

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

*Tobias Hagen*

## **Abstract**

Using cross-country data, this paper estimates the impact of the 2007 financial shock on countries' macroeconomic developments conditional on national financial regulations before the crisis. For this purpose, the "financial reform index" developed by Abiad et al. (A New Database of Financial Reforms, 2008a) is used. The econometric analyses indicate that countries with more deregulated financial markets experienced deeper recessions, stronger employment losses, and larger government budget deficits. Against the background of the ongoing global crisis and the results of other studies, the usefulness of liberalized financial markets for macroeconomic stability and economic development should be rigorously reconsidered.

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**Keywords** Financial crisis; financial regulation; Great Recession; robust regression; semi-parametric regression

## **Authors**

*Tobias Hagen*, ✉ Frankfurt University of Applied Sciences, Department of Business and Law, Nibelungenplatz 1, 60318 Frankfurt am Main, Germany, [tobiashagen@email.de](mailto:tobiashagen@email.de)

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## 1 Introduction

The global financial crisis that began in 2007, led to the most severe recession since the Great Depression. It was a synchronized shock for almost all countries around the world, which led to substantial output losses and, partly, to long-lasting crises. At the same time, the depths of the recessions and the degrees to which the countries have been affected varied significantly (see Masciandaro *et al.* 2011). Countries with higher income per capita have experienced the most severe output losses (see Rose and Spiegel 2011). Furthermore, the recessions led to employment losses and government debt crises in many countries. For this reason, this paper not only analyses GDP growth rates after the 2007 financial shock, but also employment changes as well as government budget balances.

The global recession took off in the financial sector, and the following years were characterized by threatening bankruptcy, scandals, and bailouts of some of the biggest financial intermediaries. Hence, the point of departure is the question: which role did financial liberalization play with regard to the severity and extent of output and employment losses as well as budget deficits during the global recession? For the empirical analyses the „New Database of Financial Reforms“, developed by Abiad *et al.* (2008a), is used as an indicator for financial liberalization. It covers 91 economies over the time period 1973–2005 and includes seven aspects of financial sector policy. This indicator has been used in previous papers to study the long-term growth effects of financial liberalization (see, for example, Christiansen *et al.* 2013; Abiad *et al.* 2008b).

With regard to previous empirical studies on the role of financial market regulation in the crisis one may differentiate between studies directly using indicators for financial market regulation and studies using measures for the size of the financial market (financial deepening). Even though both types of variables are correlated, this difference should be kept in mind (Abiad *et al.* 2008b).

The paper by Giannone *et al.* (2011) analyses the role of market freedom on average GDP growth in 2008 and 2009 using a cross-country dataset. Their results indicate that the set of policies that favor liberalization in credit markets are negatively correlated with countries' resilience to the recession as measured by output growth in 2008 and 2009. Furthermore, they find that the negative correlation remains after the inclusion of a wide range of controls, and the conduction of several robustness tests. Moreover, credit market regulation is found

to be one of the more significant (with a negative sign) explanatory variables for the decline in output growth in 2008 and 2009.

Besides other concepts, Masciandaro *et al.* (2011) make use of the same financial reform index as this paper. They reveal that the countries with the most liberalized financial system were hit the hardest by the crisis. They focus on the effects of various features of supervisory architecture and governance on economic resilience of countries. Their findings show that they were *negatively* correlated with economic resilience.<sup>1</sup>

Rose and Spiegel (2011) empirical cross-country analyses of the post 2007 recession indicate that countries with higher income and looser credit market regulation seemed to suffer worse crises.

In its “Global Financial Stability Report” the IMF (2012) performs cross-country panel regressions to relate economic outcomes (real GDP per capita growth, volatility of real GDP per capita growth, and financial stress) to financial structures for 58 economies during the 1998–2010 period. Here, only some of the findings for volatility of real GDP per capita growth are summarized. Volatility is positively affected by the share of foreign banks in the domestic market, and is negatively affected by the higher concentration in the banking sector. A higher ratio of equity to total assets is associated with lower volatility. The IMF (2012, Chap. 4) draws the conclusions that protective financial buffers within banks have been associated with better economic outcome and a domestic financial system that is dominated by some types of non-traditional bank intermediation has in some cases been associated with adverse economic outcomes.

This paper builds on Giannone *et al.* (2011) since it analyses the effects on output growth rates too, and makes use of some of the methodological approaches applied by them. However, with regard to the following aspects, this study aims to go beyond previous research:

- This paper not only analyses the effects on output growth after the 2007 shock. It estimates the effects on employment growth rates and on budget balance ratios as well. The latter seems to be a matter of particular interest since the financial crisis transformed into fiscal crises in many countries,

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<sup>1</sup> Another paper using also the financial reform index to analyze banking crises more general is Angkinand *et al.* (2010).

which seems to be a common experience in history (see Reinhart and Rogoff 2011).

- Also the years 2010 to 2011 in case of output growth and the year 2010 in case of the other two outcome variables are included. Using also data for 2010 and 2011 accounts for the fact that the recessions have been long-lasting in several countries.
- This paper takes some methodological difficulties into account. Especially, since the dataset is only cross-sectional, unobserved heterogeneity may bias the results. Further issues being considered are outliers and functional form assumptions.

The econometric analyses find evidence that financial liberalization has had a strongly negative effect on countries' performances after the year 2007. Thus, our paper refers to similar findings of the studies, as mentioned above: the countries which followed the IMF's agenda of financial market liberalization (see, e.g., Joyce and Noy 2008) the most, have also been hit the hardest economically, with regard to all three outcome variables. Note, however, that this paper is not able to identify the exact channel through which financial liberalization works. Consequently, it cannot give answer to the question, *why* national financial regulations affect the processes of the crises.<sup>2</sup>

The remainder of the paper is as follows. In the next section, the dataset used is described and preliminary correlation analyses are performed. Note that more information on the dataset can be found in the Appendix. Section 3.1 describes the econometric methods used considering several methodological difficulties. Sections 3.2, 3.3, and 3.4 present the results of the econometric analyses of the three outcome variables. Finally, Section 4 offers some conclusions.

## 2 Dataset and Correlation Analyses

The empirical analyses are based on the financial reform index (*FRI*) developed by Abiad *et al.* (2008a) for 91 countries covering the time period 1973–2005. Abiad *et*

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<sup>2</sup> Some answers can be found, for example, in IMF (2012), Caprio *et al.* (2010), Favara and Imbs (2010), as well as Chudika and Fratzscher (2011).

*al.* (2008b: 271) define financial liberalization and the *FRI* as a “...reduction in the role of government, and an increase in the role of the market, in allocating credit.” The *FRI* is a time-varying index for 91 countries, which can have values between 0 (= fully repressed) and 21 (= fully liberalized). Due to restrictions of the other data sources only 88 countries are included. These countries can be found in Table A1 in the Appendix.

The *FRI* consists of 7 different dimensions of financial sector policy (see also Angkinand *et al.* 2010): (i) reduction of credit controls and excessively high reserve requirements,<sup>3</sup> (ii) reduction of interest rate controls,<sup>4</sup> (iii) reduction of entry barriers,<sup>5</sup> (iv) reduction of state ownership in the banking sector,<sup>6</sup> (v) reduction of capital account restrictions,<sup>7</sup> (vi) enhancement of prudential regulations and supervision of the banking sector,<sup>8</sup> (vii) liberalization of securities market policy.<sup>9</sup> Note that the dimension (vi) may actually be interpreted as being the opposite of liberalization.<sup>10</sup> However, in this paper, the authors of the *FRI* are taken by their words and the *FRI* is treated as a “black box” which serves as a proxy for the financial liberalization of a country. Doing so, this paper follows influential studies which more or less conclude that financial liberalization (as

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<sup>3</sup> Based on the questions: (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?

<sup>4</sup> Based on the questions: (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?

<sup>5</sup> Based on the questions: (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?

<sup>6</sup> This variable is based on the percentage of the state ownership of banks.

<sup>7</sup> Based on the questions: (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?

<sup>8</sup> Based on the questions: (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?

<sup>9</sup> Based on the questions: (1) Has a country taken measures to develop security market? (2) Is a country's equity market open to foreign investors?

<sup>10</sup> I thank an anonymous referee for highlighting this issue.

measured by this proxy) lead to higher long-term growth (see Christiansen *et al.* 2013; Abiad *et al.* 2008b).

A natural approach would be to use the *FRI* for 2005 only. However, the average of the *FRI* over the time period 2001 to 2005 is used for the following reason: one may argue that the state of the national financial system at the time of the shock in 2007 does not only depend on the regulation of one year (2005), but also on the regulation of a longer time period before. The year 2001 is defined as the beginning of this time period, since this is the first year after the end of the dot-com bubble. Furthermore, by using not only the *FRI* of 2005, it is possible to gain more variation of this variable. For example, 10 out of 18 advanced countries have the highest value of 21 in 2005. By using the average *FRI* for 2001 to 2005, only 8 out of 18 advanced countries have the value 21.

The second main data sources are the World Development Indicators (World Bank 2013) and the World Bank Financial Structure Dataset (Beck *et al.* 2009). Other data sources used and the exact variable definitions can be found in Table A2 in the Appendix.

In the following, some figures are presented in order to give an overview of the data. Table 1 shows that the advanced economies are the countries which are liberalized to a high extent. Furthermore, within the advanced economies the variation of the *FRI* is rather low (see the last column showing the total index). The impression is confirmed in Figure A1, Figure A2 and Figure A3 (Figures A1 to A8 are listed in the Appendix) showing that richer countries have a higher *FRI* and that the variance of the *FRI* is low within the advanced economies. This has to be taken into account in the econometric analyses, mainly because – as demonstrated by Figure A4 – richer countries (real GDP per capita) were more affected by the recession (in terms of the cumulated GDP growth rate in 2008 to 2011) than poorer countries. Within the developing and transition economies (Figure A2) only Estonia and Latvia have an *FRI* value of 21. Already at this point it is worth noting that these countries were hit particularly hard by output losses (see Figure A6).

A drawback of the dataset used with a wide range of countries is that there is no detailed information available on labor market institutions and regulations such as those published by the OECD for the advanced economies (see OECD 2012). Labor market institutions and regulations have turned out to be important

*Table 1: The Financial Reform Index by its Components and Regions, Average 2001–2005*

		Credit Controls	Interest Rate Controls	Entry Barriers	Bank Regulations	Privatization	Capital Account	Securities Market	Total Index
Advanced Economies n=22	Mean	2.78	3.00	2.98	2.58	2.35	3.00	3.00	19.70
	Min	1.50	3.00	2.00	1.00	0.00	3.00	3.00	17.00
	Max	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.00
Emerging and Developing Asia n=12	Mean	2.34	2.50	2.27	1.43	1.13	2.13	2.25	14.05
	Min	1.00	0.00	1.00	0.00	0.00	1.00	1.00	7.25
	Max	3.00	3.00	3.00	2.00	3.00	3.00	3.00	20.00
Latin America and Caribbean n=17	Mean	2.25	2.91	2.67	1.55	2.05	2.40	1.99	15.81
	Min	0.00	0.00	1.00	0.00	0.00	0.00	1.00	11.00
	Max	3.00	3.00	3.00	2.00	3.00	3.00	3.00	20.00
Sub-Saharan Africa n=14	Mean	2.30	2.46	2.64	1.34	2.29	1.61	1.51	14.16
	Min	0.75	1.00	1.00	0.00	0.00	0.00	1.00	7.00
	Max	3.00	3.00	3.00	3.00	3.00	3.00	3.00	18.25
Transition Economies n=17	Mean	2.36	2.60	2.67	2.06	1.84	2.45	2.07	16.04
	Min	1.50	0.00	0.00	1.00	0.00	1.00	0.00	7.50
	Max	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.00
Middle East and Northern Africa n=7	Mean	2.37	2.86	2.43	1.71	1.06	1.86	2.09	14.37
	Min	1.50	2.00	0.00	1.00	0.00	0.00	1.00	11.00
	Max	3.00	3.00	3.00	3.00	3.00	3.00	3.00	19.25

Source: Author’s calculations based on Abiad *et al.* (2008a).

determinants for the explanations of cross-country differences in labor market performance during the crisis (OECD 2012). Hence, these are important control variables. In order to control for labor market institutions and regulations, the “Economic Freedom Dataset” of the Fraser-Institute is used (see Gwartney *et al.* 2011), which includes data on national labor markets as well. The variable “Labor Market Freedom Index” is coded, such as a high value indicates a deregulated labor market. Figure A5 indicates that countries with highly deregulated labor markets experienced greater employment losses than more regulated countries.

