Impact of National Financial Regulation on Macroeconomic and Fiscal Performance after the 2007 Financial Shock – Econometric Analyses Based on Cross-Country Data

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Tobias Hagen
Introduction

• Cross-country heterogeneity of the “Great Recession”
  – intensity and duration of the crises.
  – rich countries more affected than poor countries.

• “… a unique opportunity to identify the link between the structural characteristics of economic and institutional systems before the crisis and their resilience with respect to the global recessionary shock.” (Giannone et al., 2011).

• Role of financial market (de-)regulation before 2007?
  Financial liberalization = “…reduction in the role of government, and an increase in the role of the market, in allocating credit” (Abiad et al., 2008).

• „New Database of Financial Reforms“ by Abiad et al. (2008) – indicator for financial liberalization (FRI).
Introduction: Related Research

• Cross-country studies by Giannone et al. (2011), Masciandaro et al. (2011), Rosea and Spiegel (2011): Liberalization in financial (credit) markets or looser credit market regulations ⇒ deeper recessions in 2008-2009.

• Panel country study by the IMF (2012): “.....a domestic financial system that is dominated by some types of nontraditional bank intermediation has in some cases been associated with adverse economic outcomes.”

• Historical time series by Reinhart and Rogoff (2011): „...banking crises [...] often precede or accompany sovereign debt crises; we find they help predict them.”

• Based on the FRI used here and panel data for 5 emerging markets Abiad et al. (2008) find “... strong evidence that financial liberalization, rather than financial deepening, improves allocative efficiency”

• Based on the FRI used here and panel data for 1974-2004 Christiansen et al. (2009) find that „... financial reforms, ..., are robustly associated with economic growth, but only in middle-income countries. ..... the effect ... is explained by improvements in measured aggregate TFP growth, not by higher aggregate investment. “
Introduction

What’s new in this paper?

• Builds on Giannone et al. (2011)

• Outcome variables:
  – GDP growth rates (2008-2011),
  – Employment growth rates (2008-2010)
  – Average budget deficits (2008-2010).

• Methodological difficulties are taken into account:
  – outliers,
  – functional form assumptions,
  – model uncertainty with regard to explanatory variables
1. Introduction

2. Dataset and Correlation Analyses

3. Methodology

4. Results
   4.1 GDP Growth Rate Models
   4.2 Deficit Rate Models
   4.3 Employment Growth Rate Models

5. Summary and Conclusions
Dataset and Correlation Analyses

„*Financial Reform Index*“ (*FRI*) by IWF / Abiad et al. (2008): indicator for financial liberalization:
- 91 economies (here: 88)
- annual, time-varying, 1973-2005
- seven aspects of financial sector policy aggregated to one indicator
- values between 0 (=fully repressed) and 21 (=fully liberalized)
- average 2001-2005 (more variance than if only 2005 is used)

**World Bank Development Indicator**: GDP, Employment, Deficit....

**World Bank Financial Structure Dataset**: Variables measuring the size of the financial market (financial deepening)

*“Economic Freedom Dataset” of the Fraser-Institute*: “Labour Market Freedom Index” (control variable)....
Financial reform index (FRI)

(i) reduction of credit controls and excessively high reserve requirements,
(1) Are reserve requirements restrictive? (2) Are there minimum amounts of credit that must be
channeled to certain sectors? Are there ceilings on credit to other sectors? (3) Are there any credits
supplied to certain sectors at subsidized rates?

(ii) reduction of interest rate controls,
(1) Are interest rates subject to ceilings/floors or determined by the central bank? (2) Are interest rates
allowed to float within a band or are partially liberalized? (3) Are interest rates determined at market
rates?

(iii) reduction of entry barriers,
(1) To what extent does the government allow foreign banks to enter into a domestic market? (2) Does
the government allow the entry of new domestic banks (3) has the government eased branching
restrictions? (4) Does the government allow banks to engage in a wider range of activities?

(iv) reduction of state ownership in the banking sector,
This variable is based on the percentage of the state ownership of banks.

(v) reduction of capital account restrictions,
(1) Is the exchange rate system unified? (2) Does a country set restrictions on capital inflow? (3) Does a
country set restrictions on capital outflow?

(vi) enhancement of prudential regulations and supervision of the banking sector
(1) Has a country adopted a capital adequacy ratio based on the Basle standard? (2) Is a banking
supervisory agency independent from the executives’ influence? (3) Does a banking supervisory agency
conduct effective supervisions through on-site and off-site examinations?

(vii) liberalization of securities market policy
(1) Has a country taken measures to develop security market? (2) Is a country’s equity market open to
foreign investors?

