BANK OF GREECE
EUROSYSTEM

Working Paper

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158

MAY 2013

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ISSN 1109-6691

FINANCIAL SOUNDNESS INDICATORS AND FINANCIAL CRISIS EPISODES

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ABSTRACT

This paper studies the links between financial soundness indicators and financial crisis episodes controlling for several macroeconomic and fiscal variables in 20 OECD countries. We focus our attention on aggregate capital adequacy, asset quality and bank profitability indicators compiled by the IMF. Our key findings suggest that, in times of severe financial crisis, regulatory capital to risk weighted assets increases (by about 0.5-0.6 percentage points –p.p.) to abide by regulatory and supervisory demands, non performing loans (NPL) to total loans increase dramatically (by about 0.5-0.6 p.p.), but loan loss provisions lag behind NPLs (they fall by about 12.3-18.8 p.p.) and profitability deteriorates dramatically (returns on assets (equity) fall by about 0.3-0.4 (5.0-7.0) p.p.).

Keywords: Bank profitability, capital adequacy, asset quality, financial crisis.

JEL classification: E44, E58, G21, G28, E61, E62, H61, H62, E32.

Acknowledgments: We would like to thank Anne Villamil for useful comments and suggestions. The views of the paper are our own and do not necessarily reflect those of the Bank of Greece. All remaining errors are ours.

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1. Introduction

During the recent financial and economic crisis preserving banking sector stability was one of the main problems that governments around the world had to deal with. To this end, government assistance to the banking sector involved equity injections, subsidies, asset purchases, loan guarantees and other forms of assistance which all had very high cost for public finances and contributed to rising debt levels. According to European Commission (2011) government assistance to the banking sector has been "sizeable and in more than half of EU Member States has exceeded 5% of GDP" and "currently, sizable rescue measures to the banking sector weigh heavily on the public finances, most particularly in Ireland, the UK, Denmark, Belgium, the Netherlands, Austria and Germany." Building on this, the aim of the current study is to asses the risks to banking sector stability that policy makers will have to address in the event of severe financial crisis episodes.

The recent crisis has revealed that there are complex links between fiscal policy and the financial sector and feedback loops between government activity and banking sector stability. For example, unsound fiscal policies, by impacting negatively on market confidence and sovereign bonds, could represent a risk to financial and consequently economic stability[1]. The government borrowing operations in financial markets and its tax decisions could also have repercussion for interest rates and asset price behaviour, which could become a risk to financial market stability (IMF 2009a).

The increased interest of policy makers in understanding what leads to systemic banking crises; the need to design early warning mechanisms to prevent them from occurring has led to the creation of the so-called macro-prudential analysis.[2] The IMF initiated work on identifying a small set of macro-prudential indicators comprising information on the aggregate banking system of each country (see Sundararajan et al.

[1] As stated by Peter Praet "Public debt is commonly held as a low-risk asset by financial institutions and it is also used as collateral in refinancing operations… When the financial markets doubt the sustainability of public debt, the liquidity and even the solvency of financial institutions can deteriorate, in turn potentially destabilising the financial sector." See Bank for International Settlements (BIS, 2011) and discussion therein on the implication that fiscal policy has on monetary and financial stability.

[2] As discussed in Galati and Moessner (2010) the origin of the term macro-prudential traces back to the late 1970s, and became much more commonly used in the post 2007 period. For more information see also Borio (2010). Tsomocos (2003) and Goodhart et al. (2004, 2005, 2006) have examined theoretically the importance of financial fragility/stability and its consequence for economic policy.

2002). Several other IMF studies followed using these financial soundness or stability indicators (FSIs) in cross country studies, e.g., Babihuga (2007), Cihak and Schaeck (2007, 2010). Babihuga (2007) analyzed the relationship between selected FSIs and macroeconomic variables and Cihak and Schaeck (2007, 2010) examined whether these financial soundness indicators can predict systemic banking crisis.

Financial stability indicators are affected by a series of factors, macroeconomic, fiscal, institutional, etc. Several country level studies have investigated the determinant of FSIs, e.g., Berger and De Young (1997) link cost efficiency and non performing loans (NPLs) in the US banking industry; Podpiera and Weill (2008) link cost efficiency and NPLs in the Czech Rebublic; Salas and Saurina (2002) examine the determinants of NPLs in the Spanish banking sector. Sorge and Virolainen (2006) examine the relationship between loan loss provisions and macroeconomic determinants in Finland. Quagliarello (2007) discusses the links between business cycle developments and NPLs in Italy, and more recently Louzis at al. (2012) investigate the determinants of NPLs in the Greek banking industry. Nkusu (2011) and De Bock and Demyanets (2012) investigate the determinants of NPLs in developed and emerging market economies, respectively. Gropp and Heider (2009) examine the determinants of bank capital structure of large EU and the US banks. While, Saurina (2009a,b) examines the role of provisioning as a tool that avoids pro-cyclicality of capital adequacy requirements and strengthens the solvency of banks.

This paper building on the abovementioned country specific studies as well as earlier cross-country IMF studies like Babihuga (2007) and Cihak and Schaeck (2007, 2010) extend previous work by investigating the effect of financial crisis episodes on FSIs, while controlling for several macroeconomic and fiscal variables in a set of 20 advanced OECD economies over the periods 1997-2009. Our findings will reveal the degree of the fragility of the banking system (in terms of capital adequacy, asset quality and profitability) and the risks to financial stability that policy makers will have to address in the event of financial crisis episodes.

Moreover, the effects of the financial crisis on banking sector stability will signal to policy makers the likely future costs for public finances, in the event that these costs

might have to be borne by the public.[3] This reinforces the argument for a more proactive stance on the side of the regulatory and supervisory authorities of the financial sector in order to preserve financial stability, as well as enhanced cooperation between fiscal, monetary and macro-prudential authorities in order to contain the effects of financial crisis. [4]

It is worth stressing that there have been a number of theoretical papers linking the financial sector with macroeconomic developments, highlighting the important role of banking sector stability, as well as the need to avoid pro-cyclical capital requirements.[5] Whereas, other theoretical studies have discussed how monetary policy decisions impact on the risk taking behavior of financial intermediaries that are relevant for financial stability.[6]

Our key findings suggest that in times of severe financial crisis the ratio of regulatory capital to risk weighted assets is increased by about 0.5-0.6 percentage points (to abide by regulatory and supervisory demands as also pointed out by Cihak and Schaeck, 2010)[7], non performing loans (NPL) to total loans increase dramatically (by about 0.5-0.6 percentage points in the short run and 3.0-4.6 p.p. in the long run), but loan loss provisions lag behind NPLs (fall by about 12.3-18.8 p. p.), and profitability deteriorates dramatically (returns on assets (equity) fall by about 0.3-0.4 (6.0-7.0)

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[3] The Greek and the Irish debt problems are very useful examples of inter-linkages between the government and the financial sectors. Despite the fact that the two problems are interrelated, the origin of each one of them is different. The Irish public debt problem stems from the fact that the Irish government assumed the debt and vulnerabilities of the private and banking sector created by the 2008-2009 financial crisis; while, in the case of Greece the sovereign debt problem was passed on to the local banking sector, which had been unaffected by the 2008-2009 financial crisis (see IMF, 2010a, 2010b). As stated in IMF (2010b) "sovereign downgrades, increasing loan impairment, and the deteriorating economic outlook have undermined confidence in the Greek banking sector."

