | 20.45 20.92  | 0.22 0.22      | 0.65 0.66    |                |              |                |              |
| Information Technology  | 4.65 4.48      | 23.58 14.06  | 0.00 0.00      | 0.96 0.70    |                |              |                |              |
| Materials               | 3.23 3.54      | 21.79 19.09  | 0.00 0.00      | 0.91 1.27    |                |              |                |              |
| Telecommunications      | 5.90 7.22      | 19.52 14.04  | 2.03 2.03      | 0.00 0.00    |                |              |                |              |
| Services                | 5.25 7.80      | 26.90 11.72  | 0.00 0.00      | 5.99 2.73    |                |              |                |              |
| Total degree            | 4.42           | 20.57        | 0.53           | 1.66         |                |              |                |              |

Table 14: Eigenvector centrality in $\xi_{\omega,n}^T$ LVDNs.

| 2000-2013  | 2007-2008  |
|------------|------------|
| APA Apache Corp. | USB US Bancorp |
| DVN Devon Energy | COF Capital One Financial Corp. |
| BAC Bank of America Corp. | AIG American International Group Inc. |
| COP Conoco Phillips | MS Morgan Stanley |
| WFC Wells Fargo | JPM JP Morgan Chase & Co. |
| APC Anadarko Petroleum Corporation | LOW Lowes |
| SLB Schlumberger | DVN Devon Energy |
| C Citigroup Inc. | APA Apache Corp. |
| JPM JP Morgan Chase & Co. | BAC Bank of America Corp. |
| OXY Occidental Petroleum Corp. | ORCL Oracle Corporation |

| 2000-2013  | 2007-2008  |
|------------|------------|
| WFC Wells Fargo | USB US Bancorp |
| BAC Bank of America Corp. | BAC Bank of America Corp. |
| JPM JP Morgan Chase & Co. | JPM JP Morgan Chase & Co. |
| USB US Bancorp | WFC Wells Fargo |
| C Citigroup Inc. | AXP American Express Inc. |
| SLB Schlumberger | IBM International Business Machines |
| HAL Halliburton | AIG American International Group Inc. |
| NOV National Oilwell Varco | GS Goldman Sachs |
| APA Apache Corp. | CVX Chevron |
| DVN Devon Energy | AEP American Electric Power Co. |
## Table 15: S&P100 constituents.

| Ticker | Name                                      |
|--------|-------------------------------------------|
| AAPL   | Apple Inc.                                |
| ABT    | Abbott Laboratories                       |
| AEP    | American Electric Power Co.               |
| AIG    | American International Group Inc.         |
| ALL    | Allstate Corp.                            |
| AMGN   | Amgen Inc.                                |
| AMZN   | Amazon.com                                |
| APA    | Apache Corp.                              |
| APC    | Anadarko Petroleum Corp.                  |
| AXP    | American Express Inc.                     |
| BA     | Boeing Co.                                |
| BAC    | Bank of America Corp.                     |
| BAX    | Baxter International Inc.                 |
| BK     | Bank of New York                          |
| BMY    | Bristol-Myers Squibb                      |
| BRK.B  | Berkshire Hathaway                         |
| C      | Citigroup Inc.                            |
| CAT    | Caterpillar Inc.                          |
| CL     | Colgate-Palmolive Co.                     |
| CMCSA  | Comcast Corp.                             |
| COF    | Capital One Financial Corp.               |
| COP    | Conoco Phillips                           |
| COST   | Costco                                    |
| CSCO   | Cisco Systems                             |
| CVS    | CVS Caremark                              |
| CVX    | Chevron                                   |
| DD     | DuPont                                    |
| DELL   | Dell                                      |
| DIS    | The Walt Disney Co.                       |
| DOW    | Dow Chemical                              |
| DVN    | Devon Energy                              |
| EBay   | eBay Inc.                                 |
| EMC    | EMC Corp.                                 |
| EMR    | Emerson Electric Co.                      |
| EXC    | Exelon                                    |
| F      | Ford Motor                                |
| FCM    | Freeport-McMoran                          |
| FDX    | FedEx                                    |
| GD     | General Dynamics                          |
| GE     | General Electric Co.                      |
| GILD   | Gilead Sciences                           |
| GS     | Goldman Sachs                             |
| HAL    | Halliburton                               |
| HD     | Home Depot                                |
| HON    | Honeywell                                 |
| HPQ    | Hewlett Packard Co.                       |
| IBM    | International Business Machines           |
| INTC   | Intel Corp.                               |
| JNJ    | Johnson & Johnson Inc.                    |
| JPM    | JP Morgan Chase & Co.                     |
| KO     | The Coca-Cola Co.                         |
| LLY    | Eli Lilly and Co.                         |
| LMT    | Lockheed-Martin                           |
| LOW    | Lowe’s                                    |
| MCD    | McDonald’s Corp.                          |
| MDT    | Medtronic Inc.                            |
| MMM    | 3M Co.                                    |
| MO     | Altria Group                              |
| MRK    | Merck & Co.                               |
| MS     | Morgan Stanley                            |
| MSFT   | Microsoft                                 |
| NKE    | Nike                                      |
| NOV    | National Oilwell Varco                    |
| NSC    | Norfolk Southern Corp.                    |
| ORCL   | Oracle Corp.                              |
| OXY    | Occidental Petroleum Corp.                |
| PEP    | Pepsi Inc.                                |
| PFE    | Pfizer Inc.                               |
| PG     | Procter & Gamble Co.                      |
| QCOM   | Qualcomm Inc.                             |
| RTN    | Raytheon Co.                              |
| SBUX   | Starbucks Corp.                           |
| SLB    | Schlumberger                              |
| SO     | Southern Co.                              |
| SPG    | Simon Property Group, Inc.                |
| T      | AT&T Inc.                                 |
| TGT    | Target Corp.                              |
| TXW    | Time Warner Inc.                          |
| TXN    | Texas Instruments                         |
| UNH    | UnitedHealth Group Inc.                   |
| UNP    | Union Pacific Corp.                       |
| UPS    | United Parcel Service Inc.                |
| USB    | US Bancorp                                |
| UTX    | United Technologies Corp.                 |
| VZ     | Verizon Communications Inc.               |
| WAG    | Walgreens                                 |
| WFC    | Wells Fargo                               |
| WMB    | Williams Companies                        |
| WMT    | Wal-Mart                                  |
| XOM    | Exxon Mobil Corp.                         |