Abiad et al. (2008).
## List of Countries

| Category                                      | Countries                                                                 |
|-----------------------------------------------|---------------------------------------------------------------------------|
| **Advanced Economies** (N=22)                | Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Denmark (DNK), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), United Kingdom (GBR), United States (USA) |
| **Emerging and Developing Asia** (N=12)      | Bangladesh (BDG), Hong Kong (HKG), China (CHN), India (IND), Indonesia (IDN), Korea (KOR), Malaysia (MYS), Nepal (NPL), Philippines (PHL), Singapore (SGP), Sri Lanka (LKA), Thailand (THA) |
| **Latin America and Caribbean** (N=17)       | Argentina (ARG), Bolivia (BOL), Brazil (BRA), Chile (CHL), Colombia (COL), Costa Rica (CRI), Dominican Republic (DOM), Ecuador (ECU), El Salvador (SLV), Guatemala (GTM), Mexico (MEX), Nicaragua (NIC), Paraguay (PRY), Peru (PER), Uruguay (URY), Venezuela (VEN) |
| **Sub-Saharan Africa** (N=14)                | Burkina Faso (BFA), Cameroon (CMR), Cote d'Ivoire (CIV), Ethiopia (ETH), Ghana (GHA), Kenya (KEN), Madagascar (MDG), Mozambique (MOZ), Nigeria (NIG), Senegal (SEN), South Africa (ZAF), Tanzania (TZA), Uganda (UGA), Zimbabwe (ZWE) |
| **Transition Economies** (N=17)              | Albania (ALB), Azerbaijan (AZE), Belarus (BLR), Bulgaria (BGR), Czech Republic (CZE), Estonia (EST), Georgia (GEO), Hungary (HUN), Kazakhstan (KAZ), Kyrgyz (KGZ), Latvia (LVA), Lithuania (LTU), Poland (POL), Russian Federation (RUS), Ukraine (UKR), Uzbekistan (UZB), Vietnam (VNM) |
| **Middle East and Northern Africa** (N=7)    | Algeria (DZA), Egypt (EGY), Jordan (JOR), Morocco (MAR), Pakistan (PAK), Tunisia (TUN), Turkey (TUR) |
| **Members of the Euro Area** (N=11)          | Austria (AUT), Belgium (BEL), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Ireland (IRL), Italy (ITA), Netherlands (NLD), Portugal (PRT), Spain (ESP) |
**Observation No. 1:** Advanced countries have a higher *FRI*

**Observation No. 2:** The variation of *FRI* within the Advanced countries is rather low
**Observation No. 3:** A liberalized financial market is not a pre-condition for economic development.
Observation No. 4: Worldwide trend towards liberalization, especially in the first part of the 1990s
**FRI (AVERAGE 2001–2005) AND CUMULATED GROWTH RATE OF GDP PER CAPITA IN USD 2008–2011**

**Observation No. 5:** Negative correlation between post-2007 GDP growth and FRI. However, not for the sample restricted to advanced countries.
Observation No. 6: Rich countries were hit harder by the recession
Econometric Model

1. GDP Growth Rate Model  
Based on the “Finance and Growth research” (Levine, 2005)

\[
\frac{y_{i,2011} - y_{i,2007}}{y_{i,2007}} = \alpha + \beta_1 \ln(y_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i
\]

\(y_{i,2011}\) = real GDP per capita in USD in 2011  
\(u_i\) = i.i.d. error term  
\(X\) = Matrix of control variables  
\(FRI\) = Financial Regulation Index

\(i=1,\ldots,N\) countries; \(N=88\) 
\(\alpha, \beta_1, \beta_2, \gamma\) parameters to be estimated

2. Average Budget Deficit Model  
Based on Bohn (1998)

\[
\sum_{t=2008}^{2010} \frac{B_{i,t}}{\sum_{t=2008}^{2010} Y_{i,t}} = \alpha + \beta_1 \ln(D_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i
\]

\(B\) = Budget balance in current local currency  
\(Y\) = GDP in current local currency  
\(D\) = Stock of government debt in % of GDP

average deficit ratio 2008 - 2010

3. Employment Growth Rate Model

\[
\frac{E_{i,2010} - E_{i,2007}}{E_{i,2007}} = \alpha + \beta_1 \ln(E_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i
\]

\(E\) = Employment per Population \(\geq 15\)
Econometric Problems

1. Large heterogeneity of the countries
   • always hard to handle in cross-sectional studies (without panel data)
   • different samples
   • include a lot of control variables, for example:
     – GDP growth rate 2002-2006,
     – Population in 2006
     – Dummies for country groups: advanced countries, emerging Asia, transition countries, Sub-Saharan Africa, Latin America, Middle East and North Africa, Euro
     – Openess \((EX + IM / GDP)\) in 2006
     – Size of financial sector (“financial deepening”): Financial system deposits to GDP, Stock market capitalization to GDP...