[4] In this study we investigate the effects of financial crisis on banking sector stability. Several previous studies have examined the impact of financial and banking crisis instability on public finance. For example, some previous studies have investigated the direct fiscal implications of past banking system support schemes (Honohan and Klingebiel 2003), the determinants of fiscal recovery rates (European Commission, 2009), as well as whether costly fiscal interventions reduce output loss (Claessens et al. 2005; Detragiache and Ho 2010). Other studies have investigated the effect of financial crisis on the debt to GDP ratio and GDP growth (European Commission 2009b; Furceri and Zdzienicka 2010, 2011; Reinhart and Rogoff 2008, 2009, 2010, Tagkalakis, 2013).

[5] See for example Benanke et al. 1999, Goodhart et al. (2005, 2006), Goodfried and McCallum (2007), Covas and Fujita (2009), Repullo and Suarez (2008), Meh and Moran (2010).,

[6] See for example Adrian and Shin (2009), Borio and Zhu (2008) and Brunnermeier and Pedersen (2009).

[7] Other studies such as Gropp and Heider (2009) find that find that unobserved time invariant bank fixed effects are ultimately the most important determinant of banks' capital structures.

percentage points in the short run and by 0.8-0.9 p.p. (10.0-15.0 p.p.) in the long run). Increased real short term interest rates are associated with higher regulatory-capital to risk weighted assets, increased NPLs and lower profitability. Increases in the real long term government bonds rates deteriorate asset quality and reduce profitability.

Our findings should be looked at in close association with the findings reported by Adrian and Shin (2009, 2010) suggesting that broader balance sheet aggregates of financial intermediates such as total assets and leverage could be incorporated into macroeconomic analysis in order to improve the conduct of monetary policy making.[8]

The remaining of the paper is as follows: Section 2 provides a brief overview of related studies and data information on FSIs and financial crisis indicators. In Sections 3 to 5 we discuss methodology and econometric estimation of capital adequacy, asset quality and profitability equations, respectively. Section 6 summarizes the main findings and concludes. A Data Appendix provides additional information on the data used in the analysis.

2. Financial soundness indicators: data issues and related studies

The FSI data used in this study are drawn from successive IMF Global Financial Stability Reports (from March 2002 to October 2010)[9]. FSI data have been previously employed by several IMF studies, like Babihuga (2007) and Cihak and Schaeck (2007, 2010). Due to their wide coverage, FSIs are able to capture a range of factors that may pose risks to the financial system as a whole (Sundararajan et al. 2002).

The paper employs the following core FSIs: capital adequacy (measured by the ratios of capital to assets and regulatory capital to risk weighted assets), asset quality (measured by the ratio of non-performing loans (NPLs) to total loans and by loan loss provisions to non performing loan) and profitability (measured by return on assets and

[8] As pointed out by Goodhart et al (2004) there may be a trade-off between efficiency and financial stability, not only for regulatory policies, but also for monetary policy. However, in subsequent research Goodhart et al. (2011) show that interest rate setting is an appropriate instrument in order to maintain financial stability, because in times of a panic or financial crisis the Central Bank automatically satisfies the increased demand for money, i.e. preventing sharp losses in asset values and enhanced asset volatility.

[9] See Data Appendix. The IMF has created a website (http://fsi.imf.org/) disseminating data and metadata on selected FSI provided by several countries.

return on equity). Capital adequacy, asset quality and profitability are all important indicators of bank performance and fragility.

The FSI data start in 1997, reflecting the fact that many countries began collecting FSI data in the context of the IMF's Financial Sector Assessment Programme (FSAP), which began in 1999 (Babihuga 2007). Despite the short time dimension of the dataset (1997-2009), the sample size (20 countries) is sufficient to allow for consistent estimators by taking into account the asymptotic properties (of the relatively larger sample of countries). [10]

A few IMF studies have used these FSI indicators. Babihuga (2007) analyzes the relationship between selected macroeconomic and financial soundness indicators (FSIs) for 96 countries covering the period 1998-2005. The analysis covers key macroeconomic indicators and capital adequacy, asset quality and profitability. The paper finds that the business cycle—measured as the cycle component of real GDP, obtained using the Hodrick-Prescott filter (1980)—has a robust, negative relationship with capital adequacy, and non-performing loans (NPL), and a robust, positive relationship with profitability. Furthermore, inflation, the real effective exchange rate, and real interest rates also emerge to different degrees as important determinants of FSIs. Cross country differences in income, size of the financial sector, quality of banking supervision, and market concentration robustly explain cross country differences in the cyclicality of FSIs.

Cihak and Schaeck (2007, 2010) working with financial soundness indicators investigate how well these aggregate banking system ratios identify systemic banking crises. The authors also estimate a duration model to investigate whether these ratios help determine the timing of a banking crisis. As is shown by the authors, bank regulatory capital to risk weighted assets does not show any variability prior to the crisis, it only increases as a consequence of the crisis, i.e., authorities impose or markets require a higher capital requirement after a financial crisis. The capital to asset ratio increases prior

[10] The second drawback which is also stated in Babihuga (2007), Cihak and Schaeck (2007) and IMF (2009b) is that FSI metadata is sourced from national sources, implying that due to differences in national accounting, taxation, and supervisory regimes, FSI data might not be strictly comparable across countries. However, contrary to Babihuga (2007) and Cihak and Schaeck (2007) we decide to focus on a smaller sample, i.e., 20 industrialized countries (excluding other emerging market and developing economies for which the IMF reports analogous data). This way we try to avoid major problems in terms of data quality, as well as in terms of non comparability or great diversity and heterogeneity of national definitions.

to the crisis possibly because banks build up capital buffers in anticipation of regulatory pressure. The non-performing loans to total loans increase prior to the crisis deteriorating the asset quality of institutions and gradually fall following the crisis. Consequently, bank provisions to non performing loans increase following the recognition of nonperforming loans. Finally, bank profitability (returns on earnings) is not much affected prior to the banking crisis, but deteriorates rapidly at the time of the crisis.

After controlling for macroeconomic conditions Cihak and Schaeck (2007) investigate, by estimating a logit regression, which financial soundness indicators can provide an accurate signal for the probability of observing systemic banking vulnerabilities. They use a sample of 100 countries of which 51 experience serious banking problems during the period 1994-2004. A high capital to risk weighted assets and a high return on equity lowers the probability of a systemic banking crisis occurring. On the contrary, declining asset quality, i.e., an increase in nonperforming loans to total loans is indicative of an impending banking turmoil. The duration analysis performed by the authors reiterates that increasing profitability of financial institutions increases in a significant manner the survival time of banking systems. A low capital adequacy ratio and a high ratio of nonperforming loans to total loans decreases the survival time of the banking system, but the effect is not statistically significant.[11]

There are several other studies that use macro-economic variables to explain banking crisis episodes, e.g., Demirguc-Kunt and Detragiache (1998) and Kaminsky (1998). Prodriera (2004) controlling for macroeconomic variables and other relevant factors investigates the extent to which quality of supervision and regulation impact on the asset quality and profitability of the banking sector.