Finally, by applying correlation analyses it is investigated whether the *FRI* is directly interrelated with the outcome variables of interest. Figure A6 is a scatter plot of the *FRI* and the cumulated growth rate of GDP per capita measured in USD over the period 2008 to 2011. The strong negative relationship is visually obvious and confirmed by correlation coefficients (see the notes to Figure A6). However, note that this may not be causal as Figure A3 and Figure A4 indicate that high income countries also have a higher *FRI* and that high income countries have experienced deeper recessions. Hence, this must be taken into account in the

econometric analyses. Furthermore, Figure A6 indicates that it might be important to consider the problem of outliers. For example China (CHN) has low value of the *FRI* (a highly regulated financial market) and very high GDP growth.

In Figure A7 the cumulated growth rate of the employment to population ratio is plotted against the *FRI*. Less clear-cut but still significant is the negative relationship found (see the notes to Figure A7).

At last, Figure A8 cannot find any correlation of the *FRI* with the average budget balance ratio over the time period 2008–2010. However, it will become clear in the regression analyses in the subsequent section, that – after controlling for other factors – the *FRI* has a strong negative effect on the budget balance ratio.

### 3 Econometric Analyses

#### 3.1 Econometric Models

The aim of this paper is to go further than the simple correlation analyses in the previous section and to estimate the causal effects of financial liberalization on the outcome variables GDP growth rate, employment growth rate and the budget balance ratio using regression analyses. The GDP model includes the year 2011. Due to data restrictions the employment growth rate model as well as the budget balance ratio model ranges only to year 2010.

Firstly, the *GDP growth rate model* is explained. Based on the “Finance and Growth” literature (see Levine 2005) and building on Giannone *et al.* (2011), the determinants of the 4-years cumulated growth rate over the period 2008–2011 (percentage change of the real GDP from the end of 2007 to the end of 2011) is specified as the following regression function

$$(1) \quad \frac{y_{i,2011} - y_{i,2007}}{y_{i,2007}} = \alpha + \beta_1 \ln(y_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i$$

for  $i=1, \dots, n$  countries, where  $\ln(y_{i,2006})$  is the natural logarithm of real GDP per capita of country  $i$  in USD in 2006,  $FRI_i$  is the financial regulation index of country  $i$ ,  $X$  is a matrix of control variables which may affect GDP growth, too,  $u_i$  is a classical error term, and  $\alpha$ ,  $\beta_1$ ,  $\beta_2$ ,  $\gamma$  are the parameters to be estimated. The



parameter of interest in this study is  $\beta_2$ , the ceteris paribus effect of  $FRI_i$  on the dependent variable.

Secondly, the budget balance ratio model is

$$(2) \quad \frac{\sum_{t=2008}^{2010} B_{i,t}}{\sum_{t=2008}^{2010} Y_{i,t}} = \alpha + \beta_1 \ln(D_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i$$

where  $B$  is the nominal government budget balance in current local currency,  $Y$  is the nominal GDP in current local currency and,  $D_{i,2006}$  is the stock of government debt in % of GDP of country  $i$  in year 2006. Hence, the left-hand side of Equation (3) is the average government debt-to-GDP ratio over the years 2008–2010 expressed in percentages. A comparable time-series regression equation is proposed by Bohn (1998) for the analysis of the sustainability of government debt.<sup>11</sup> Note that GDP growth has a direct effect on the budget balance ratio by affecting the denominator in Equation (2)

Thirdly, similarly, the *employment growth rate model* is specified as follows

$$(3) \quad \frac{E_{i,2010} - E_{i,2007}}{E_{i,2007}} = \alpha + \beta_1 \ln(E_{i,2006}) + \beta_2 FRI_i + \gamma X + u_i$$

where  $E$  is the employment per population ratio of persons being at least 15 years old in percent. Hence, the dependent variable is the cumulated 3-years growth rate of the employment population ratio over the period 2008 to 2010 in percent (percentage change of the real employment population ratio from the end of 2007 to the end of 2010).  $X$  includes the Labor Market Freedom Index by the Fraser Institute (Gwartney *et al.* 2011).

The outcome variables in Equation (2) and (3) are positively correlated with GDP growth (see Table A3 in the Appendix). The budget balance ratio is associated with GDP growth via the denominator as well as automatic stabilizers. In line with Okun’s Law, also employment growth and GDP growth are positively

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<sup>11</sup> However, the dependent variable in Bohn’s (1998) approach is the primary budget balance. Here we have only data on total budget balance (“headline deficit”). Furthermore, Bohn (1998) does not use the log of  $D$ .

correlated. Hence, if the *FRI* has a negative impact on GDP growth, it does not seem surprising to find corresponding effects with regard to the budget balance ratio as well as the employment growth.

This raises the question whether there is an additional effect after controlling for GDP growth in the corresponding time period. For the purpose of analyzing this question in a second step, Equation (2) and (3) are augmented by cumulated GDP growth per capita in 2007 to 2010 ( $(y_{i,2010} - y_{i,2007})/y_{i,2007}$ ) in order to estimate the effect of *FRI* on the budget balance ratio and the employment growth conditional on GDP growth. Notwithstanding the fact that it does not seem possible to reveal the additional channels in detail, a remaining of the effect conditional on GDP growth permits the interpretation that there is an effect besides the GDP shock channel.

Trying to identify the causal quantitative effects of *FRI* on the outcome variables of interest by estimating the Equations (1) to (3) is associated with some methodological difficulties.

First of all, all kinds of countries (not exclusively advanced economies or developing countries) are included. This *large heterogeneity* of the countries is likely to lead to an *omitted variable bias*, that is, biased estimates of  $\beta_2$  due to the fact that variables are omitted which are correlated with the outcome variables and *FRI* (see Angrist and Pischke 2009). This is often hard to handle if only cross-sectional data and no panel data are available. The approach chosen here is to include as many control variables as available into  $X$ . For example,  $X$  includes in most regression models the size of the population in 2006, dummies for country groups (advanced countries, emerging Asia, transition countries, Sub-Saharan Africa, Latin America, Middle East and North Africa, members of the Euro area, see Table A1 in the Appendix), lagged values of the dependent variable, openness of the economy (exports + imports / GDP)<sup>12</sup> in 2006, and the size of the financial sector in 2006. There is another reason for including indicators for the size of the financial sector (financial deepening) besides the *FRI*: one may draw conclusions about the question whether it is the size of the financial markets that were the cause or whether it is about qualitative features of the financial markets. The *FRI* and all

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<sup>12</sup> Another possibility would be to use the “KOF Index of Globalization” (Dreher 2006; Dreher *et al.* 2008) instead. The reason for not using the KOF index is the fact that it includes components (such as capital account restrictions) which are also aspects of the *FRI*.

variables for the size of the financial sector are positively correlated (see Table A4 in the Appendix). The explanatory variables are discussed in more detail in the following sections as well as in Table A2 in the Appendix.

A second difficulty may arise due to *outliers* (see Rousseeuw and Leroy 2003). OLS tends to award an excessive importance to observations with very large residuals and, consequently, distort parameters' estimation in case of the existence of outliers (see Verardi and Croux 2009). Examples may be China in case of the growth model (Figure A6) and Norway in case of the budget balance ratio model (Figure A8). A first approach is to use different samples and to exclude these "outlier countries". A second approach is to use robust regression techniques. Here, the so-called MM-estimator is applied (see Yohai 1987; Jann 2010a; and Jann 2010b).

A third methodological difficulty may arise due to *non-linear effects* of *FRI* on the outcome variables. Equation (1), (2), and (3) assume a linear relationship between the dependent variables and *FRI*. However, the relationship may be non-linear. Here, the problem is dealt with by testing whether transforming the *FRI* into four dummy variables affects the results. Furthermore, a statistical test is performed in order to reveal whether a non-parametric specification of the effects of *FRI* affects the results and if it is justified to assume a linear specification of *FRI*. For example, in case of the GDP growth model the following semiparametric regression equation is estimated (see Robinson 1988, and Verardi and Debarsy 2012):

$$(4) \quad \frac{y_{i,2011} - y_{i,2007}}{y_{i,2007}} = \beta_1 \ln(y_{i,2006}) + f(FRI_i) + \gamma X + u_i$$

Afterwards, the null hypothesis (H0) is tested that the parametric fit (linear specification) and the non-parametric fit are not different (see Härdle and Mammen 1993, and Verardi and Debarsy 2012).

A fourth methodological difficulty is the *low variance of the FRI variable*, especially the fact that 8 out of 18 advanced economies have a *FRI* value of 21. As mentioned above, this is one reason for using the average *FRI* for the time period 2001–2005. Because doing so decreases the number of *FRI*=21 countries from 10 to 8 compared to the situation only the year 2005 is included.

Fifth, one may ask whether *FRI* is *endogenous with regard to the outcome variables* in the sense that *FRI* may be a function of the respective outcome variable, even after controlling for other variables. Due to the time structure of the models (the outcome variables are measured 2007 to 2010/11 and *FRI* is measured over the period 2001 to 2005) as well as the fact that the financial crisis was an unexpected shock for all governments, this is very unlikely. Note that this kind of endogeneity would require that governments have chosen their regulation in 2001 to 2005 in expectation of the post-2007 events.<sup>13</sup>

Finally, there is the widely neglected issue of *model uncertainty* about the choice of explanatory variables (see Magnus *et al.* 2010). As stressed by De Luca and Magnus (2012) standard econometric practice of using the same data for model selection (the choice of explanatory variables) and estimating – while ignoring that the resulting estimators are in fact pretest estimators – leads to false inference, since traditional statistical test theory is not directly applicable. Approaches to deal with this difficulty is the “extreme bounds analysis” (see Sturm and de Haan 2005; Hartwig and Sturm 2012) and the “Bayesian model averaging” (BMA) technique within a linear regression model (see Magnus *et al.* 2010, and De Luca and Magnus 2011). Here, the BMA technique is applied. The idea is to define two sets of explanatory variables: focus regressors which are included in the model on theoretical or other grounds, and auxiliary regressors which contain additional explanatory variables of which the researcher is less certain. Here, *FRI* is defined as an “auxiliary regressor” in order to test whether the *FRI* should really be included into the model. A similar approach is chosen by Giannone *et al.* (2011).

### **3.2 Estimation Results of the GDP Growth Rate Model**

Table 2 includes the GDP growth rate model with 10 different specifications. They differ with regard to the estimation technique as well as the explanatory variables. As mentioned in the previous paragraph, besides OLS also robust regression

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<sup>13</sup> The determinants of financial reforms are studied by Abiad and Mody (2005).