2. Outliers
   • for example: China, Norway, Ireland
   • different samples
   • median regression (quantile regression)
   • robust regression (MM-estimator; Yohai 1987; Jann 2010)
Econometric Problems

3. Non-linear Effects
   • Specify FRI as 4 Dummies
   • Use Robinson's (1988) semiparametric regression estimator
     \[ \frac{y_{i,2011} - y_{i,2007}}{y_{i,2007}} = \beta_1 \ln(y_{i,2006}) + f(FRI_i) + \gamma X + u_i \]

4. Low variance of the FRI variable – most advanced countries have FRI=21
   • Average of 2001 to 2005
   • Sample without FRI = 21 countries

5. Endogeneity of FRI with respect to the outcome variables?

6. Model uncertainty about the choice of explanatory variables (see Magnus et al. 2010)
   • An approach to deal with this difficulty is the “Bayesian model averaging” technique within a linear regression model (Magnus et al. 2010, and De Luca and Magnus 2011).
### Results Growth Regression: Basic

| Term            | Coefficient | Standard Error | p-Value |
|-----------------|-------------|----------------|---------|
| $FRI_i$         | -1.585***   | (-3.63)        |         |
| $\ln(y_{i,2006})$ | -0.905      | (-0.98)        |         |
| $\ln(\text{pop}_{i,2006})$ | 1.228*      | (1.67)         |         |

| Estimate        | t-statistic |
|-----------------|-------------|
| Constant $\hat{\alpha}$ | 19.54       |
|                 | (1.39)      |
| $N$             | 88          |
| adj. $R^2 / ^1\text{pseudo } R^2$ | 0.429 |
| Mean (median) dependent variable | 7.2 (5.2) |
| mean $FRI_i$    | 16.2        |

Notes: $t$ statistics based on robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
## Results Growth Regression: Heterogeneity?

|                | (1)          | (2)          | (3)          |
|----------------|--------------|--------------|--------------|
|                | OLS          | OLS          | OLS          |
| $\text{FRI}_i$| -1.585***    | -1.333***    | -1.235***    |
|                | (-3.63)      | (-2.90)      | (-2.89)      |
| $\ln(y_{i,2006})$ | -0.905      | -0.523      | -1.685      |
|                | (-0.98)      | (-0.44)      | (-1.30)      |
| $\ln(\text{pop}_{i,2006})$ | 1.228*     | 1.296*      | 1.527*      |
|                | (1.67)       | (1.73)       | (1.72)       |

Country groups (base: emerging Asia)$_i,2006$

|                | (1)          | (2)          | (3)          |
|----------------|--------------|--------------|--------------|
| advanced       | -6.654**     | 0.412        |              |
|                | (-2.23)      | (0.09)       |              |
| transition     | -2.473       | -4.639       |              |
|                | (-0.78)      | (-1.25)      |              |
| Sub-Saharan Africa | -6.044   | -3.930       |              |
|                | (-1.56)      | (-1.12)      |              |
| Latin America  | -1.456       | 2.046        |              |
|                | (-0.45)      | (0.56)       |              |
| Middle East and North Africa | -6.899** | -4.854      |              |
|                | (-2.01)      | (-1.31)      |              |
| Euro member    | -4.161**     | -4.786**     |              |
|                | (-2.13)      | (-2.36)      |              |

| openmess $_i,2006$ | 0.0208   |              |              |
|                   | (1.19)    |              |              |

| $(y_{i,2006} - y_{i,2002})/y_{i,2002}$ | 0.213*** |              |              |
|                                         | (3.03)   |              |              |

| Constant $\hat{\alpha}$ | 19.54 | 15.70 | 11.59 |
|                         | (1.39) | (0.94) | (0.68) |

| $N$ | 88 | 88 | 88 |
| adj. $R^2$ / $\hat{\text{pseudo}} R^2$ | 0.429 | 0.476 | 0.520 |

Mean (median) dependent variable

| mean $\text{FRI}_i$ | 7.2 (5.2) | 7.2 (5.2) | 7.2 (5.2) |
| mean $\ln(\text{pop}_{i,2006})$ | 16.2 | 16.2 | 16.2 |

*Notes: t statistics based on robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
### Results Growth Regression: Outliers?

|                | (1) OLS | (2) OLS | (3) OLS | (5) MM |
|----------------|---------|---------|---------|--------|
| \( FRI_i \)   | -1.585*** | -1.333*** | -1.235*** | -0.972* |
|                | (-3.63) | (-2.90) | (-2.89) | (-1.95) |
| \( \ln(y_{i,2006}) \) | -0.905 | -0.523 | -1.685 | -3.086* |
|                | (-0.98) | (-0.44) | (-1.30) | (-1.88) |
| \( \ln (pop_{i,2006}) \) | 1.228* | 1.296* | 1.527* | 1.931** |
|                | (1.67)  | (1.73)  | (1.72)  | (2.01)  |

Country groups (base: emerging Asia) \( i,2006 \)