Several studies have focused on country specific cases, linking FSIs with macroeconomic and other institutional and bank specific factors. For example, Wong et

[11] Poghosyan and Cihak (2009) present a new database on individual bank distress across the European Union from mid-1990s to 2008. Building on this dataset, they analyze the causes of banking distress and identify a set of indicators and thresholds that can help distinguish sound from vulnerable banks and can help as an early warning system. The authors estimate a logistic random effects model robust to heteroskedasticity to identify the determinant of the probability of distress. According to the findings the probability of distress is negatively associated with the level of bank capitalization and earnings. Moreover, the probability of distress is inversely related to asset quality, i.e., the higher loan loss provision profile implies a riskier loan portfolio.

al. (2005) have investigated the determinants of asset quality, profitability and capital adequacy in Hong-Kong. Brewer et al. (2008) demonstrated that if the banking sector is relatively small, the banks maintain a higher capital adequacy ratio. According to Marques and Santos (2003) capital regulation is the first external determinant of the banks' capital structure. Barth et al. (2005), Berger et al. (2008) and Brewer et al. (2008) observe that the levels of bank capital are much higher than the regulatory minimum, which means that banks could hold capital buffers in excess of the regulatory minimum (see Ayuso et al. 2004). Banks may hold capital buffers in order to reduce the probability that they incur high costs by raising equity on short notice so as to abide by regulatory requirements.

Gropp and Heider (2009) examining the determinants of bank capital structure of large EU and the US banks find that unobserved time invariant bank fixed effects are ultimately the most important determinant of banks' capital structures. Contrary to previous beliefs (Mishkin 2000) they suggest that capital regulation and buffers may only be of second order importance in determining the capital structure of most banks.[12]

Bikker and Metzemakers (2002) have investigated the determinants of loan loss provisioning in OECD countries, while Sorge and Virolainen (2006) examine the relationship between loan loss provisions to total loans and various macroeconomic and other determinants in the Finish banking system.

Other country specific studies have linked cost efficiency with non-performing loans. Berger and De Young (1997) using US banking industry data investigate the relationship between loan quality, cost efficiency, and bank capital. They find a negative correlation between cost efficiency and NPLs, which runs both ways, as well as that that reductions in capital at thinly capitalized banks, precede increases in problem loans. Hence, cost efficiency may be an important indicator of future problem loans and

[12] Several authors have developed theories of optimal bank capital structure, in which capital requirements are not necessarily binding (e.g. Flannery 1994; Myers and Rajan 1998; Diamond and Rajan 2000; Allen et al. 2009). Based on the market discipline view, banks' capital structures are the outcome of pressures emanating from shareholders, debt holders and depositors which implies that regulatory intervention is non-binding and of secondary importance (see e.g. Flannery and Sorescu 1996; Morgan and Stiroh 2001; Martinez Peria and Schmuckler 2001; Calomiris and Wilson 2004; Ashcraft 2008; Flannery and Rangan 2008).

problem banks. Salas and Saurina (2002) investigating the Spanish banking system use both macroeconomic and efficiency variables to explain NPLs and find a significant negative effect of output and bank capitalization on NPLs. Podpiera and Weill (2008) looking into the Czech banking sector examine the links between cost efficiency and NPLs and finding significant evidence that low efficiency lead to rising future NPLs. More recently, Louzis et al. (2011) focusing on the Greek banking system and investigating NPLs (on consumer, business and mortgage loans) find that rising NPLs can be explained mainly by macro fundamentals (GDP, unemployment, interest rates) and management quality (cost efficiency). Quagliarello (2007) has investigated and found significant business cycle effects on NPLs in the Italian banking industry. While Nkusu (2011) and De Bock and Demyanets (2012) investigated the macroeconomic determinants of NPLs in developed and emerging market economies, respectively.

2.1 Financial crisis indicators and financial soundness indicators

In our analysis we consider 20 advanced OECD economies over the period 1997-2009. [13] The decisions on the dataset is based on two grounds: 1) the time dimension is dictated by the fact that aggregate FSI are collected by the IMF since 1997 and 2) the group of 20 OECD countries was chosen because of the deficiencies in the collection of the FSI (described above), i.e., advanced OECD economies are more homogeneous group reducing to the extent possible data coverage and definition problems linked to FSI indicators.

Building on the work of Babihuga (2007) and Cihak and Schaeck (2007, 2010) we extend their work by studying the relationship between financial soundness indicators and financial crisis. Before doing that we need first to discuss the financial crisis indicators that will be considered in the analysis.[14] In our investigation we do not employ the

[13] We consider the following OECD countries: Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and the US, see Data Appendix.

[14] Allen and Gale in a series of contributions have investigated the root causes of financial crisis. For example, Allen and Gale (1998) describe a model where financial crisis are caused by exogenous asset returns shocks, whereas Allen and Gale (2004a, 2004b) describe endogenous crises, where small or negligible shocks set off self-reinforcing and self-amplifying price changes, with a key role played by liquidity (which affects asset prices).

Laevan and Valencia (2008) banking crisis data base. Instead we define two types of financial crisis episodes, a severe one and a weak one. The first definition relates to the 2008-2009 financial market crash. As can be seen in Table 1, on average, in the 20 OECD countries considered in the sample, real share prices fell by 26.2% per year. At the same time the real GDP fell, on average, by 1.7% per year and the unemployment rate increased, on average, by 1 percentage point per year. Automatic and discretionary fiscal policy responses resulted in debt increasing, on average, by 7.4% of GDP per year. Hence, in the 2008-2009 financial crises, we observed a substantial fall in real GDP, an increase in unemployment, a collapse in asset prices and a significant worsening of fiscal positions. The first financial crisis indicator, capturing the effects of the 2008-2009 Great Recession is called "severe financial crisis" indicator.[15]

[Table 1 about here]

As an alternative definition we want to consider financial market crashes that are significant but have far less important effects compared to the 2008-2009 Great Recession. We call this second indicator "weaker financial crisis" indicator. It captures the year-country observations where real share prices fell by more than 5%. The second indicator encompasses the country-year observations reflected in the severe financial crisis indicator.[16] As can be seen in Table 2 the weak financial crisis indicator results in financial crisis episodes that are not associated with dramatic falls in real GDP or sharp increases in unemployment and debt ratios. During the periods captured by this weaker definition of financial crisis, real share prices fell on average by 21.0% per year,[17] the debt ratio increased by 3.4% per year, real GDP increased by 0.4% per year and

[15] Borio and Drehmann (2009) building on earlier work on Borio and Lowe (2002a,b) show that indicators based on asset price and credit developments provide a fairly successful signal for subsequent banking system stability issues.