Table 2: Determinants of the 4-Years Cumulated Growth Rate of Real GDP in % over the Period 2008-2011

Explanatory variables	(1) OLS	(2) OLS	(3) OLS	(4) MM	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) MM	(10) Semi
$FRI_i$	-1.585*** (-3.63)	-1.333*** (-2.90)	-1.235*** (-2.89)	-0.972* (-1.95)	-1.112** (-2.45)	-0.750* (-1.69)	-0.942** (-2.34)			$f(FRI_i)$ (Figure 1)
$\ln(Y_{i,2006})$	-0.905 (-0.98)	-0.523 (-0.44)	-1.685 (-1.30)	-3.086* (-1.88)	-1.767 (-1.36)	-2.808* (-1.90)	-1.515 (-1.11)	-2.392* (-1.97)	-3.623** (-2.16)	-1.382 (-1.08)
$\ln(pop_{i,2006})$	1.228* (1.67)	1.296* (1.73)	1.527* (1.72)	1.931** (2.01)	1.450 (1.56)	1.387 (1.48)	0.743 (0.78)	1.821* (1.95)	2.184** (2.46)	1.539* (1.69)
Country groups (base: emerging Asia) <sub>i,2006</sub>										
<i>advanced</i>		-6.654** (-2.23)	0.412 (0.09)	4.417 (0.70)	-0.355 (-0.07)	0.272 (0.05)	-2.150 (-0.34)	1.937 (0.36)	5.121 (0.87)	-0.916 (-0.18)
<i>transition</i>		-2.473 (-0.78)	-4.639 (-1.25)	-3.901 (-0.95)	-5.702 (-1.44)	-8.447** (-2.12)	-4.218 (-1.11)	-4.656 (-1.15)	-4.046 (-1.02)	-5.040 (-1.31)
<i>Sub-Saharan Africa</i>		-6.044 (-1.56)	-3.930 (-1.12)	-3.762 (-0.99)	-3.788 (-1.07)	-3.557 (-0.89)	-3.961 (-1.01)	-4.576 (-1.35)	-4.801 (-1.34)	-3.415 (-0.85)
<i>Latin America</i>		-1.456 (-0.45)	2.046 (0.56)	1.950 (0.48)	1.973 (0.55)	2.739 (0.71)	0.734 (0.18)	2.046 (0.55)	1.815 (0.48)	1.269 (0.35)
<i>Middle East and North Africa</i>		-6.899** (-2.01)	-4.854 (-1.31)	-3.065 (-0.66)	-4.970 (-1.37)	-4.486 (-1.21)	-4.971 (-1.22)	-4.788 (-1.24)	-3.135 (-0.64)	-4.800 (-1.42)
<i>Euro member<sub>i</sub></i>		-4.161** (-2.13)	-4.786** (-2.36)	-4.603*** (-2.58)	-4.620** (-2.24)	-4.193* (-1.96)	-3.937 (-0.92)	-4.797** (-2.34)	-4.653*** (-2.64)	-4.229** (-2.24)
<i>openness<sub>i,2006</sub></i>			0.0208 (1.19)	0.0329 (1.53)	0.0173 (0.86)	0.0155 (0.86)	0.00993 (0.45)	0.0274 (1.38)	0.0381* (1.88)	0.0134 (0.70)
$(y_{i,2006} - y_{i,2002}) / y_{i,2002}$			0.213*** (3.03)	0.257* (1.91)	0.230*** (2.69)	0.263** (2.13)	0.218*** (2.82)	0.230*** (2.98)	0.255* (1.85)	0.209*** (3.44)

Table continued

Table continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Explanatory variables	OLS	OLS	OLS	MM	OLS	OLS	OLS	OLS	MM	Semi
Financial system deposits in % of GDP <sub>i,2006</sub>					0.0076 (0.33)					
Stock market capitalization in % of GDP <sub>i,2006</sub>						0.009 (0.75)				
<i>FRI</i> dummies (base: [0 –13.5]) <sub>i</sub>										
[13.6–16.0]								-2.860 (-0.98)	-1.557 (-0.40)	
[16.1–19.05]								-6.670** (-2.05)	-4.062 (-0.81)	
[19.1–21.0]								-10.06** (-2.53)	-7.197 (-1.38)	
Constant $\hat{\alpha}$	19.54 (1.39)	15.70 (0.94)	11.59 (0.68)	8.855 (0.49)	11.39 (0.62)	14.70 (0.77)	20.51 (1.06)	-3.694 (-0.21)	-3.948 (-0.24)	
<i>N</i>	88	88	88	88	86	74	77	88	88	88
adj. R <sup>2</sup>	0.429	0.476	0.520		0.506	0.533	0.395	0.491		
Mean (median) dependent variable	7.2 (5.2)	7.2 (5.2)	7.2 (5.2)	7.2 (5.2)	7.2 (5.2)	6.3 (4.7)	8.4 (7.8)	7.2 (5.2)	7.2 (5.2)	7.2 (5.2)
mean <i>FRI</i> <sub>i</sub>	16.2	16.2	16.2	16.2	16.4	16.8	15.7	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.

techniques (MM estimator) and semi-parametric estimators are applied. All estimated standard errors are robust with regard to heteroscedasticity.<sup>14</sup>

Column (1) shows the simplest specification, where  $(y_{i,2011} - y_{i,2007})/y_{i,2007}$  is explained only by the *FRI*, the natural logarithm of GDP per capita in USD in 2006,  $\ln(y_{i,2006})$ , as well as the natural log of the population size,  $\ln(pop_{i,2006})$ . The coefficient of *FRI* is highly statistically significant at the 1% level.

In Column (2) are the estimation results if country group dummies are included. Compared to the base group of emerging Asian economies, advanced economies have a four-year growth rate which is about 6.7 percentage points lower. An additional growth reduction of more than 4 percentage points occurs for member countries of the Euro area which may result from the impossibility to conduct a national monetary policy (including nominal exchange rate adjustments).

The preferred specification with regard to the explanatory variables is in Column (3). Additionally, the openness of the economy (measured as imports + exports in percentage of GDP) in 2006 as well as the lagged GDP growth rate from 2002 to 2006 are included. The estimated coefficient of *FRI* has the following quantitative interpretation: an increase of the *FRI* by one unit (for example, from the sample mean 16.2 to 17.2) reduces the 4-year growth rate by 1.235 percentage points (for example, from the sample mean 7.2% to 6.0%).

The following columns show robustness checks to this result. The MM estimator in Column (4) is an approach to deal with outliers. An increase of *FRI* by one unit decreases the 4-year GDP growth rate by almost one percentage point on average. However, the estimated coefficient of *FRI* is only weakly statistically significant.

In Column (7) the sample is reduced with respect to two aspects: countries with *FRI*=21 (the highest value)<sup>15</sup> and China (with a low *FRI* and a very high GDP growth rate) are excluded. The central result is that the estimated coefficient is still statistically significant and amounts to -0.94.

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<sup>14</sup> In case of OLS the Huber/White standard errors are estimated. For the MM estimator standard errors as suggested by Croux *et al.* (2003) are calculated using the stata command “*robreg*” by Jann (2010b).

<sup>15</sup> The following countries have a *FRI* of 21: Australia, Canada, Denmark, Estonia, France, Ireland, Latvia, Spain, United Kingdom, United States.

As discussed in Section 3.1, one may argue that not the national financial regulation, but the size of the national financial market determined the severity of the recessions. Therefore in the Columns (5) and (6) it is additionally controlled for the size of the national financial market. Several variables of the World Bank Financial Structure Dataset (Beck *et al.* 2009) are tested, but only the results of two variables (financial system deposits to GDP, stock market capitalization to GDP) both measured in 2006, are shown for the sake of clarity. Both variables are positively correlated with the *FRI* (see Table A4 in the Appendix): the Bravais Pearson correlation coefficients (corresponding p-values) are 0.48 (0.000) and 0.35 (0.002). However, both variables do not affect the dependent variable within the regressions. The same is true for other measures, such as “private credit by deposits money banks and other financial institutions in % of GDP” or “stock market total value traded in % of GDP”<sup>16</sup>. Most important, the estimated coefficient of *FRI* is still statistically significant. Note that the sample size is affected due to missing values in the variables on the size of the financial market. Hence, the coefficients are not directly comparable across the specifications. Nevertheless, one may conclude that not financial deepening (size of the financial market) drive the results, but some qualitative features of the financial markets.

Finally, in Columns (8) and (9) of Table 2 a dummy variable specification of *FRI* is used in order to test the issue of functional form. While the OLS results in Column (8) indicate a negative strongly monotone effect, the *t* statistics of the MM estimator suggest no statistically significant effect of the *FRI* dummies on the dependent variable.

As mentioned in the last section, in order to explore the issue of functional form further, a semi-parametric regression is estimated, where *FRI* is included non-parametrically  $f(FRI_i)$  in a parametric regression (see Verardi and Debarsy 2012). Then the  $H_0$  is tested that the parametric fit (linear specification) and non-parametric fit are not different (see Härdle and Mammen 1993). The results of the parametric part can be found in Column (10) of Table 2. More important, the non-parametric fit of  $f(FRI)$  in Figure 1 indicates that – taking the confidence interval into account – it seems reasonable to assume a linear relationship. This is confirmed by the statistical test that cannot reject the  $H_0$  (see the notes below Figure 1).

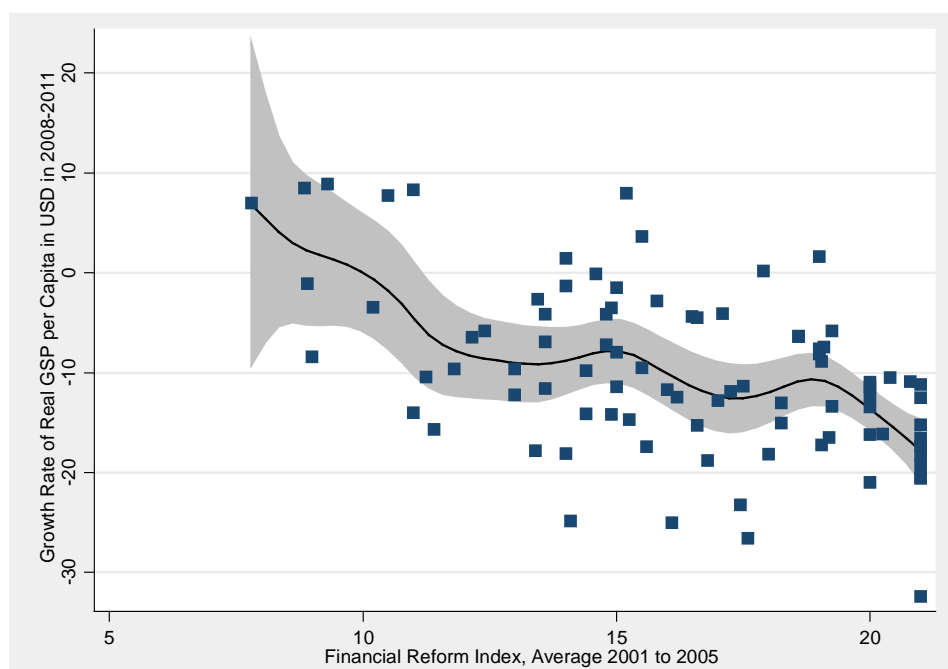
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<sup>16</sup> Results are available upon request from the author.