- **advanced**
  - \( FRI_i \): -6.654**
  - \( \ln(y_{i,2006}) \): -2.473
  - \( \ln (pop_{i,2006}) \): -6.044
- **transition**
  - \( FRI_i \): -1.456
  - \( \ln(y_{i,2006}) \): -0.45
  - \( \ln (pop_{i,2006}) \): -6.899**
- **Sub-Saharan Africa**
  - \( FRI_i \): -2.473
  - \( \ln(y_{i,2006}) \): -0.45
  - \( \ln (pop_{i,2006}) \): -4.161**
- **Latin America**
  - \( FRI_i \): -1.456
  - \( \ln(y_{i,2006}) \): -0.45
  - \( \ln (pop_{i,2006}) \): -6.899**
- **Middle East and North Africa**
  - \( FRI_i \): -2.473
  - \( \ln(y_{i,2006}) \): -0.45
  - \( \ln (pop_{i,2006}) \): -4.161**
- **Euro member**
  - \( FRI_i \): -1.456
  - \( \ln(y_{i,2006}) \): -0.45
  - \( \ln (pop_{i,2006}) \): -6.899**

|                | (1) OLS | (2) OLS | (3) OLS | (5) MM |
|----------------|---------|---------|---------|--------|
| openness \( i,2006 \) | 0.0208  | 0.0329  | 0.0208  | 0.0329  |
|                | (1.19)  | (1.53)  | (1.19)  | (1.53)  |
| \( (y_{i,2006} - y_{i,2002})/y_{i,2002} \) | 0.213*** | 0.257*  | 0.213*** | 0.257*  |
|                | (3.03)  | (1.91)  | (3.03)  | (1.91)  |
| Constant \( \hat{\alpha} \) | 19.54   | 15.70   | 11.59   | 8.855   |
|                | (1.39)  | (0.94)  | (0.68)  | (0.49)  |
| \( N \)        | 88      | 88      | 88      | 88      |
| adj. \( R^2 \) / \( ^\dagger \)pseudo \( R^2 \) | 0.429   | 0.476   | 0.520   | 0.520   |
| Mean (median) dependent variable | 7.2 (5.2) | 7.2 (5.2) | 7.2 (5.2) | 7.2 (5.2) |
| mean \( FRI_i \) | 16.2    | 16.2    | 16.2    | 16.2    |

**Notes:** \( t \) statistics based on robust standard errors in parentheses; * \( p < 0.10 \), ** \( p < 0.05 \), *** \( p < 0.01 \)
## Results Growth Regression: Outliers?

|        | (1) OLS | (2) OLS | (3) OLS | (5) MM | (8) OLS |
|--------|---------|---------|---------|--------|---------|
| \(FRI_i\)        | -1.585*** | -1.333*** | -1.235*** | -0.972* | -0.942** |
|                 | (-3.63)  | (-2.90)  | (-2.89)  | (-1.95) | (-2.34) |
| \(\ln(y_{i,2006})\) | -0.905   | -0.523   | -1.685   | -3.086* | -1.515  |
|                 | (-0.98)  | (-0.44)  | (-1.30)  | (-1.88) | (-1.11) |
| \(\ln(\text{pop}_{i,2006})\) | 1.228*   | 1.296*   | 1.527*   | 1.931** | 0.743   |
|                 | (1.67)   | (1.73)   | (1.72)   | (2.01)  | (0.78)  |

Country groups (base: emerging Asia) \(i,2006\)

- **advanced**
  - \(\text{FRI}_i\): \(-6.654**\)
  - \(\ln(y_{i,2006})\): \(-2.473\)
  - \(\ln(\text{pop}_{i,2006})\): \(-0.78\)
- **transition**
  - \(\text{FRI}_i\): \(-6.044\)
  - \(\ln(y_{i,2006})\): \(-2.473\)
  - \(\ln(\text{pop}_{i,2006})\): \(-0.78\)
- **Sub-Saharan Africa**
  - \(\text{FRI}_i\): \(-6.899**\)
  - \(\ln(y_{i,2006})\): \(-2.473\)
  - \(\ln(\text{pop}_{i,2006})\): \(-0.78\)
- **Latin America**
  - \(\text{FRI}_i\): \(-1.456\)
  - \(\ln(y_{i,2006})\): \(2.046\)
  - \(\ln(\text{pop}_{i,2006})\): \(0.56\)
- **Middle East and North Africa**
  - \(\text{FRI}_i\): \(-4.161**\)
  - \(\ln(y_{i,2006})\): \(-2.473\)
  - \(\ln(\text{pop}_{i,2006})\): \(-0.78\)
- **Euro member**
  - \(\text{FRI}_i\): \(-6.899**\)
  - \(\ln(y_{i,2006})\): \(-2.473\)
  - \(\ln(\text{pop}_{i,2006})\): \(-0.78\)

\(\text{openness}_{i,2006}\)

\(\ln(y_{i,2006} - y_{i,2002})/y_{i,2002}\)

|        | (1) OLS | (2) OLS | (3) OLS | (5) MM | (8) OLS |
|--------|---------|---------|---------|--------|---------|
| Constant \(\hat{\alpha}\) | 19.54   | 15.70   | 11.59   | 8.855  | 20.51   |
|        | (1.39)  | (0.94)  | (0.68)  | (0.49) | (1.06)  |
| N      | 88      | 88      | 88      | 88     | 77      |
| adj. \(R^2\) / pseudo \(R^2\) | 0.429   | 0.476   | 0.520   | 0.395  |
| Mean (median) dependent variable | 7.2 (5.2) | 7.2 (5.2) | 7.2 (5.2) | 7.2 (5.2) | 8.4 (7.8) |
| Mean \(FRI_i\) | 16.2    | 16.2    | 16.2    | 16.2   | 15.7    |