[16] This definition captures the real share prices falls in late 1990s, early 2000s and in 2008-2009. The exclusion of the 2008-2009 financial crisis would have resulted in having less pronounced effects on FSIs in weak crisis episodes. At the same time it would have implied that we would have to reduce our sample to 1997-2007 and lose valuable information. In any case the main message comes through i.e., that in severe or extreme event financial crisis the effects are bigger than in more normal or reoccurring weaker financial crisis events.

[17] Note that in the severe financial crisis definition (Table 1) the average per year fall in real share prices was more pronounced than in the weak financial crisis definition (Table 2) in all OECD countries considered (except in Canada where the average per year fall of real share prices is about the same; however, even in Canada's case during the 2008-2009 financial crisis the debt ratio increased by much more, real GDP fell to a greater extent and the unemployment rate increase was bigger).

unemployment increased by 0.4 percentage points per year in the 20 OECD countries examined.

While in the case of severe financial market episode we have in total 40 country year observations (those corresponding to 2008 and 2009) , in the weak financial crisis indicator we have in total 99 country-year observations, i.e., 4.95 observations per country.

[Table 2 about here]

Financial stability indicators are affected significantly in financial crisis.[18] As shown in Table 3 bank profitability (reflected in returns to asset and returns to equity) is reduced dramatically in financial crisis episodes (be it severe ones like the 2008-2009 financial crisis –column 2- or less severe ones-column 5) compared to non crisis periods. Bank capital to assets ratios are reduced in times of crisis, however, bank regulatory capital to risk weighted assets is increased possibly reflecting regulatory authorities' requirements and interventions. Furthermore, asset quality deteriorates during financial crisis as reflected by the higher value of non-performing loans to total loans in crisis episodes. At the same time loan loss provisioning to non performing loans remains well below its non crisis levels, implying increased riskiness and exposure on the side of banks.

Therefore, the behavior of financial stability indicators can provide useful signals to policy makers on risks stemming from the banking sector and its likely consequences for public finances. If the deterioration of banking sector stability coincides with falling economic activity then fiscal risks could be much higher.[19]

[Tables 3 and 4 about here]

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[18] As discussed by Adrian and Shin (2008, 2009) price changes contributed to financial contagion in the post 2007 financial crisis era. As the authors point out "w*hen balance sheets are marked to market, asset price changes show up immediately on balance sheets and elicit response from financial market participants. Even if exposures are dispersed widely throughout the financial system, the potential impact of a shock can be amplified many-fold through market price changes".*

[19] During the 2008-2009 financial crisis bank profitability ratios (returns on assets and on equity) were substantially lower that in the other financial crisis episodes. At the same time capital to asset ratio was lower, but regulatory capital to risk-weighted assets were higher. Non performing loans to total loans were slightly lower that in past financial crisis, but this time loan loss provisioning to non-performing loans was significantly lower (see Table 4).

3. Capital adequacy

Building on earlier work by Shrieve and Dahl (1992), Jacques and Nigro (1997), Aggarwal and Jacques (1998), Wong et al. (2005), and Babihuga (2007) we estimate the following regression:[20] [21]

$$Capital/assets_{it} = \alpha_1 Capital/assets_{it-1} + \alpha_2 ygap_{it} + \alpha_3 X_{it-1} + \alpha_4 FC_{it} + \alpha_5 Credit_{it} + \lambda_i + \varepsilon_{it} \quad (1)$$

λ_i stand for unobserved country effects, *Capital/assets* is the capital adequacy ratio (regulatory capital to risk weighted assets, capital to assets), $Capital/assets_{t-1}$ stands for the lagged change in the capital adequacy ratio. $ygap_t$ is the cyclical indicator (output gap), FC_{it} stands for the financial crisis indicators, *Credit* stands for credit growth, and X_{t-1} are variables that are likely to affect the capital adequacy ratio. These are the GDP deflator based inflation rate, the percentage change in the real effective exchange rate, the change in the real short term interest rate, the change in the real long term interest (government bond) rate, the debt ratio, the change in the debt ratio, the level of financial intermediation, and the percentage change in real share prices (see Data Appendix). These additional explanatory variables, and the country effects, were also included to reduce the omitted variables problem related to institutional and other bank related variables identified by earlier country specific studies (see sections 1 and 2).[22]

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[20] The underlying specification assumes that changes to bank capital reflect (partial) adjustment towards a target capital rate and exogenous factors (see Shrieve and Dahl 1992). A detailed look on theories of capital structure is provided in Puerra and Keppo (2006), Allen et al. (2011), Mehran and Thakor (2011), Diamond and Rajan (2000). Diamond and Rajan (2000) and Allen et al. (2009) suggest that banks are different and that we should be looking for bank specific factors to explain bank leverage. While Bertrand and Schoar (2003) and Frank and Goyal (2007), indicate that managers' preferences have a direct impact on capital structure, with less risk averse managers choosing a more aggressive strategy and higher leverage. See Guegan and Tarrant (2012) for a discussion of risk management measures that are relevant for the determination of banks' capital requirements.

[21] Goodhart et al. (2006) develop a theoretical model that allows one to assess the role and impact of capital requirements for the soundness of the financial system and the macroeconomy. As the authors highlight "*it is important for crisis management and prevention to study situations where banks' capital depletes and capital requirements are 'biting*'."

[22] Jokipii and Milne (2011) and Allen and Gale (2003) discuss how liquidity affects capital and risk. Jokipii and Milne (2011) claim that banks with higher liquidity can decrease their capital and increase their levels of risk. However, banks may hold liquidity as self-insurance against liquidity shocks. In turn, high levels of liquidity expose banks, mainly small ones, to risk-taking (Allen and Gale, 2003) leading to increasing levels of capital in order to control risk-taking. In some cases liquidity requirements can be as effective as

In order to address endogeneity issues due to the presence of a lagged dependent variable and possible feedback effects from the output gap and credit growth we estimate equation (1) with a dynamic panel data two-step system GMM estimator (see Arellano and Bover 1995; Blundell and Bond 1998; Roodman 2009b). We use a subset of the available instrument matrix, i.e., we use the t-1 to t-3 lags of the lagged dependent variable and the lagged values of the output gap and credit growth.[23]

The specific decision on the subset of instruments to be used in each case that will be presented below takes into account the performance of the Hansen test of overidentifying restrictions and the absence of second order autocorrelation in first difference errors (i.e., that moment conditions are valid).[24] To transform the equation of interest and remove fixed effects we consider both first differencing and forward orthogonal deviations proposed by Arellano and Bover (1995). The forward orthogonal deviations transformation, rather than subtracting the previous observation, subtracts the average of all available future observations. The use of forward orthogonal deviations transformation is more appropriate in unbalanced panels.[25]

The likely impact of the explanatory variables on the dependent variable is the following: the lagged dependent variable reflects the cost of raising capital or reflects adjustment costs; hence, the higher the adjustment costs the more capital the banks will hold. In a cyclical upswing (increase in ygap) banks hold less capital.[26] The impact of the

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capital requirements - in this case, the effect of liquidity on capital will be positive the effect on risk will be ambiguous.