A problem with the results presented so far is the remaining uncertainty of the statistical significance of *FRI*. For example, even within OLS estimates the *t* statistics varied significantly between the specifications. Following Giannone *et al.* (2011), an approach to deal with this difficulty is the “Bayesian model averaging” (BMA) technique (see Subsection 3.1). The results can be seen in Table 3 where three different specifications are shown. In Column (1) all explanatory variables

Figure 1: Non-Parametric Fit of  $f(FRI)$  in the GDP Growth Rate Model



Notes: The 95 % confidence interval is indicated by the shaded area around the non-parametric fit. Statistical test based on 500 bootstrap replication.  $H_0$ : The linear specification and the non-parametric fit is not different; Standardized Test statistic T: 1.347; Critical value (95%): 1.96; Approximate P-value: 0.202.

Table 3: Determinants of the 4-Years Cumulated Growth Rate of Real GDP in % over the Period 2008-2011 – BMA Regression

	(1)			(2)			(3)		
	Coef.	t-ratio	pip	Coef.	t-ratio	pip	Coef.	t-ratio	pip
$FRI_i$	-1.158	-2.56	0.95	-1.342	-3.44	0.99	-1.629	-4.89	1.00
$\ln(y_{i,2006})$	-1.813	-1.29	1.00	-0.787	-0.79		-0.088	-0.21	0.12
$\ln(pop_{i,2006})$	1.549	1.86	1.00	1.527	2.11		0.656	0.76	0.45
Country groups (base: emerging Asia) <sub><math>i,2006</math></sub>									
<i>Advanced</i>	0.325	0.06	1.00	-0.897	-0.35	0.20	-1.117	-0.45	0.24
<i>Transition</i>	-4.793	-1.27	1.00	-0.690	-0.35	0.20	-0.898	-0.41	0.22
<i>Sub-Saharan Africa</i>	-4.140	-1.04	1.00	-0.401	-0.25	0.14	-0.135	-0.13	0.10
<i>Latin America</i>	1.962	0.50	1.00	1.515	0.61	0.36	0.829	0.44	0.23
<i>Middle East and North Africa</i>	-4.899	-1.21	1.00	-0.664	-0.34	0.18	-0.591	-0.32	0.16
<i>Euro member<sub><math>i</math></sub></i>	-4.802	-1.55	1.00	-1.643	-0.58	0.33	-2.230	-0.69	0.40
<i>openness<sub><math>i,2006</math></sub></i>	0.020	0.96	1.00	0.005	0.39	0.21	0.0015	0.21	0.12
$(y_{i,2006} - y_{i,2002}) / y_{i,2002}$	0.215	2.86	1.00	0.172	2.01	0.90	0.165	1.83	0.87
Constant $\hat{\alpha}$	11.10	0.62	1.00	6.561	0.43	1.00	20.91	1.20	1.00
$N$	88			88			88		
No. of focus regressors	11			3			1		
No. of auxiliary regressors	1			9			11		
Model space (no. of models)	2			512			2048		

Notes: The estimation results for the auxiliary regressors are marked with a grey background.

besides the  $FRI$  are defined as “focus regressors” and  $FRI$  is defined as the “auxiliary regressor”. In Column (2), all variables, besides  $\ln(y_{i,2006})$ ,  $\ln(pop_{i,2006})$ , and the constant, are defined as auxiliary regressors. Finally, in Column (3) only the constant is a focus regressor. According to Magnus *et al.* (2010) a rough guideline for the robustness of a regressor is a value of the posterior inclusion probability (pip) of 0.5 which corresponds approximately with an absolute  $t$ -ratio of 1. By definition for all focus regressors the pip equals 1, since these regressors are included in the model with probability one (see Magnus *et al.* 2010). Most important, the absolute value of the  $t$ -ratios of  $FRI$  are always larger than 2.5 and

the pip is near 1.0. Hence, the results in Table 3 clearly indicate that *FRI* has a robust impact. Therefore, it should be included into the regression models.

All in all, the regression results can be summarized in the following way: even after controlling for further variables, taking into account outliers and functional form issues, there is a significantly monotone negative effect of the financial reform index on the cumulated GDP growth rate from 2008 to 2011.

### 3.3 Estimation Results of the Budget Balance Ratio Model

Table 4 shows the results of the budget balance ratio model. The methodology is analogous to the GDP growth rate model of the last paragraph. However, there are two additional explanatory variables: the natural logarithm of the stock of government debt in % of GDP of country  $i$  in year 2006,  $\ln(D_{i,2006})$ , and the mean budget balance ratio over the years 2002–2006, that is,  $\sum_{t=2002}^{2006} B_{i,t} / \sum_{t=2002}^{2006} Y_{i,t}$ . In the Columns (1) to (3) the number of explanatory variables is increased. In Column (4) the MM estimator being robust against outliers is applied. Apart from Column (2) the estimated coefficients of *FRI* are statistically significant and indicate that a one-unit increase in *FRI* raises the average deficit ratio by about 0.4 percentage-points.

Controls for the size of the financial markets are included in Columns (5) and (6). Both variables are not statistically significant and in Column (6) – based on a reduced sample – the estimated coefficient of *FRI* becomes statistically insignificant.

Again, the estimated regression results in Column (7) are based on a restricted sample excluding *FRI*=21 countries with (highest value; see Footnote 15) as well as China (with a low *FRI* and very high GDP growth rates) and Norway (with large budget surpluses). The estimated coefficient of  $FRI_i$  is still statistically significant and amounts to  $-0.3$ .

The estimates in Columns (8), (9), (10) as well as Figure 2 again deal with the non-linearity issue and indicate a negative monotone effect of  $FRI_i$  on the government budget.

In the same way as in the last subsection the problem of model uncertainty (the question whether *FRI* should be included into the model) is examined by applying the “Bayesian model averaging” technique (see Subsections 3.1. and 3.2). Once

Table 4: Determinants of Average Budget Balance Ratios in % over the Period 2008 to 2010

Explanatory variables	(1) OLS	(2) OLS	(3) OLS	(4) MM	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) MM	(10) Semi
$FRI_i$	-0.456** (-2.23)	-0.352 (-1.56)	-0.428*** (-3.06)	-0.393*** (-2.66)	-0.416*** (-2.85)	-0.333 (-1.58)	-0.301* (-1.97)			$f(FRI_i)$ (Figure 2)
$\ln(D_{i,2006})$	-0.543 (-0.98)	-0.417 (-0.69)	1.172 (1.56)	0.198 (0.41)	1.120 (1.47)	1.445 (1.46)	0.425 (0.86)	1.322* (1.77)	0.725 (1.05)	1.319* (1.83)
$\ln(y_{i,2006})$	0.792 (1.47)	1.021** (2.04)	0.885** (2.18)	0.614** (2.04)	0.929** (2.33)	0.647 (1.14)	0.664** (2.06)	0.623 (1.51)	0.509 (1.26)	1.136 (1.67)
$\ln(pop_{i,2006})$	-0.713* (-1.74)	-0.884* (-1.81)	-0.354 (-1.05)	-0.423 (-1.55)	-0.304 (-0.86)	-0.450 (-0.98)	0.0938 (0.31)	-0.343 (-0.93)	-0.432 (-1.38)	-0.451 (-1.12)
Country groups (base: emerging Asia) $i_{,2006}$										
<i>advanced</i>		-2.464 (-1.21)	-3.362* (-1.76)	-2.075 (-1.52)	-3.206 (-1.64)	-4.337* (-1.98)	0.0804 (0.06)	-3.644 (-1.65)	-2.501 (-1.55)	-4.934* (-1.75)
<i>transition</i>		-2.712* (-1.75)	1.000 (0.64)	-0.736 (-0.59)	0.777 (0.50)	1.360 (0.65)	0.676 (0.41)	0.848 (0.55)	0.333 (0.20)	0.901 (0.43)
<i>Sub-Saharan Africa</i>		-2.112 (-1.49)	-0.774 (-0.53)	-1.060 (-0.63)	-0.807 (-0.55)	-2.506 (-1.08)	0.293 (0.19)	-1.068 (-0.61)	-0.680 (-0.38)	-0.918 (-0.37)
<i>Latin America</i>		-1.920 (-1.33)	0.0780 (0.05)	0.0833 (0.05)	-0.00301 (-0.00)	0.0545 (0.03)	1.721 (1.18)	-0.0766 (-0.05)	0.325 (0.23)	0.101 (0.05)
<i>Middle East and North Africa</i>		-2.885** (-2.16)	-0.831 (-0.58)	-1.106 (-0.59)	-0.719 (-0.49)	-1.275 (-0.66)	0.299 (0.20)	-0.845 (-0.52)	-0.534 (-0.33)	-1.192 (-0.57)
<i>Euro member</i> <sub><math>i</math></sub>		-3.438 (-1.59)	-2.129 (-1.44)	-0.597 (-0.73)	-2.151 (-1.45)	-1.883 (-1.48)	-2.462** (-2.26)	-2.026 (-1.31)	-0.894 (-1.05)	-1.732 (-1.51)
<i>openness</i> <sub><math>i_{,2006}</math></sub>			0.00464 (0.59)	0.010*** (2.66)	0.00709 (0.84)	0.00124 (0.10)	0.0142** (2.54)	0.00409 (0.48)	0.00861 (1.28)	-0.00198 (-0.18)