**Notes:** t statistics based on robust standard errors in parentheses;
* \(p < 0.10\), ** \(p < 0.05\), *** \(p < 0.01\)

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4. Results

\(FRI_i = 21\) countries and China

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Results Growth Regression: Linearity Assumption?

| Dummy Specification of $FRI_i$ (excerpt) | OLS       |
|------------------------------------------|-----------|
| $FRI$ dummies (base: [0 – 13.5])         |           |
| [13.6–16.0]                              | -2.860    |
|                                          | (-0.98)   |
| [16.1–19.05]                             | -6.670**  |
|                                          | (-2.05)   |
| [19.1–21.0]                              | -10.06**  |
|                                          | (-2.53)   |

Non-parametric fit of $f(FRI_i)$ in the GDP Growth Rate Model

Statistical test

$H_0$: Linear specification and non-parametric fit is not different

$\rightarrow$ p-value: 0.202

$\rightarrow$ $H_0$ is not rejected:

$\rightarrow$ linearity assumption seems appropriate

Robinson (1988) semiparametric regression estimator
Is it the regulation or the size of the financial sector (financial deepening)?

**World Bank Financial Structure Dataset:** measured in 2006

|                                               | Liquid liabilities to GDP | Financial system deposits to GDP | Private credit by deposits money banks to GDP | Stock market capitalization to GDP | Stock market total value traded to GDP |
|-----------------------------------------------|---------------------------|---------------------------------|----------------------------------------------|----------------------------------|----------------------------------------|
| **Liquid liabilities to GDP**                 | 1.000                     |                                 |                                              |                                  |                                        |
| **Financial system deposits to GDP**          |                           | 0.9477                          | 1.000                                        |                                  |                                        |
|                                               |                           | (0.0000)                        |                                              |                                  |                                        |
| **Private credit by deposits money banks to GDP** |                           | 0.7530                          | 0.7860                                       | 10.000                           |                                        |
|                                               |                           | (0.0000)                        | (0.0000)                                     |                                  |                                        |
| **Stock market capitalization to GDP**        |                           | 0.7070                          | 0.7464                                       | 0.6033                           | 10.000                                 |
|                                               |                           | (0.0000)                        | (0.0000)                                     | (0.0000)                         |                                        |
| **Stock market total value traded to GDP**    |                           | 0.6310                          | 0.6594                                       | 0.7204                           | 0.7508                                 | 10.000                                 |
|                                               |                           | (0.0000)                        | (0.0000)                                     | (0.0000)                         | (0.0000)                               |                                        |
| **FRI**                                       |                           | 0.3384                          | 0.4747                                       | 0.5743                           | 0.3491                                 | 0.4231                                 |
|                                               |                           | (0.0013)                        | (0.0000)                                     | (0.0000)                         | (0.0021)                               | (0.0002)                               |

4. Results
## Results Growth Regression: Regulation and/or size?

|                  | (6)       | (7)         |
|------------------|-----------|-------------|
|                  | OLS       | OLS         |
| \( FRI_i \)     | -1.112**  | -0.750*     |
|                  | (-2.45)   | (-1.69)     |
| \( \ln(y_{i,2006}) \) | -1.767    | -2.808*     |
|                  | (-1.36)   | (-1.90)     |
| \( \ln(\text{pop}_{i,2006}) \) | 1.450     | 1.387       |
|                  | (1.56)    | (1.48)      |
| Country groups (base: emerging Asia),2006 |             |             |
| advanced         | -0.355    | 0.272       |
|                  | (-0.07)   | (0.05)      |
| transition       | -5.702    | -8.447**    |
|                  | (-1.44)   | (-2.12)     |
| Sub-Saharan Africa | -3.788    | -3.557      |
|                  | (-1.07)   | (-0.89)     |
| Latin America    | 1.973     | 2.739       |
|                  | (0.55)    | (0.71)      |
| Middle East and North Africa | -4.970    | -4.486      |
|                  | (-1.37)   | (-1.21)     |
| Euro member      | -4.620**  | -4.193*     |
|                  | (-2.24)   | (-1.96)     |
| openness,2006    |           |             |
|                  | 0.0173    | 0.0155      |
|                  | (0.86)    | (0.86)      |
| \( (y_{i,2006} - y_{i,2002}) / y_{i,2002} \) | 0.230***  | 0.263**     |
|                  | (2.69)    | (2.13)      |
| Fin. system deposits in % of GDP,2006 | 0.0076    | 0.0094      |
|                  | (0.33)    | (0.75)      |
| Stock market capitalization in % of GDP,2006 |             |             |
|                  |           |             |
| Constant \( \hat{\alpha} \) | 11.39    | 14.70       |
|                  | (0.62)    | (0.77)      |
| \( N \)         | 86        | 74          |
| adj. \( R^2 \) / \( \hat{\text{pseudo}} R^2 \) | 0.506    | 0.533       |
| Mean (median) dependent variable | 7.2 (5.2) | 6.3 (4.7)   |
| mean \( FRI_i \) | 16.4      | 16.8        |

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Summary

An increase in the $FRI$ by one unit, leads to

- a loss of GDP growth of approx. 1 percentage-points between end of 2007 and end of 2011, that is, an annual loss of approx. ¼ percentage points GDP growth.