[23]The system GMM estimator is less affected by the weak instrument problem compared to the differenced GMM (Arellano and Bond, 1991). Omitting the more distant lags might not lead to significant loss of information, see Bond (2002) and Roodman (2009a) on the implication of using too many instruments. Moreover, the two-system GMM estimator is more efficient than the one-step system GMM estimator. The finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005) is implemented.

[24]In all specifications, the test on overidentifying restrictions indicates that the hypothesis that instruments are valid cannot be rejected and that there is no higher-order autocorrelation.

[25] On balanced panels, GMM estimators based on the two transformations return numerically identical coefficient estimates, holding the instrument set fixed (Arellano and Bover 1995). As a robustness test we consider also the two-step difference GMM estimator where we apply the forward orthogonal deviations transformation. We shall refer to these findings in the next sections but we do not present them here due to space limitation. However, they are available in the supplementary material appendix.

[26] Jokipii and Milne (2011) argue that higher risk-taking can increase the probability of default and encourage banks to increase regulatory capital. Jacques and Nigro (1997), Rime (2001) and Roy (2008) find that weakly capitalized banks increase their capital faster than well-capitalized banks.

inflation rate and the real effective exchange rate on bank capital is ambiguous, as Babihuga (2007) points out the effects depends on the impact of high inflation to bank income and on the share of banking system assets held abroad. Changes in the real short term interest rate reflect the impact of monetary policy; the impact is ambiguous depending on the pass through to deposit vis-à-vis lending rates. Changes in real share prices will impact the capital adequacy ratios to the extent that part of the capital is depicted in current market and not on historic prices. Moreover, the movements of share prices incorporate expectation about future economic prospects and outlook, which could impact on the capital raising decision of the banking sector.

Long term interest rates, debt ratio and change in debt ratio, all reflect the impact of the government sector on the banking system stability. As the government sector expands and its debt increases this could lead to higher borrowing costs for the official sector. This would imply that government assets held by banks might lose value, e.g., in case of sovereign downgrade and fall in the price of government bonds. On the other hand, if the government securities are still creditworthy the purchase of new government securities at lower prices and higher yields will increase banks' profits. The overall effect depends on the creditworthiness of the sovereign, e.g. in the current sovereign debt crisis, government assets held by banks have lost significant part of their value, deteriorating banks' positions and leading to successive recapitalizations by the state. The financial crisis indicator reflects the impact of severe and/or weak financial crisis on the capital adequacy indicators. Credit growth and financial intermediation control for the leverage and level of development of the banking system.

3.1 Findings

In Tables 5-6 and in Tables 7-8 we report the findings for the specifications using as dependent variable the regulatory capital to risk weighted assets and the capital to

assets ratio, respectively. In Tables 5 and 7 we control for the severe financial crisis episodes, while in Tables 6 and 8 we control for the weak financial crisis episodes.[27]

Starting from the case of regulatory capital to risk weighted assets (Tables 5 and 6) we see that the lagged dependent variable is positive and statistically significant confirming the existence of adjustment costs (as in Babihuga 2007). The output gap coefficient is negative and statistically significant in most cases, implying that as economic conditions improve (the output gap variable increases) the capital adequacy ratio declines. Alternatively, the capital ratio increases when economic conditions worsen (a 1% fall in the output gap increases the regulatory capital adequacy ratio by 0.10 to 0.16 p.p.).[28] This finding is in line with Wong et al (2005) and Babihuga (2007). It implies that as economic conditions worsen and the quality and value of assets held by banks deteriorate, banks increase capital to address vulnerabilities or alternatively reduce their assets to attain regulatory capital ratios. This could also reflect the procyclicallity of capital requirements which propagates recessions, i.e., when economic conditions deteriorate, supervisory authorities impose tougher rules on banks, which in turn reduces credit to the private sector propagating the fall in output.[29]

The financial crisis indicator, in particular the one controlling for severe financial crisis episodes, confirms that in times of crisis the regulatory capital to risk weighted assets is increased to abide by regulatory and supervisory authorities' demands. According to our findings the increase in the regulatory capital adequacy ratio ranges from about 0.5 to 0.6 p.p. (see Table 5, columns 1-4)[30]. This highlights the procyclicality

[27] Apart from the other macroeconomic and financial crisis variables, in columns 1 and 5 we control for the real short term interest rate, in columns 2 and 6 we control for the real long term interest rate, in columns 3 and 7 we control for the real short term interest rate and the debt ratio, while in columns 4 and 8 we control for the real short term interest rate and the change in debt ratio. This applies to Tables 5-16.

[28] A similar result is found when considering the two step difference GMM estimator (with the findings being more robust in the weak financial crisis estimations); see supplementary material appendix.

[29] Saurina (2009a) finds that the effect of provisioning in Spain had only a small effect on credit growth while strengthening the solvency of banks through countercyclical buffers. While Drehmann et al (2010) propose several options of system-wide countercyclical capital buffers. More recently, Drehmann et al. (2011) find that the gap between the ratio of credit-to-GDP and its long-term backward-looking trend performs best as an indicator for the accumulation of capital as this variable captures the build-up of system-wide vulnerabilities that typically lead to banking crises. As these authors point out "*credit spreads are better in indicating the release phase as they are contemporaneous signals of banking sector distress that can precede a credit crunch*".

[30] However, the long run effects are not statistically significant.

of capital requirements, which can in themselves propagate the crisis, if credit conditions are tightened and economic activity deteriorates further. As pointed out by Cihak and Schaeck (2010), "*in the aftermath of a crisis, regulatory capital increases, which is due to the frequently higher capital requirements in the period after an episode of financial turmoil and the shoring up of reserves in financial institutions*."[31] However, the findings reported in Table 6 (on weak financial crisis) and in Table 5 (columns 5-8) point to a positive, but not statistically significant coefficient estimate.

[Tables 5 and 6 about here]

The coefficient estimates of inflation rate and real effective exchange rate are insignificant as reported in Tables 5 and 6. There is statistically significant evidence that increased short term real interest rates are associated with higher regulatory capital to risk weighted assets ratios (see Table 5, columns 1, 3-4). Long term interest rates, debt ratio and the change in debt ratio are all insignificantly estimated. The same applies for the coefficient estimates of credit growth and the level of financial intermediation. Finally, there is evidence that higher real share prices lead to lower regulatory capital to risk weighted assets ratio, possibly because increases in stock market reflect improved current and future outlook, which leads to lower regulatory capital asset ratios (see Table 5, columns 1, 3-4 and 6).

Turning to the capital-to-assets ratio (see Tables 7 and 8), we see that most independent variables are not statistically significant. Moreover, there are some differences compared to the results presented in Tables 5-6 that stand out, we will focus our attention to these ones. The coefficients of the lagged dependent variable, the output gap, and the real short term interest rate appear to have no significant effect on the capital-to-assets ratio. Moreover, both the severe and the weak financial crisis dummy variables appear to lower the capital-to-assets ratio, but not in a statistically significant

[31] Earlier work by Gropp and Heider (2009) find that unobserved time invariant bank fixed effects are ultimately the most important determinant of banks' capital structures. While in others studies banks' capital structures are the outcome of pressures emanating from shareholders, debt holders and depositors which makes regulatory intervention non-binding and of secondary importance (see e.g. Calomiris and Wilson 2004; Ashcraft 2008; Flannery and Rangan 2008).

manner.[32] Note that Cihak and Schaeck (2010) have found that the capital-to-assets ratio decreases in the event of a financial crisis.