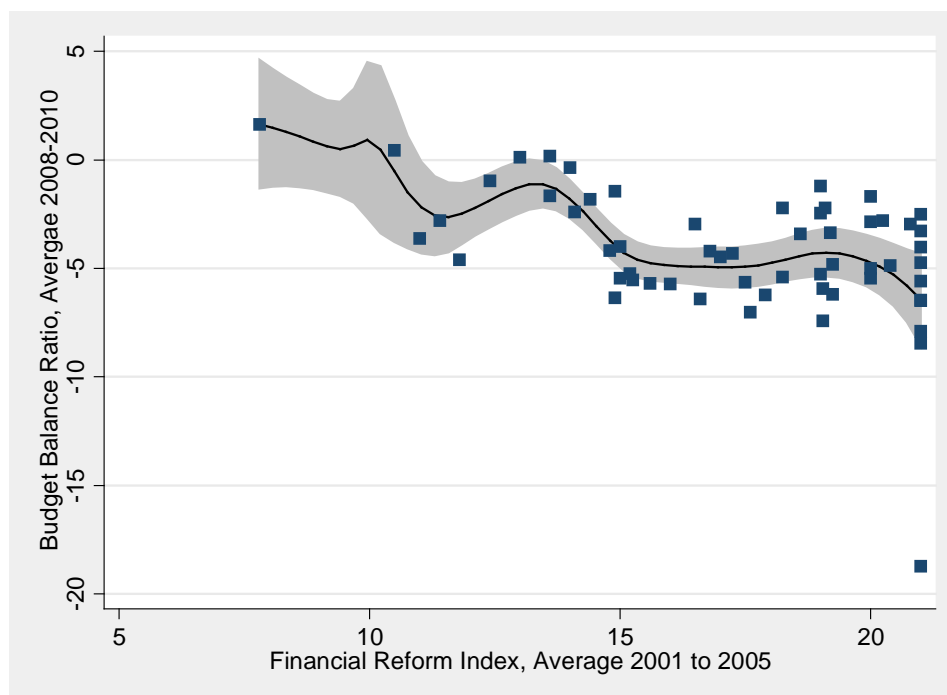
Table continued

Table continued

Explanatory variables	(1) OLS	(2) OLS	(3) OLS	(4) MM	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) MM	(10) Semi
$\sum_{t=2002}^{2006} B_{i,t} / \sum_{t=2002}^{2006} Y_{i,t}$			0.932*** (7.23)	0.681*** (4.78)	0.913*** (6.67)	0.989*** (7.68)	0.746*** (5.41)	0.956*** (7.15)	0.918*** (3.50)	0.962*** (7.56)
$(y_{i,2006} - y_{i,2002}) / y_{i,2002}$			-0.100* (-1.93)	-0.0561 (-0.80)	-0.100* (-1.94)	-0.140** (-2.23)	-0.0601 (-0.87)	-0.0993* (-1.83)	-0.0866 (-1.23)	-0.133* (-1.87)
Financial system deposits in % of GDP <sub>i,2006</sub>					-0.00693 (-0.51)					
Stock market capitalization in % of GDP <sub>i,2006</sub>						0.00357 (0.27)				
FRI dummies (base: [0–13.5]) <sub>i</sub>										
[13.6–16.0]								-1.501 (-1.27)	-1.457 (-1.27)	
[16.1–19.05]								-2.283 (-1.54)	-2.781** (-2.00)	
[19.1–21.0]								-2.915* (-1.83)	-3.052* (-1.84)	
Constant $\hat{\alpha}$	12.23** (2.08)	13.69 (1.34)	2.471 (0.29)	7.212 (0.72)	1.413 (0.16)	4.653 (0.40)	-5.597 (-0.70)	-1.123 (-0.12)	2.610 (0.34)	
N	66	66	58	58	58	53	47	58	58	58
adj. R <sup>2</sup>	0.044	0.111	0.546		0.537	0.664	0.722	0.500		
Mean (median) dependent variable	-2.8 (-2.6)	-2.8 (-2.6)	-2.8 (-2.7)	-2.8 (-2.7)	-2.8 (-2.7)	-2.9 (-2.7)	-2.7 (-2.7)	-2.8 (-2.7)	-2.8 (-2.7)	-2.8 (-2.7)
mean FRI <sub>i</sub>	16.9	16.9	17.2	17.2	17.2	17.7	16.4	17.2	17.2	17.2

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

Figure 2: Non-Parametric Fit of  $f(FRI)$  in the Budget Balance Ratio Model



Notes: The 95 % confidence interval is indicated by the shaded area around the non-parametric fit. Statistical test based on 500 bootstrap replications.  $H_0$ : 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.

more it turns out that *FRI* is an important regressor and should be included into the model.<sup>17</sup>

Finally, as discussed in Subsection 3.1 the question arises whether the effect remains even after controlling for GDP growths in 2008 to 2010. The regression results can be found in Table 5. It turns out that the estimated coefficients decrease in size, and are not statistically significant (even if the *t*-value of the OLS estimate

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<sup>17</sup> The results are available upon request from the author.

Table 5: Determinants of Average Budget Balance in % over the Period 2008 to 2010 – Controlling for GDP Growth over 2008 to 2010

	(11) OLS	(12) MM
$FRI_i$	-0.249 (-1.67)	-0.212 (-1.46)
$\ln(D_{i,2006})$	0.989 (1.41)	-0.0078 (-0.02)
$\ln(y_{i,2006})$	0.870* (1.99)	0.505* (1.77)
$\ln(pop_{i,2006})$	-0.495 (-1.52)	-0.455* (-1.87)
Country groups (base: emerging Asia) $i,2006$		
<i>advanced</i>	-3.068 (-1.65)	-1.828 (-1.61)
<i>transition</i>	1.556 (0.91)	-0.121 (-0.08)
<i>Sub-Saharan Africa</i>	-0.846 (-0.68)	-0.969 (-0.73)
<i>Latin America</i>	-0.173 (-0.13)	0.228 (0.18)
<i>Middle East and North Africa</i>	-0.789 (-0.59)	-0.649 (-0.39)
<i>Euro member</i> <sub><math>i</math></sub>	-1.556 (-1.15)	-0.255 (-0.33)
<i>openness</i> <sub><math>i,2006</math></sub>	0.0028 (0.33)	0.0100** (2.42)
$\sum_{t=2002}^{2006} B_{i,t} / \sum_{t=2002}^{2006} Y_{i,t}$	0.936*** (6.80)	0.717*** (5.56)
$(y_{i,2006} - y_{i,2002}) / y_{i,2002}$	-0.107** (-2.02)	-0.0689 (-1.14)
$(y_{i,2010} - y_{i,2007}) / y_{i,2007}$	0.134** (2.36)	0.106** (2.50)
Constant $\hat{\alpha}$	2.241 (0.29)	5.929 (0.82)
$N$	58	58
adj. $R^2$	0.575	

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

indicates that the 10 percentage level significance is just barely missed). Hence, based on the current small sample of 58 observations, it is not possible to find an additional channel besides via GDP growth.

The empirical analyses have found evidence that financial liberalization has deepened the fiscal crises in many countries. However, it was not possible to identify a statistically significant effect after controlling for GDP growth after

2007. Hence, most of the deficit increase is likely to be generated by the negative GDP shock.

### 3.4 Estimation Results of the Employment Growth Rate Model

Table 6 shows the estimation results of the regressions of the cumulated growth rate of the employment to population ratio,  $(E_{i,2010} - E_{i,2007})/E_{i,2007}$ . Since the method is quite similar to the two previous models, the findings are only briefly summarized.

An estimated coefficient of *FRI* of -0.4 indicates that an one-unit increase of *FRI* leads to a decrease in the employment growth rate of -0.4 percentage points. Note, however, that the estimated coefficient of *FRI* is not statistically significant in case of the MM estimator (Column (4)) as well as the reduced sample excluding *FRI*=21 countries (Columns (7)). This may be a problem of the linearity assumption, which is in line with the result of the dummy specification in Column (8). The latter suggest, that only countries with a relatively highly liberalized financial market suffered from stronger employment losses.

The linearity assumption is investigated further using the semi-parametric regression method (Column (10)). Though the non-parametric estimate of  $f(FRI)$  in Figure 3 indicates at least for  $FRI > 13$  a negative monotone effect of *FRI* on the employment growth rate, the statistical test rejects the linear specification (see the notes below Figure 3).

Hence, Column (3) of Table 6 is again estimated on a reduced sample of 71 countries with  $FRI > 13$  assuming linearity (Columns (11), (12) in Table 7).<sup>18</sup> The Columns (13) and (14) show the results if additionally countries with  $FRI=21$  are excluded. At least for the first sample in Table 7 (Columns (11) and (12)) the results are clear-cut: All estimation methods show statistically significantly negative effects. In the further reduced sample, at least the robust MM estimator delivers statistically significant results. Furthermore, the “Bayesian model averaging” technique indicates that in the whole sample as well as in the reduced

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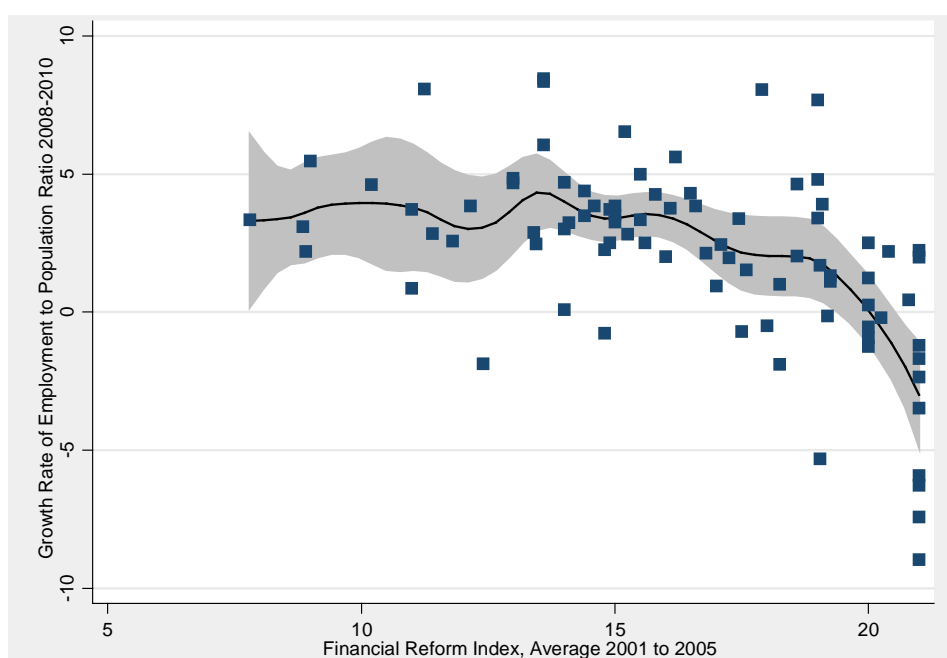
<sup>18</sup> As a result, the following countries are excluded: Algeria, Bangladesh, Belarus, Brazil, Burkina, Faso, Cameroon, China, Costa Rica, Ethiopia, Ghana, India, Nepal, Pakistan, Uzbekistan, Vietnam, and Zimbabwe.



sample ( $FRI > 13$ ),  $FRI$  is an important regressor and should be included into the models.<sup>19</sup>

Finally, it is analyzed in the reduced sample of countries with  $FRI > 13$  whether the negative effect of  $FRI$  on employment growth remains statistically significant even after controlling for the cumulated GDP growth in 2008 to 2010. The results can be found in Columns (15) and (16) of Table 7.

Figure 3: Non-Parametric Fit of  $f(FRI)$  in the Employment Growth Model



Notes: The 95 % confidence interval is indicated by the shaded area around the non-parametric fit.

Statistical test based on 500 bootstrap replications.  $H_0$ : 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.

<sup>19</sup> For the whole sample the  $t$ -ratio of  $FRI$  is -1.43 and the pip amounts to 0.77. For the reduced sample, the  $t$ -ratio of  $FRI$  is -2.09 and the pip amounts to 0.90. For the interpretation of these results see Subsection 3.1 and 3.2. The detailed results are available upon request from the author.

Table 6: Determinants of the 3-Years Cumulated Growth Rate of the Employment to Population in % over the Period 2008-2010