- an increase in the annual deficit ratio by 0.4 percentage points.

- an employment growth loss of approx. 0.7. percentage-points between end of 2007 and end of 2010, that is, an annual loss of approx. 0.2 percentage points employment growth, if only countries with $FRI_i > 13$ are included.
Conclusions: Experiencing a déjà vu?

“It has become increasingly clear that financial and capital market liberalization (...) was at the core of the problem. It is no accident that the two large developing countries that survived the crisis – and continued with remarkably strong growth in spite of a difficult global economic environment – were India and China, both countries with strong controls on these capital flows.”

Stiglitz (2000, P. 1075) about the East Asian Crisis 1997-1998
Financial Reform Index, Average 2001 to 2005

Growth Rate of Real GDP per Capita in USD 2008–2011

2. Dataset and Correlation Analyses
Conclusions / Future Research

What are the channels?

→ Asset prices? (see, e.g., Favara and Imbs, 2011)

Which components of financial deregulation?
Thank you very much for your attention

Questions?
Comments?

Paper: Hagen, Tobias (2013). Impact of National Financial Regulation on Macroeconomic and Fiscal Performance after the 2007 Financial Shock – Econometric Analyses Based on Cross-Country Data. Economics Discussion Papers, No 2013-26, Kiel Institute for the World Economy.
http://www.economics-ejournal.org/economics/discussionpapers/2013-26
Percentage change of real GDP per capita from 2007 to 2011
Percentage change of real GDP per capita from 2007 to 2011

Growth Rate of real GDP per capita 2008-2011 in %

Appendix
Percentage change of employment-population ratio from 2007 to 2011
Percentage change of employment-population ratio 2007 to 2011
Average budget deficit 2008-2010

Deficit Ratio in %, Average 2008 to 2010

Ireland, Greece, United States, United Kingdom, Portugal, Japan, France, Spain, Israel, Italy, Belgium, Netherlands, Austria, Germany, Australia, Canada, Denmark, New Zealand, Finland, Sweden, Norway.
Average budget deficit 2008-2010

- Deficit Ratio in %, Average 2008 to 2010

Appendix
FINANCIAL REFORM INDEX (AVERAGE 2001–2005) AND CUMULATED GROWTH RATE OF THE EMPLOYMENT TO POPULATION RATIO 2008–2010

Positive correlation between post-2007 employment growth and FRI

|                          | Pearson       | Spearman      |
|--------------------------|---------------|---------------|
| All Countries, N=88      | -0.4165 (0.0000) | -0.4389 (0.0000) |
| Only Advanced, N=22      | -0.3288 (0.1352) | -0.2207 (0.3237) |
| Advanced + Asia, N=51    | -0.4508 (0.0009) | 0.5228 (0.0001) |
FIGURE 8: FINANCIAL REFORM INDEX (AVERAGE 2001–2005) AND AVERAGE DEFICIT RATIO 2008–2010

No correlation between post-2007 budget deficits and FRI
## Results Deficit Regression

|                | (1) OLS | (2) OLS | (3) OLS | (4) Median | (5) MM | (8) OLS |
|----------------|---------|---------|---------|------------|--------|---------|
| FRI<sub>i</sub> | -0.456*** | -0.352 | -0.428*** | -0.465** | -0.393*** | -0.301* |
|                | (-2.23) | (-1.56) | (-3.06) | (-2.13) | (-2.66) | (-1.97) |
| ln(D<sub>i,2006</sub>) | -0.543 | -0.417 | 1.172 | -0.0953 | 0.198 | 0.425 |
|                | (-0.98) | (-0.69) | (1.56) | (-0.15) | (0.41) | (0.86) |
| ln(y<sub>i,2006</sub>) | 0.792 | 1.021** | 0.885** | 0.621 | 0.614** | 0.664** |
|                | (1.47) | (2.04) | (2.18) | (0.93) | (2.04) | (2.06) |
| ln (pop<sub>i,2006</sub>) | -0.713* | -0.884* | -0.354 | -0.584 | -0.423 | 0.0938 |
|                | (-1.74) | (-1.81) | (-1.05) | (-1.41) | (-1.55) | (0.31) |