[Tables 7 and 8 about here]

4. Asset quality

Building on the work of Salas and Saurina (2002), Qualgliarello (2007), Bubihuga (2007), Louzis et al. (2012) and Nkusu (2011) we estimate the following equation[33]:

$$Asset\ quality_{it} = \alpha_1 Asset\ quality_{it-1} + \alpha_2 ygap_{it} + \alpha_3 X_{it-1} + \alpha_4 FC_{it} + \alpha_5 Credit_{it-1} + \lambda_i + \varepsilon_{it} \quad (2)$$

λ_i stand for unobserved country effects, *Asset quality* is the asset quality index, i.e., non-performing loans to total loans and provisions to non performing loans. $Asset\ quality_{t-1}$ stands for the lagged value of the depended variable. $ygap_t$ is the cyclical indicator (output gap), FC_{it} stands for the financial crisis indicators, $Credit_{t-1}$ stands for credit growth, and X_{t-1} are variables that are likely to impact on the asset quality ratios. These are the GDP deflator based inflation rate, the unemployment rate, the percentage change in the real effective exchange rate, the change in the real short term interest rate, the change in the real long term interest rate the debt ratio, the change in the debt ratio, the level of financial intermediation (see Data Appendix).[34]

In order to address endogeneity issues due to the presence of a lagged dependent variable and possible feedback effects from the output gap and credit growth we estimate

[32] When considering the two step difference GMM estimator (see supplementary material appendix) we find statistically significant evidence that the real effective exchange rate has a negative impact effect on the capital-to-assets ratio (i.e., a real appreciation lowers the capital to assets ratio) in line with Babihuga (2007). Moreover, we find that an increase in the level of financial intermediation (domestic credit to private sector over GDP) reduces in a significant manner the capital to assets ratio. Finally, we find that an increase in real share prices leads to lower capital-to-assets ratio.

[33] The specification reflects the inter-linkages between the financial sector and the real economy, focusing mostly on the macroeconomic determinants of NPLs. The financial accelerator theory lies behind the modeling of both NPL and its interaction with macroeconomic performance (see e.g Bernanke and Gertler 1989; Bernanke and Gilchrist 1999; Kiyotaki and Moore 1997.

[34] These additional explanatory variables, and the fixed effects, were also included to reduce the omitted variables problem related to institutional and other bank related variables identified by country specific studies (see sections 1 and 2).

equation (1) with a dynamic panel data two-step system GMM estimator (see Arellano and Bover 1995; Blundell and Bond 1998; Roodman 2009b). We use a subset of the available instrument matrix, i.e., in our benchmark model we use the t-1 to t-3 lags of the lagged dependent variable and the lagged values of the output gap and credit growth. The specific decision on the subset of instruments to be used in each case that will be presented below takes into account the performance of the Hansen test of overidentifying restrictions and the absence of second order autocorrelation in first difference errors (i.e., that moment conditions are valid). To transform the equation on interest and remove fixed effects we consider both first differencing and forward orthogonal deviations proposed by Arellano and Bover (1995).[35]

In line with explanations put forward by earlier studies the likely impact of the explanatory variables on the dependent variable is the following: improved economic conditions (an increase in the output gap and lower unemployment) are associated with deterioration in asset quality. Higher short term interest rates worsen repayment opportunities and deteriorate asset quality.[36] The inflation rate and the real exchange rate have ambiguous effect. Increases in long term interest rates and the other fiscal variables could signal a worse budgetary position and could be associated with increase taxes in the near future, impacts on the ability to repay loans, reducing asset quality. A high credit growth and high degree of financial intermediation are likely to be both associated with deteriorating asset quality. Finally, in times of financial crisis asset quality is expected to deteriorate dramatically.

4.1 Findings

In Tables 9 and 10 we report the findings for non performing loans to total loans and in Tables 11 and 12 the findings for provisions to non-performing loans. In Tables 9 and 11 we control for the severe financial crisis definition, while in Tables 10 and 12 we control for the weak financial crisis definition.

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[35] As a robustness test we consider also the two-step difference GMM estimator where we apply the forward orthogonal deviations transformation.

[36] Lawrence (1995) and Rinaldi and Sanchis-Arellano (2006) consider GDP, unemployment rate and the lending rate as the key determinants of NPLs.

Starting from non-performing loans to total loans, we find significant persistence effects, i.e., the lagged dependent variable is positive and highly significant. The coefficient of the output gap variable is negative and statistically significant in most specifications (see Tables 9 and 10) in line with the findings reported by Nkusu (2011) and De Bock and Demyanets (2012). When economic conditions worsen, borrowers' creditworthiness and the value of collaterals deteriorate increasing NPLs. A 1% fall in the output gap increases the ratio of NPLs to total loans by about 0.10 to 0.19 percentage points. This effect is magnified in times of financial crisis episodes.

NPLs increase by about 0.46-0.59 p.p. in severe financial crisis (see Table 9 columns 1-8). The long run effect of the severe financial crisis ranges from 3.0-4.6 p.p. In weak financial crisis, the coefficient estimate of the financial crisis dummy is positive, but insignificantly estimated in most cases (see Table 10, columns 1-8). The coefficient estimates of the unemployment rate, inflation, credit growth and financial intermediation are not statistically significant.[37] The coefficient estimate of the real effective exchange rate is negative as in Babihuga (2007), but not statistically significant.

[Tables 9 and 10 about here]

Increases in both short and long term interest rates worsen asset quality, increasing non-performing loans to total loans (see Tables 9 and 10). A 1 p.p. increase in short and long term interest rates increases the ratio of NPLs to total loans by about 0.07-0.1 and by 0.07 - 0.10 p.p., respectively.[38] Fiscal variables have no particular impact effect on non performing loans.[39]

The results for the other dependent variable (provisions to non-performing loans) are shown in Tables 11-12. The lagged dependent variable is positive and highly significant, indicating that there is high degree of persistence. The output gap has a negative (and in some cases statistically significant) correlation with the provisions to

[37] It is worth noting that in the two-step difference GMM estimation the coefficient estimate of financial intermediation is positive and significant across all specifications, i.e., the higher the ratio of domestic credit to private sector to GDP, the bigger the ratio of NPLs to total loans (see supplementary material appendix).

[38] Nkusu (2011) finds that an increase in the policy rate increases NPLs.

[39] We do not account for differences in supervisory practices and quality of banking supervision, but the wider explanatory variable set used and the presence of country effects control for unaccounted country characteristics.