Explanatory variables	(1) OLS	(2) OLS	(3) OLS	(4) MM	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) MM	(10) Semi
$FRI_i$	-0.386*** (-2.78)	-0.345** (-2.25)	-0.433** (-2.53)	-0.121 (-0.93)	-0.424** (-2.44)	-0.392* (-1.86)	-0.185 (-1.32)			$f(FRI_i)$ (Figure 3)
$\ln(E_{i,2006})$	-2.170 (-1.33)	-4.727 (-1.29)	-8.243** (-2.56)	-3.585 (-0.50)	-8.504** (-2.52)	-9.121** (-2.52)	-1.453 (-0.49)	-4.671 (-1.39)	-1.244 (-0.12)	-2.868 (-0.88)
$\ln(y_{i,2006})$	-0.214 (-0.82)	-0.504 (-1.10)	-0.884* (-1.83)	-0.666 (-1.32)	-0.892* (-1.69)	-0.792 (-1.46)	-0.388 (-0.78)	-0.897* (-1.81)	-0.626 (-1.16)	-0.520 (-1.10)
$\ln(pop_{i,2006})$	0.188 (0.53)	0.0591 (0.19)	0.291 (0.89)	-0.000593 (-0.00)	0.307 (0.90)	0.378 (1.06)	0.197 (0.56)	0.515 (1.57)	0.0721 (0.24)	0.560* (1.88)
Labor market freedom index $i,2006$		-0.192 (-0.73)	-0.335 (-1.32)	-0.239 (-0.71)	-0.322 (-1.13)	-0.261 (-0.72)	-0.0206 (-0.09)	-0.0573 (-0.21)	-0.0990 (-0.24)	0.0476 (0.18)
Country groups (base: emerging Asia) $i,2006$										
<i>advanced</i>		2.243 (1.44)	4.887** (2.50)	1.431 (0.81)	5.020** (2.50)	3.535** (2.02)	2.068 (0.91)	4.928** (2.53)	1.758 (0.90)	4.959*** (2.81)
<i>transition</i>		-1.420 (-0.92)	0.729 (0.46)	-0.758 (-0.59)	0.562 (0.35)	1.153 (0.68)	0.483 (0.37)	0.867 (0.60)	-0.187 (-0.12)	1.507 (1.07)
<i>Sub-Saharan Africa</i>		0.286 (0.21)	1.331 (1.11)	0.455 (0.39)	1.222 (0.99)	0.295 (0.22)	0.732 (0.68)	0.959 (0.86)	0.331 (0.24)	1.547 (1.12)
<i>Latin America</i>		2.585** (2.30)	4.694*** (3.63)	2.464* (1.93)	4.680*** (3.60)	4.735*** (3.30)	3.384*** (2.86)	4.626*** (3.87)	2.865 (1.44)	4.737*** (3.97)
<i>Middle East and North Africa</i>		-0.00176 (-0.00)	0.506 (0.28)	0.754 (0.23)	0.458 (0.24)	-0.565 (-0.29)	2.187 (1.25)	2.104 (1.06)	1.789 (0.50)	2.614 (1.36)
<i>Euro member</i> $i$		-3.152* (-1.88)	-3.600*** (-2.65)	-0.909 (-0.40)	-3.616** (-2.63)	-3.322** (-2.45)	-1.102 (-0.74)	-2.822* (-1.98)	-0.253 (-0.09)	-2.397* (-1.97)
<i>Openness</i> $i,2006$			0.0163** (2.27)	0.00543 (0.93)	0.0170** (2.21)	0.0158* (1.89)	0.00549 (0.82)	0.0195*** (2.79)	0.00721 (1.22)	0.0143** (2.18)
$(E_{i,2006} - E_{i,2002})/E_{i,2002}$			-0.281*** (-3.14)	-0.110 (-0.85)	-0.289*** (-3.04)	-0.348*** (-3.23)	-0.102 (-1.45)	-0.232*** (-2.67)	-0.126 (-0.61)	-0.163** (-2.15)
$(y_{i,2006} - y_{i,2002})/y_{i,2002}$			-0.0304 (-0.78)	0.00740 (0.28)	-0.0260 (-0.58)	-0.0925** (-2.15)	-0.00805 (-0.28)	-0.0328 (-0.83)	0.00564 (0.27)	-0.0328 (-0.96)
<i>Financial system deposits in % of GDP</i> $i,2006$					-0.0027 (-0.29)					
<i>Stock market capitalization in % of GDP</i> $i,2006$						-0.0002 (-0.03)				

Table continued

Table 6 continued

Explanatory variables	(1) OLS	(2) OLS	(3) OLS	(4) MM	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) MM	(10) Semi
<i>FRI</i> dummies (base: [0–13.5]) <sub><i>i</i></sub>										
[13.6–16.0]								0.306 (0.33)	0.339 (0.15)	
[16.1–19.05]								-0.624 (-0.64)	-0.353 (-0.37)	
[19.1–21.0]								-3.689*** (-2.82)	-1.360 (-0.69)	
Constant $\hat{\alpha}$	12.48 (1.35)	27.50 (1.62)	41.46*** (2.68)	21.65 (0.77)	42.12** (2.51)	43.23** (2.28)	6.739 (0.47)	14.99 (0.85)	7.585 (0.17)	
<i>N</i>	88	85	85	85	84	73	74	85	85	85
adj. <i>R</i> <sup>2</sup>	0.164	0.269	0.373		0.364	0.401	0.078	0.372		
Mean (median) dependent variable	-1.2 (-0.5)	-1.2 (-0.5)	-1.2 (-0.5)	-1.2 (-0.5)	-1.2 (-0.6)	-1.5 (-0.8)	-0.4 (-0.1)	-1.2 (-0.5)	-1.2 (-0.5)	-1.2 (-0.5)
mean <i>FRI</i> <sub><i>i</i></sub>	16.2	16.2	16.2	16.2	16.6	16.8	15.8	16.2	16.2	16.2

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

Table 7: Determinants of Employment to Population Growth Rate – Reduced Samples and Controlling for GDP Growth over 2008 to 2010

	(11) OLS	(12) MM	(13) OLS	(14) MM	(15) OLS	(16) MM
$FRI_i$	-0.707*** (-2.96)	-0.497** (-1.98)	-0.425 (-1.65)	-0.374** (-2.01)	-0.438** (-2.19)	-0.518** (-2.22)
$\ln(E_{i,2006})$	-8.650** (-2.50)	-4.855 (-1.41)	-3.364 (-1.12)	-1.554 (-0.41)	-6.563** (-2.05)	-4.165 (-1.29)
$\ln(y_{i,2006})$	-1.136** (-2.48)	-1.230*** (-2.80)	-0.816 (-1.59)	-1.000* (-1.85)	-0.660* (-1.74)	-0.897* (-1.82)
$\ln(pop_{i,2006})$	0.847** (2.06)	0.467 (1.21)	0.776* (1.73)	0.464 (1.36)	0.703** (2.17)	0.670** (2.08)
Labor market freedom index $i_{2006}$	-0.240 (-0.83)	-0.222 (-0.84)	0.0419 (0.16)	-0.130 (-0.39)	-0.369 (-1.35)	-0.300 (-0.91)
Country groups (base: emerging Asia) $i_{2006}$						
<i>advanced</i>	6.876*** (3.47)	6.006*** (3.06)	4.959* (1.74)	4.579* (1.75)	6.448*** (4.47)	7.254*** (6.06)
<i>transition</i>	1.595 (0.85)	0.290 (0.21)	1.202 (0.71)	0.463 (0.37)	3.109* (1.96)	2.622 (1.19)
<i>Sub-Saharan Africa</i>	0.815 (0.68)	-0.00282 (-0.00)	0.476 (0.43)	-0.131 (-0.13)	1.590 (1.39)	1.102 (0.89)
<i>Latin America</i>	6.147*** (4.26)	4.816*** (3.92)	5.055*** (3.39)	4.270*** (5.24)	5.698*** (4.76)	5.741*** (5.03)
<i>Middle East and North Africa</i>	-0.617 (-0.32)	0.548 (0.29)	1.195 (0.67)	1.896 (0.94)	0.105 (0.05)	1.621 (0.61)
<i>Euro member<sub>i</sub></i>	-3.393** (-2.46)	-2.505* (-1.70)	-1.904 (-1.19)	-1.538 (-0.69)	-2.470** (-2.08)	-1.687 (-1.59)
<i>Openness<sub>i,2006</sub></i>	0.0244*** (3.31)	0.0196*** (2.81)	0.0152* (1.78)	0.0151** (2.10)	0.0212*** (4.12)	0.0233*** (5.20)
$(E_{i,2006} - E_{i,2002})/E_{i,2002}$	-0.387*** (-4.40)	-0.314*** (-2.92)	-0.220*** (-3.69)	-0.234*** (-5.04)	-0.336*** (-4.28)	-0.292*** (-3.50)
$(y_{i,2006} - y_{i,2002})/y_{i,2002}$	-0.00628 (-0.22)	0.0240** (1.99)	0.00581 (0.24)	0.0239** (2.13)	-0.0340 (-1.56)	-0.0211 (-0.64)
$(y_{i,2010} - y_{i,2007})/y_{i,2007}$					0.220*** (4.27)	0.170** (2.23)
Constant $\hat{\alpha}$	38.42** (2.14)	26.99 (1.38)	10.22 (0.64)	9.780 (0.54)	24.21 (1.47)	17.48 (1.01)
$N$	71	71	61	61	71	71
adj. $R^2$	0.482		0.180		0.600	
Mean (median) dependent variable	-1.4 (-0.7)	-1.4 (-0.7)	-0.5 (-0.5)	-0.5 (-0.5)	-1.4 (-0.7)	-1.4 (-0.7)
mean $FRI_i$	17.5	17.5	16.9	16.9	17.5	17.5

Notes:  $t$  statistics based on robust standard errors in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  The estimated coefficients of Columns (11), (12), (15) and (16) are based on a re-estimation of Column (3) of Table excluding countries with  $FRI \leq 13$ . The estimates in Columns (14) and (15) are based on samples in which additionally  $FRI=21$  countries are excluded.

It becomes apparent that even though the size of the estimated coefficients of *FRI* is reduced in Column (15) and (16), the coefficients are still statistically significant. Consequently, financial liberalization had a negative impact on employment after the financial shock. Moreover, this negative effect did not work only through the GDP growth channel.

Hence, it can be concluded, that a more liberalized financial market aggravated the employment loss after the shock.

## 4 Conclusions

In a comprehensive survey of the research Levine (2005: 866) concludes that “...*theory and evidence imply that better developed financial systems ease external financing constraints facing firms, which illuminates one mechanism through which financial development influences economic growth.*“. In this paper it has been found that the higher the financial regulation index by Abiad *et al.* (2008a), and, hence, the more liberalized the national financial markets were before the shock in 2007, the more severe were the subsequent output and employment losses as well as the fiscal crises. The empirical results turn out to be relatively robust. And surprisingly, the fact that the financial regulation index include the dimension “prudential regulations and supervision of the banking sector”, which may be interpreted as stronger regulation, does not change this result, which is in line with the results of Masciandaro *et al.* (2011).

While the approach chosen here cannot identify the channels through which financial liberalization amplifies macroeconomic instability, the analyses have provided some empirical indications at least: For all three models (GDP, employment, budget balance) it has been tested whether controlling for the size of the financial sector (financial deepening) changes the estimated effect of financial liberalization. Since this is hardly the case, one may conclude that the effect does not work through the (relative) size of financial markets, but through some qualitative features of financial markets. Furthermore, in case of the employment growth model, the effect has remained statistically significant even after controlling for the effect of GDP growth. It can therefore be concluded that a liberalized financial market had an adverse effect on employment which was not only driven by the decline in GDP growth.

Obviously, in line with Giannone *et al.* (2011), one may conclude that future research should study the causal mechanisms thoroughly in order to give detailed policy conclusions. Furthermore, future research should analyze whether and to what extent similar conclusions can be drawn for other financial crises.

This paper continues the series of empirical research indicating the adverse effects of financial deregulation on macroeconomic stability after 2007. It is quite amazing that analogous arguments had been put forward subsequent to another “great recession” – the Asian financial crisis in 1997. For example, Stiglitz stated in 2000:

*“It has become increasingly clear that financial and capital market liberalization – done hurriedly, without first putting into place an effective regulatory framework – 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: 1075).