Country groups (base: emerging Asia),<sub>1,2006</sub>

|                | Advanced | Transition | Sub-Saharan Africa | Latin America | Middle East and North Africa | Euro member | openness,<sub>1,2006</sub> | ∑<sub>2006</sub>B<sub>i</sub> / ∑<sub>2002</sub>Y<sub>i</sub> | (Y<sub>i,2006</sub> - Y<sub>i,2002</sub>) / Y<sub>i,2002</sub> | Constant ̂α |
|----------------|----------|------------|-------------------|---------------|----------------------------|-------------|-------------------|-----------------------------|-----------------------------|-------------------|
|                | -2.464   | -3.362*    | -2.402            | -2.075        | 0.0804                     |             |                   |                             |                             |                   |
|                | (-1.21)  | (-1.76)    | (-1.15)           | (-1.52)       | (0.06)                      |             |                   |                             |                             |                   |
|                | -2.712*  | 1.000      | -0.501            | -0.736        | 0.676                       |             |                   |                             |                             |                   |
|                | (-1.75)  | (0.64)     | (-0.17)           | (-0.59)       | (0.41)                      |             |                   |                             |                             |                   |
|                | -2.112   | -0.774     | -0.802            | -1.060        | 0.293                       |             |                   |                             |                             |                   |
|                | (-1.49)  | (-0.53)    | (-0.23)           | (-0.63)       | (0.19)                      |             |                   |                             |                             |                   |
|                | -1.920   | 0.0780     | -0.654            | 0.0833        | 1.721                       |             |                   |                             |                             |                   |
|                | (-1.33)  | (0.05)     | (-0.26)           | (0.05)        | (1.18)                      |             |                   |                             |                             |                   |
|                | -2.885** | -0.831     | -2.169            | -1.106        | 0.299                       |             |                   |                             |                             |                   |
|                | (-2.16)  | (-0.58)    | (-0.66)           | (-0.59)       | (0.20)                      |             |                   |                             |                             |                   |
|                | -3.438   | -2.129     | -1.373            | -0.597        | -2.462**                    |             |                   |                             |                             |                   |
|                | (-1.59)  | (-1.44)    | (-1.20)           | (-0.73)       | (-2.26)                     |             |                   |                             |                             |                   |
|                | 0.00464  | 0.0128*    | 0.010***          | 0.0142**      | 0.0142**                    |             |                   |                             |                             |                   |
|                | (0.59)   | (1.86)     | (2.66)            | (2.54)        | (2.54)                      |             |                   |                             |                             |                   |
|                | 0.932*** | 0.605***   | 0.681***          | 0.746***      | 0.746***                    |             |                   |                             |                             |                   |
|                | (7.23)   | (4.03)     | (4.78)            | (5.41)        | (5.41)                      |             |                   |                             |                             |                   |
|                | -0.100*  | -0.0914    | -0.0561           | -0.0601       | -0.0601                     |             |                   |                             |                             |                   |
|                | (-1.93)  | (-1.00)    | (-0.80)           | (-0.87)       | (-0.87)                     |             |                   |                             |                             |                   |
|                | 12.23**  | 13.69      | 2.471             | 12.62         | 7.212                       | -5.597      |                   |                             |                             |                   |
|                | (2.08)   | (1.34)     | (0.29)            | (1.06)        | (0.72)                      | (-0.70)     |                   |                             |                             |                   |

| N        | 66 | 66 | 58 | 58 | 58 | 47 |
| adj. R²  | 0.044 | 0.111 | 0.546 | 0.469 | 0.722 |
| Mean (median) dependent variable | -2.8 | -2.8 | -2.8 | -2.8 | -2.8 | -2.7 |

Notes: t statistics based on robust standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01

without FRI<sub>i</sub> = 21 countries, China and Norway
Results \textbf{Deficit Regression II}

Dummy Specification of $FRI_i$ (excerpt)

| $FRI$ dummies (base: 0 – 13.5) | OLS      |
|-----------------------------|----------|
| [13.6–16.0]                | -1.501   |
|                             | (-1.27)  |
| [16.1–19.05]               | -2.283   |
|                             | (-1.54)  |
| [19.1–21.0]                | -2.915*  |
|                             | (-1.83)  |

Figure 10: Non-parametric fit of $f(FRI_i)$ in the Deficit Ratio Model

Statistical test

$H_0$: The linear specification and the non-parametric fit is not different

- Standardized Test statistic $T$: 1.455
- Critical value (95%): 1.96
- Approximate $P$-value: 0.15

$\rightarrow H_0$ is not rejected: linearity assumption seems (barely) appropriate
## Results Employment Growth Regression