NPL ratio (see Table 11 and 12, columns 1-3), i.e., when economic conditions worsen and NPLs increase, the provisions that banks set aside to cover NPLs increases as well. A 1% fall in the output gap increases provisions to NPLs by about 1.4 to 1.6 p.p.; exactly the opposite holds in booms. However, when examining financial crisis episodes we see that NPLs increase dramatically (as shown also by Cihak and Schaeck, 2010) but at the same time provisions to NPLs fall dramatically (i.e., provisioning lags behind the recognition of NPLs). This effect is quite pronounced in the case of severe financial crisis episodes, where the fall reaches 12.3-18.8 p.p. (see Table 11, columns 1-8). The fall ranges from 4.6-5.6 percentage points in times of weak financial crisis (see Table 12, columns 1-4).[40]

The unemployment rate is insignificantly estimated in most cases.[41] Inflation rate and the real effective exchange rate have a negative (and in most cases statistically significant) correlation with the ratio of provisions to NPLs (see Tables 11 and 12, columns 1-4). The coefficient estimates of the both interest rates and the fiscal variables are insignificantly estimated. [42]

The level of financial intermediation is associated positively with the NPL ratio (as seen before) and negatively with the ratio of provisions to NPLs (see Table 11 and 12). Credit growth is associated negatively with the ratio of provisions to NPLs (see Tables 11 and 12).[43]

[Tables 11 and 12 about here]

5. Profitability

Building on the work of Demirguc-Kunt and Huizinga (1999) and Abreu ad Mendes (2002) and Bubihuga (2007) we estimate the following equation:

[40] The long run effects of both severe and weak financial crisis are not statistically significant.
[41] Interestingly, contrary to the two step system GMM findings in the two step difference GMM estimation the unemployment rate has a positive and at times significant effect on provisions to NPLs ratio.
[42] In the two step difference GMM estimation we find a positive response following an increase in real short term interest rate (see supplementary material appendix).
[43] We find a negative and quite statistically significant coefficient estimate in case of credit growth and financial intermediation in the two step difference GMM estimation (see supplementary material appendix).

$$Profitability_{it} = \alpha_1 Profitability_{it-1} + \alpha_2 ygap_{it} + \alpha_3 C/A_{it} + \alpha_4 NPL/TL_{it} + \alpha_5 Credit_{it} + \alpha_6 FC_{it} + \alpha_7 X_{it-1} + \lambda_i + \varepsilon_{it} \quad (3)$$

λ_i stand for unobserved country effects, *profitability* is returns on assets (equity). $Profitability_{t-1}$ stands for the lagged value of the depended variable. $ygap_t$ is the cyclical indicator (output gap), C/A stands for capital-to-asset ratio, NPL/TL stands for non-performing loans to total loans, FC_{it} stands for the financial crisis indicators, *Credit* stands for credit growth, and X_{t-1} are variables that are likely to impact on the asset quality ratios. These are the GDP deflator based inflation rate, the percentage change in the real effective exchange rate, the change in the real short term interest rate, the change in the real long term interest rate the debt ratio, the change in the debt ratio, the level of financial intermediation.[44]

In order to address endogeneity issues due to the presence of a lagged dependent variable and possible feedback effects from the output gap, the capital to assets ratio, non-performing loans to total loans and credit growth we estimate equation (3) with a dynamic panel data two-step system GMM estimator (see Blundell and Bond 1998; Roodman 2009b). We use a subset of the available instrument matrix, i.e., in our benchmark model we use the t-1 to t-2 lags of the lagged dependent variable and the lagged value of the output gap, the capital to assets ratio and the non performing loans to total loans and credit growth. To transform the equation on interest and remove fixed effects we consider both first differencing and forward orthogonal deviations proposed by Arellano and Bover (1995).[45]

In line with explanations put forward in ealier studies like Demirguc-Kunt and Huizinga (1999) and Babihuga (2007) the likely impact of the explanatory variables on the dependent variable is the following: improved economic conditions (an increase in the output gap) are associated with increased profitability. Banks with higher capital to

[44] These additional explanatory variables, and the fixed effects, were also included to reduce the omitted variables problem related to institutional and other bank related variables identified by country specific studies (see sections 1 and 2).

[45] As a robustness test we consider also the two-step difference GMM estimator where we apply the forward orthogonal deviations transformation.

assets ratio face lower funding costs and thus have higher profits[46], a higher credit risk as reflected by a high ratio of nonperforming loans to total loans is associated with lower profitability. Changes in short term interest rates impact both on deposit and lending rates; the pass-through to each respective component will determine whether profits will increase or fall. Inflation impacts the interest margin – the effect is ambiguous.[47] Ambiguous is also the impact of the real effective exchange rate. As Babihuga (2007) points out it depends on the share of assets held abroad. Higher credit growth and a greater degree of financial intermediation could be associated with increased profits.

Higher long term interest rates and increases in the debt ratio signal a worse budgetary position and could be associated with increased taxes in the near future, impacting negatively on profits. At the same time, they might also reflect increased profit opportunities if a higher debt ratio requires increased funds for its refinancing paying higher interest rates on government bonds and so on. However, as the recent crisis has shown this could lead to negative effects for the banking sector as a whole if the government sector defaults (or is near default) and the value of its bonds deteriorates dramatically (following sovereign rating downgrades by credit rating agencies). Finally, bank profitability is expected to fall in financial crisis episodes.

5.1 Findings

In Tables 13-14 (15-16) we report the findings for the return on assets (equity). In Tables 13 and 15 we control for the severe financial crisis definition, while in Tables 14 and 16 we control for the weak financial crisis definition.

In all cases the lagged dependent variable is positive and highly significant indicating the presence of significant persistence effects. Interestingly, the output gap coefficient is insignificantly estimated across all specifications (see Tables 13-16). However, there is robust evidence that profitability deteriorates dramatically at times of financial crisis, with the effect being much more pronounced in severe financial crisis

[46] Berger (1995) finds a positive association between capital to assets and return on equity ratios.

[47] However, as Demirguc-Kunt and Huizinga (1999) point out inflation is associated with higher realized interest margins and greater profitability. Inflation brings higher costs--more transactions and generally more extensive branch networks--and also more income from bank float. Bank income increases more with inflation than bank costs do.

episodes (see Tables 13-16).[48] Return on assets fall by about 0.24-0.28 p.p. and 0.34-0.45 p.p., respectively, in weak and severe financial crisis. With the long run effect in severe financial crisis reaching about 0.9 p.p. Returns on equity fall by about 4.8-7.0 p.p. and 4.7-7.4 percentage points, respectively, in weak and severe financial crisis. With the long run effect in severe financial crisis reaching 15.1 p.p.

[Tables 13 and14 about here]

The coefficient estimate of the inflation rate is insignificantly estimated, though in most cases it has a positive sign as in Demirguc-Kunt and Huizinga (1999) and Babihuga (2007). The real effective exchange rate has no particular effect on returns on assets, however, in most cases it has a positive and significant effect on returns on equity, i.e., a real appreciation is associated with higher returns (see Tables 15-16). Increases in both interest rate variables exerts a negative effect on both profitability ratios, in particular in the estimations that control for severe financial crisis (see Tables 13 and 15). Increases in long term government bond yields reduce the price of government bonds that are held by banks affecting negatively their profits. Moreover, higher long term yields on government paper lead to even higher yields on long term bonds issued by banks reducing their profits.[49] The variables that control for the fiscal situation are insignificantly estimated at all times.