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## APPENDIX

*Table A1: List of Countries in Different Country Groups (Country Code)*

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<b>Advanced Economies</b> (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)
<b>Emerging and Developing Asia</b> (N=12)	Bangladesh (BGD), Hong Kong (HKG), China (CHN), India (IND), Indonesia (IDN), Korea (KOR), Malaysia (MYS), Nepal (NPL), Philippines (PHL), Singapore (SGP), Sri Lanka (LKA), Thailand (THA)
<b>Latin America and Caribbean</b> (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)
<b>Sub-Saharan Africa</b> (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)
<b>Transition Economies</b> (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)
<b>Middle East and Northern Africa</b> (N=7)	Algeria (DZA), Egypt (EGY), Jordan (JOR), Morocco (MAR), Pakistan (PAK), Tunisia (TUN), Turkey (TUR)
<b>Members of the Euro Area</b> (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)

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Table A2: Data Descriptions and Sources

Variable	N	Sample Mean (Std. Dev)	Description	Source
$FRI_i$	88	16.22 (3.52)	Financial reform index, average 2001 to 2005, 0 to 21, of country $i$	Abiad <i>et al.</i> (2008a)
$y_{i,2006}$	88	9,217 (11,864)	GDP per capita (constant 2000 US\$) of country $i$ in 2006	World Development Indicator (WDI), World Bank (2013)
$(y_{i,2011} - y_{i,2007})/y_{i,2007}$	88	7.23 (11.033)	Cumulated 4-years growth rate of real GDP per capita over the year 2008-2011 in %	Calculation of the author based on WDI
$(y_{i,2006} - y_{i,2002})/y_{i,2002}$	88	17.84 (15.077)	Cumulated 4-years growth rate of real GDP per capita over the years 2003-2006 in %	Calculation of the author based on WDI
$pop_{i, 2006}$	88	56,48 Mio. (1.594·10 <sup>8</sup> )	Countries population; own calculation from GDP and GDP per Capita in 2006	WDI
$openess_{i, 2006}$	88	88.83 (60.97)	Exports + Imports in % of GDP in 2006	Calculation of the author based on WDI
Financial system deposits in % of GDP <sub><math>i, 2006</math></sub>	86	53.61 (42.67)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP in 2006. (International Monetary Fund, International Financial Statistics, and World Bank GDP estimates).	Beck <i>et al.</i> (2009)
Stock market capitalization in % of GDP <sub><math>i, 2006</math></sub>	73	65.88 (71.12)	Total value of all listed shares in a stock market as a percentage of GDP in 2006. (Standard & Poor's, Global Stock Markets Factbook and supplemental S&P data).	Beck <i>et al.</i> (2009)
$E_{i,2006}$	88	59.14 (10.30)	Employment to population ratio, age $\geq$ 15, in %	WDI
$(E_{i,2010} - E_{i,2007})/E_{i,2007}$	88	-1.16 (3.68)	Cumulated 3-years growth rate of the employment to population ratio over the years 2008-2010 in %	Calculation of the author based on WDI
$(E_{i,2006} - E_{i,2002})/E_{i,2002}$	85	2.39 (4.08)	Cumulated 3-years growth rate of the employment to population ratio over the years 2008-2006 in %	Calculation of the author based on WDI
Labor market freedom index <sub><math>i, 2006</math></sub>	85	6.09 (1.45)	Labor market regulation index [0 – 10], with a value of 10=totally deregulated in 2006	Fraser Institute Gwartney <i>et al.</i> (2011)
$\sum_{t=2008}^{2010} B_{i,t} / \sum_{t=2008}^{2010} Y_{i,t}$	66	-2.76 (4.07)	Average budget balance ratio over the years 2002 – 2006 in % of GDP. Government cash surplus or deficit in % of GDP. Cash surplus or deficit is revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.	Calculation of the author based on WDI
$D_{i,2006}$	66	49.54 (31.79)	General government gross debt in % of GDP in 2006	IMF World Economic Outlook Database 2012
$\sum_{t=2002}^{2006} B_{i,t} / \sum_{t=2002}^{2006} Y_{i,t}$	66	-1.05 (3.42)	Average budget balance ratio over the years 2002-2006 in % of GDP	Calculation of the author based on WDI

*Table A3:* Correlation Matrix of the Outcome Variables (p-values)

	$\sum_{t=2008}^{2010} B_{i,t} / \sum_{t=2008}^{2010} Y_{i,t}$	$(E_{i,2010} - E_{i,2007}) / E_{i,2007}$	$(y_{i,2011} - y_{i,2007}) / y_{i,2007}$
$\sum_{t=2008}^{2010} B_{i,t} / \sum_{t=2008}^{2010} Y_{i,t}$	1.0000		
$(E_{i,2010} - E_{i,2007}) / E_{i,2007}$	0.2868 (0.0147)	1.0000	
$(y_{i,2011} - y_{i,2007}) / y_{i,2007}$	0.1828 (0.1387)	0.4723 (0.0000)	1.0000

*Notes:* Bravais Pearson correlation coefficients. Corresponding p-values in parentheses.

*Sources:* Author's calculations based on World Bank (2013) and Abiad *et al.* (2008a).

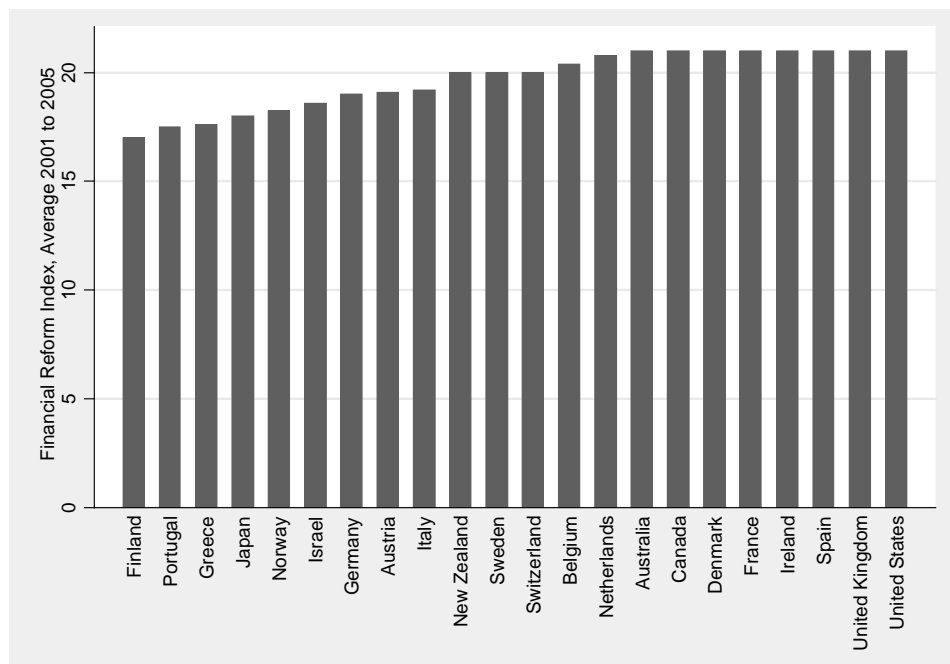
*Table A4:* Correlation Matrix (p-values)

	Liquid liabilities in % of GDP	Financial system deposits in % of GDP	Private credit by deposits money banks in % of GDP	Stock market capitalization in % of GDP	Stock market total value traded in % of GDP
Liquid liabilities in % of GDP	1.0000				
Financial system deposits in % of GDP	0.9477 (0.0000)	1.0000			
Private credit by deposits money banks in % of GDP	0.7530 (0.0000)	0.7860 (0.0000)	1.0000		
Stock market capitalization in % of GDP	0.7070 (0.0000)	0.7464 (0.0000)	0.6033 (0.0000)	1.0000	
Stock market total value traded in % of GDP	0.6310 (0.0000)	0.6594 (0.0000)	0.7204 (0.0000)	0.7508 (0.0000)	1.0000
<i>FRI</i>	0.3384 (0.0013)	0.4747 (0.0000)	0.5743 (0.0000)	0.3491 (0.0021)	0.4231 (0.0002)

*Notes:* Bravais Pearson correlation coefficients. Corresponding p-values in parentheses. All variables except the *FRI* (2001-2005) are measured in 2006.

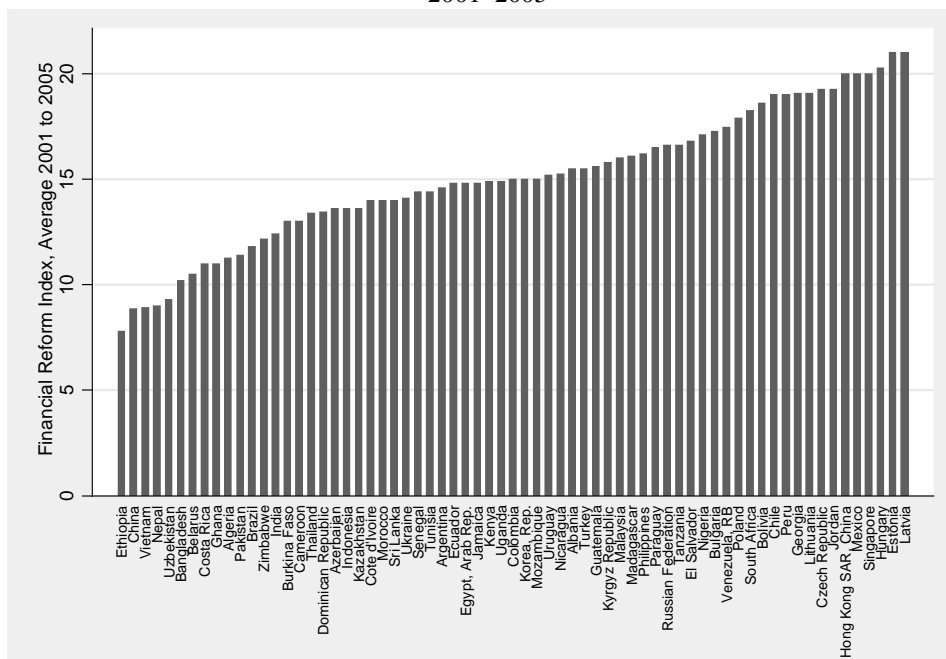
*Sources:* Author's calculations based on Beck *et al.* (2009) and Abiad *et al.* (2008a).

Figure A1: Financial Reform Index of the Advanced Economies, Average 2001–2005



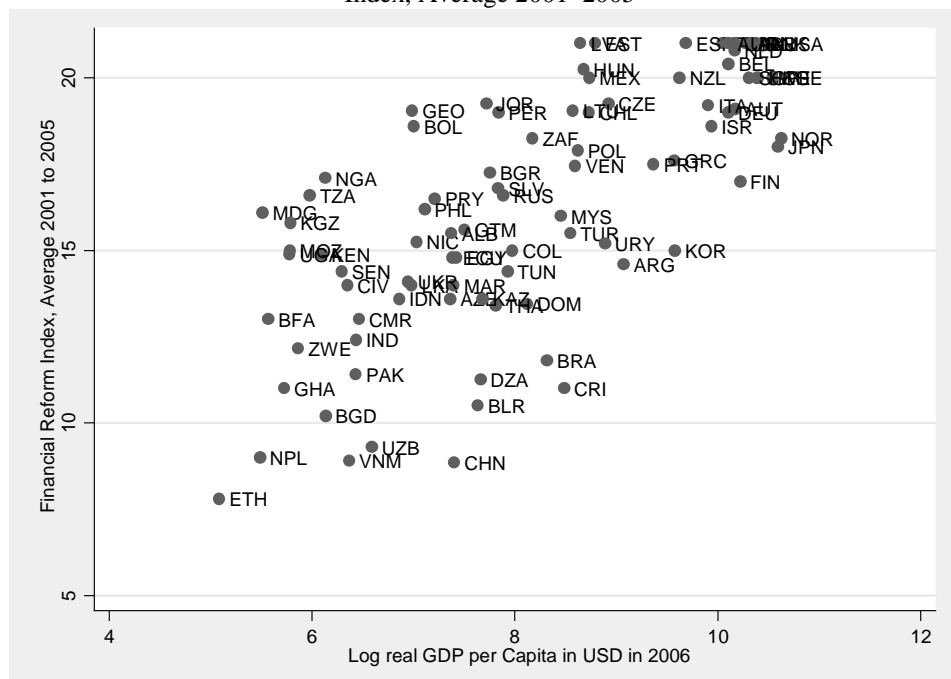
Source: Author's calculations based on Abiad *et al.* (2008a).