|                        | (1) OLS | (2) OLS | (3) OLS | (4) Median | (5) MM | (8) OLS |
|------------------------|---------|---------|---------|------------|--------|---------|
| $FRI_i$                | -0.386*** | -0.345** | -0.433** | -0.254 | -0.121 | -0.185 |
|                        | (-2.78)  | (-2.25)  | (-2.53)  | (-1.40)  | (-0.93) | (-1.32) |
| $\ln(E_{i,2006})$     | -2.170   | -4.727   | -8.243** | -5.630  | -3.585 | -1.453  |
|                        | (-1.33)  | (-1.29)  | (-2.56)  | (-1.23)  | (-0.50) | (-0.49) |
| $\ln(y_{i,2006})$     | -0.214   | -0.504   | -0.884*  | -0.762  | -0.666 | -0.388  |
|                        | (-0.82)  | (-1.10)  | (-1.83)  | (-1.12)  | (-1.32) | (-0.78) |
| $\ln(\text{pop}_{i,2006})$ | 0.188   | 0.0591   | 0.291    | 0.0886  | -0.000593 | 0.197 |
|                        | (0.53)   | (0.19)   | (0.89)   | (0.29)  | (-0.00) | (0.56)  |
| Labour market freedom index | -0.192   | -0.335   | -0.186   | -0.239  | -0.0206 | -0.09   |
|                        | (-0.73)  | (-1.32)  | (-0.57)  | (-0.71) | (-0.09) |         |
| Country groups (base: emerging Asia) $i,2006$ |         |         |         |          |        |         |
| advanced               | 2.243    | 4.887**  | 2.611    | 1.431    | 2.068  |         |
|                        | (1.44)   | (2.50)   | (1.00)   | (0.81)   | (0.91) |         |
| transition             | -1.420   | 0.729    | -0.620   | -0.758   | 0.483  |         |
|                        | (-0.92)  | (0.46)   | (-0.69)  | (-0.59)  | (0.37) |         |
| Sub-Saharan Africa     | 0.286    | 1.331    | 0.901    | 0.455    | 0.732  |         |
|                        | (0.21)   | (1.11)   | (0.69)   | (0.39)   | (0.68) |         |
| Latin America          | 2.585**  | 4.694*** | 2.970*** | 2.464**  | 3.384*** |         |
|                        | (2.30)   | (3.63)   | (2.83)   | (1.93)   | (2.86) |         |
| Middle East and North Africa | -0.00176 | 0.506    | 0.327    | 0.754    | 2.187  |         |
|                        | (-0.00)  | (0.28)   | (0.16)   | (0.23)   | (1.25) |         |
| Euro member            | -3.152*  | -3.600*** | -2.890   | -0.909   | -1.102 |         |
|                        | (-1.88)  | (-2.65)  | (-1.11)  | (-0.40)  | (-0.74) |         |
| Openess $i,2006$       |         |         |         |          |        |         |
|                        | 0.0163** | 0.00843  | 0.00543  | 0.00549  | 0.00549 |         |
|                        | (2.27)   | (0.85)   | (0.93)   | (0.82)   | (0.82) |         |
| $(E_{i,2006} - E_{i,2002})/E_{i,2002}$ | -0.281*** | -0.171    | -0.110   | -0.102   | -0.102 |         |
|                        | (-3.14)  | (-1.42)  | (-0.85)  | (-1.45)  | (0.74) |         |
| $(y_{i,2006} - y_{i,2002})/y_{i,2002}$ | -0.0304  | -0.0270  | 0.00740  | -0.00805 | -0.00805 |         |
|                        | (-0.78)  | (-0.60)  | (0.28)   | (-0.28)  | (0.28) |         |
| Constant $\hat{\alpha}$ | 12.48    | 27.50    | 41.46*** | 30.83    | 21.65  | 6.739   |
|                        | (1.35)   | (1.62)   | (2.68)   | (1.28)   | (0.77) | (0.47)  |
| $N$                    | 88       | 85       | 85       | 85       | 85     | 74      |
| adj. $R^2$ / $^\dagger$pseudo $R^2$ | 0.164    | 0.269    | 0.373    | 0.275    | 0.078 |         |
| Mean (median) dependent variable mean $FRI_i$ | -1.2 (-0.5) | -1.2 (-0.5) | -1.2 (-0.5) | -1.2 (-0.5) | -1.2 (-0.5) | -0.4 (-0.1) |

### Notes:
- $t$ statistics based on robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
- without $FRI_i = 21$ countries
Results Employment Growth Regression II

Dummy Specification of $FRI_i$ (excerpt)

| $FRI$ dummies (base: [0–13.5]) | OLS          |
|-------------------------------|--------------|
| [13.6–16.0]                   | 0.306 (0.33) |
| [16.1–19.05]                  | -0.624 (-0.64) |
| [19.1–21.0]                   | -3.689*** (-2.82) |

Figure 11: Non-parametric fit of $f(FRI_i)$ in the Employment Growth Model

Statistical test
$H_0$: The linear specification and the non-parametric fit is not different
- Standardized Test statistic $T$: 3.405
- Critical value (95%): 1.96
- Approximate P-value: 0.00

$\rightarrow H_0$ is rejected: linearity assumption not appropriate

However, (linear) negative relationship for $FRI_i > 13$?
### Results Employment Growth Regression III

Reduced sample of 71 countries with $FRI_i > 13$, assuming linearity (excerpt)

|          | (12)       | (13)       | (14)       |
|----------|------------|------------|------------|
| $FRI_i$  | OLS        | Median     | MM         |
|          | -0.707***  | -0.545**   | -0.521*    |
|          | (-2.96)    | (-2.11)    | (-1.87)    |
| $N$      | 71         | 71         | 71         |
| adj. $R^2$ / $\text{pseudo } R^2$ | 0.4817 | $^\S0.3471$ |             |
| Mean (median) dependent variable | -1.4 (-0.7) | -1.4 (-0.7) | -1.4 (-0.7) |
| mean $FRI_i$ | 17.5      | 17.5       | 17.5       |