Figure A2: Financial Reform Index of Developing and Transition Economies, Average 2001–2005



Source: Author's calculations based on Abiad *et al.* (2008a).

Figure A3: Natural Log of GDP per Capita in USD in 2006 and the Financial Reform Index, Average 2001–2005



Notes: The Bravais Pearson correlation coefficient (corresponding p-value) is 0.7182 (0.0000) and Spearman's rank correlation coefficient is 0.7265 (0.0000).  $N=88$ .

Source: Author's calculations based on Abiad *et al.* (2008a) as well as World Bank (2013).



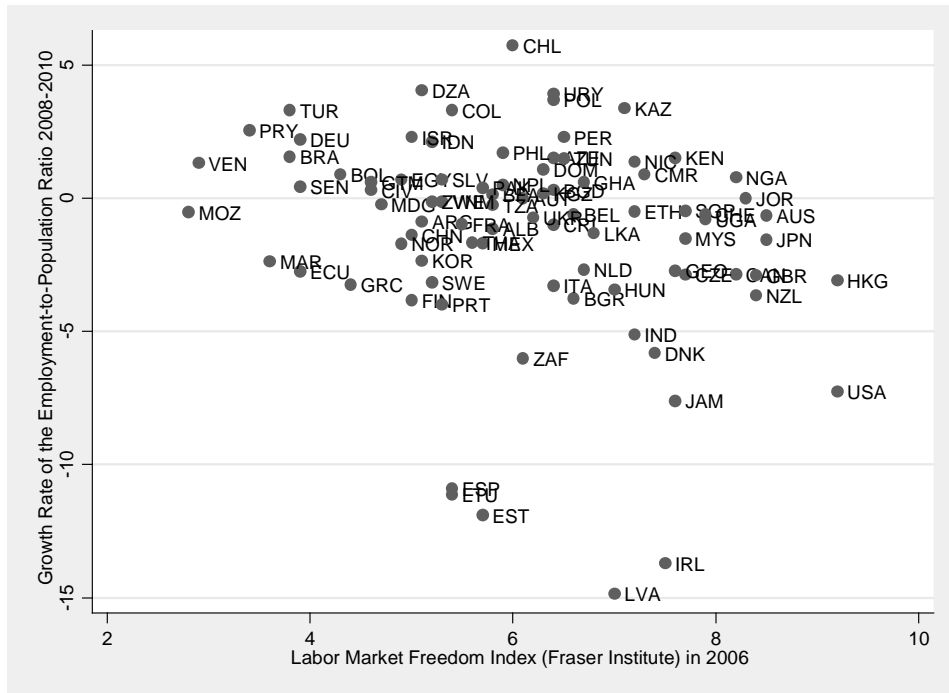
Figure A4: Natural Log of GDP per Capita in USD in 2006 and Cumulated GDP Growth 2008-2011



Notes: The Bravais Pearson correlation coefficient (corresponding p-value) is -0.5224 (0.0000) and Spearman's rank correlation coefficient is -0.5445 (0.0000).  $N=88$ .

Source: Author's calculations based on Abiad *et al.* (2008a) as well as World Bank (2013).

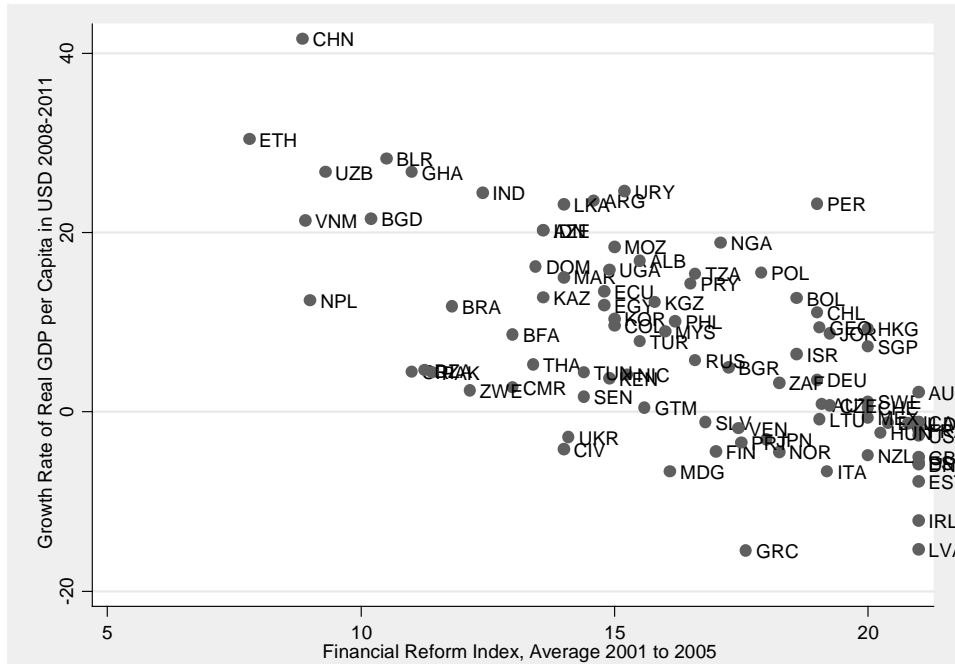
Figure A5: Labor Market Deregulation in 2006 and Cumulated Growth Rate of Employment 2008–2010



Notes: The Bravais Pearson correlation coefficient (corresponding p-value) is -0.2346 (0.0297) and Spearman's rank correlation coefficient is -0.2615 (0.0150).  $N=86$ .

Source: Author's calculations based on Gwartney *et al.* (2011) as well as World Bank (2013).

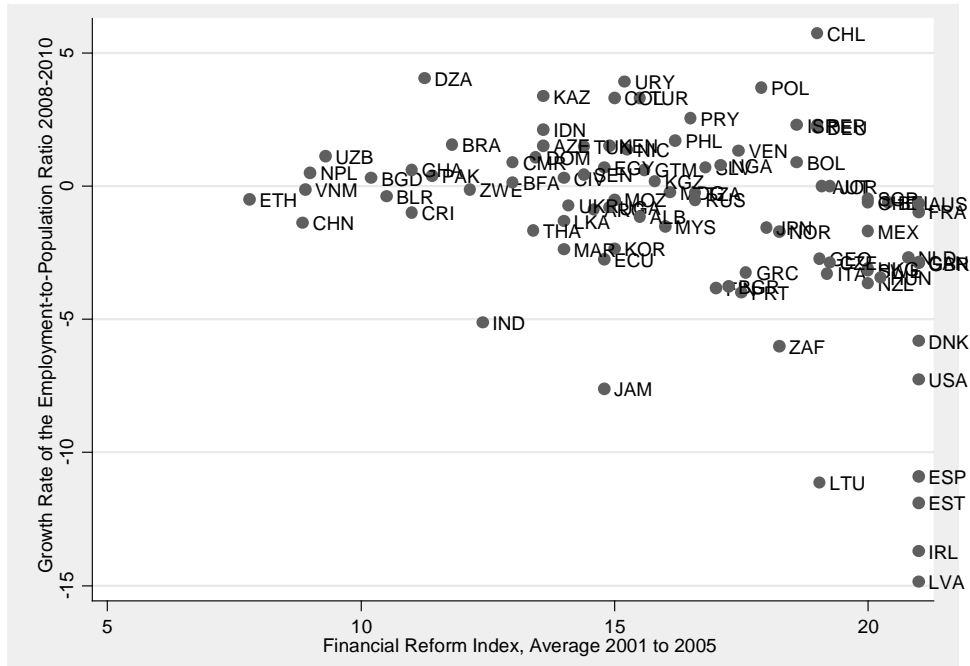
Figure A6: Financial Reform Index (Average 2001–2005) and Cumulated Growth Rate of GDP per Capita in USD 2008–2011



Notes: Taking all countries into account, the Bravais Pearson correlation coefficient (corresponding p-value) is -0.6501 (0.0000) and Spearman's rank correlation coefficient is -0.6366 (0.0000). Restricting the sample to the 22 advanced economies, both coefficients are insignificant 0.0849 (0.7070) and -0.0423 (0.8518). Using a sample with the 22 advanced economies, 12 emerging and developing Asia countries as well as 17 transition economies the coefficients are -0.8032 (0.0000) and -0.7512 (0.0000).

Source: Author's calculations based on Abiad *et al.* (2008a) as well as World Bank (2013).

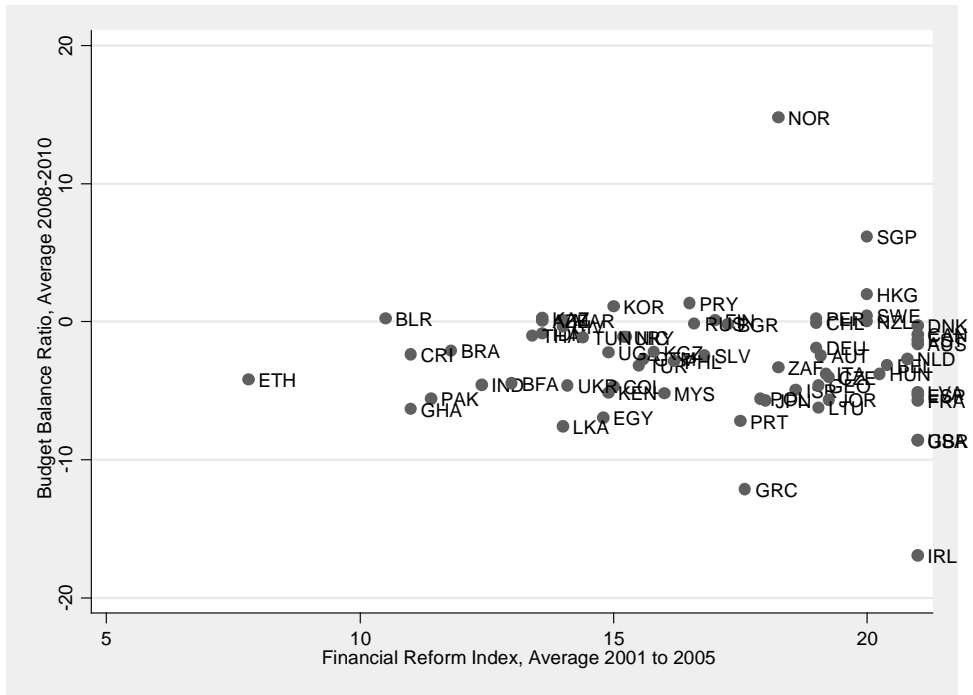
Figure A7: Financial Reform Index (Average 2001–2005) and Cumulated Growth Rate of the Employment to Population Ratio 2008–2010



Notes: Taking all countries into account, the Bravais Pearson correlation coefficient (corresponding p-value) is -0.4165 (0.0000) and Spearman's rank correlation coefficient is -0.4389 (0.0000). Restricting the sample to the 22 advanced economies, both coefficients are insignificant -0.3288 (0.1352) and -0.2207 (0.3237). Using a sample with the 22 advanced economies, 12 emerging and developing Asia countries as well as 17 transition economies the coefficients are -0.4508 (0.0009) and -0.5228 (0.0001).

Source: Author's calculations based on Abiad *et al.* (2008a) as well as World Bank (2013).

Figure A8: Financial Reform Index (Average 2001–2005) and Average Budget Balance Ratio 2008–2010



Notes: All correlation coefficients are near zero and statistically insignificant.  $N=67$ .

Source: Author's calculations based on Abiad *et al.* (2008a) as well as World Bank (2013).

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