Both credit growth and financial intermediation are associated negatively with the two aggregate profitability ratios. The findings for credit growth are statistically significant when we control for the severe financial crisis dummy (Tables 13-14), while in the case of financial intermediation the effects are significant when we control for the weak financial crisis dummy (but in some of the returns-on-equity specifications; see Table 16).

The evidence as regards capital-to-assets ratio is mixed. However, when its coefficient estimate is statistically significant, its sign is positive (see Table 13, columns 12; Table 14, columns 5-8; Table 16, column 8) in line with Babihuga (2007) and

[48] Cihak and Schaeck (2010) report that return on equity fall dramatically after the crisis, but at the time of the crisis profits do not deteriorate dramatically.

[49] In the two-step difference GMM estimation returns on equity respond negatively (and statistically significant) to increases in real short and long term interest rates.

Demirguc-Hunt and Huizinga (1999). As pointed out in Babihuga (2007) "*banks with higher capital face lower funding costs and higher profits*".[50] Non-performing loans to total loans, proxying the risk exposure of the banking system, are associated negatively with profitability in line with the findings reported in Babihuga (2007), but the coefficient estimates are not statistically significant.

[Tables 15 and 16 about here]

6. Conclusions

This paper building on earlier IMF studies, like Babihuga (2007), Cihak and Schaeck (2007, 2010) investigates the relationship between financial soundness indicators (compiled by the IMF) and financial crisis episodes while controlling for several macroeconomic and fiscal variables. Our findings reveal the degree of the fragility of the banking system and the risks to financial stability that policy makers will have to address in severe (and weak) financial crisis episodes. Actions to address banking systems stability problems could carry heavy burden for public finances as was shown during the recent crisis. Hence, proactive action and enhanced cooperation is required by all relevant authorities.[51]

We report evidence the regulatory-capital-to-risk-weighted-assets increases as economic conditions worsen (the output gap variable falls). The financial crisis indicator confirms that in times of severe crisis regulatory capital to risk weighted assets ratios increase (by about 0.5-0.6 p.p.) to abide by regulatory and supervisory authorities' demands. This highlights the procyclicality of capital requirements, which can in themselves propagate the crisis, if credit conditions are tightened and economic activity

[50] As noted by Demirguc-Hunt and Huizinga (1999) "*well-capitalized banks have higher net interest margins and are more profitable. This is consistent with the fact that banks with higher capital ratios have a lower cost of funding because of lower prospective bankruptcy costs*. "

[51] As shown in Aspachs et al. (2007) when banks do not have to comply with capital adequacy requirements, shocks that induce a decline in banks profits and an increase in banks' default rates also produce a fall in GDP. When capital adequacy requirements are in place, most shocks do not result in a fall in bank profits. The reason for this is that banks need to maintain or top up their capital, and they do this by choosing (riskier) investments that raise their profits. The authors also show that a shock to banks' probability of default and equity induces welfare and output losses.

deteriorates further. On the contrary the capital-to-assets ratio has a negative but not statistically significant association with the financial crisis indicators. Moreover, we find evidence that increases in short term real interest rates are associated with increases in the regulatory capital to risk weighted assets ratio. Increases in real share prices, to the extent they reflect improved future outlook, are associated negatively with both capital adequacy ratios. We also find evidence that increases in the level of financial intermediation, i.e., in the ratio of domestic credit to private sector to GDP leads to lower capital-to-assets ratios.

Turning to asset quality, when economic conditions worsen (the output gap falls) borrowers' creditworthiness and the value of collaterals deteriorate, increasing NPLs (by about 0.10-0.19 p.p.) and increasing banks' provisions to NPLs (by about 1.4-1.6 p.p.). However, when examining financial crisis episodes the NPL ratio increases dramatically (by about 0.5-0.6 p.p.), but at the same time provisions to NPL fall (by about 4.6 to 18.8 percentage points). This effect is quite pronounced in the case of severe financial crisis episodes, indicating that provisioning is inadequate. The long run effect of severe financial crisis on the NPL ratio reaches 3.0-4.6. p.p.

Higher short and long term real interest rates increase the NPL ratio. A 1 p.p. increase in the real short and long term interest rates increases the NPL ratio by about 0.08-0.10 p.p. A high level of financial intermediation is associated with a higher NPL ratio and a lower ratio of provisions to NPLs; whereas rapid credit growth is associated with lower provisions to NPL ratio. We find evidence that the inflation rate and the real effective exchange rate have a negative and significant effect on the ratio of provisions to NPLs.

There is robust evidence that profitability deteriorates dramatically at times of financial crisis, with the effect being much more pronounced in severe financial crisis episodes (returns on assets fall by about 0.3-0.4 p.p. and returns on equity fall by about 6.0-7.0 p.p.). Severe financial crisis reduce return-on-assets (equity) by about 0.8-0.9 (10.0-15.0) p.p. in the long run. There is some evidence that banks with higher capital-to-assets ratio face lower funding costs and higher profits (in the case of returns-on-assets).

Increases in the short and the long term real interest rate exert a negative effect on both profitability ratios, with the effect being statistically significant when controlling for severe financial crisis. An appreciation of the real effective exchange rate has a positive and significant effect on returns on equity. Rapid credit growth is associated negatively with the two profitability ratios, when controlling for severe financial crisis. A high level of financial intermediation is associated negatively with returns-on-equity when controlling for weak financial crisis episodes.

Despite the data limitations summarized above, our findings indicate that the soundness of the aggregate banking system, controlling for a series of macroeconomic and fiscal factors, is impacted heavily in times of severe financial crisis. Policy makers should take this into account in order to develop early warning systems of whether banking system stability is put at risk and to avoid passing the burden of rescue operation to society, as was the case in the recent years. This reinforces the argument for a more proactive stance on the side of the regulatory and supervisory authorities of the financial sector in order to preserve financial stability. At the same time it is important to improve both the supervisory and regulatory framework of financial markets in order to contain risks stemming from the financial sector.

As discussed in Adrian and Shin (2009) binding regulatory constraints can come through leverage bounds, forward-looking provisioning, explicit countercyclical capital rules, or systemic capital rules. All these actions will reduce excessive risk taking and unsustainable patterns and behavior like the hunt for rents, the propensity to herd and create bubbles, the misalignment of incentives, and the proliferation of complex innovative financial instruments that might carry hidden risk etc (See Bini-Smaghi, 2010). [52]

[52] In this context Andrian and Shin (2009) point out that shadow banking and, in particular the role of securitization, should be examined more thoroughly considering also more stringent financial regulation and the recognition of the importance of preventing excessive leverage and maturity mismatching (which undermines financial stability).

Moreover out findings improve our understanding on the likely consequences and spill-overs from the government to the banking sector (as higher long term government bond rates increase NPLs and reduce profitability) and hint to the need for enhanced cooperation and coordination between the fiscal, monetary and macro-prudential authorities to contain such risks.

Last but not least, the present paper shows that additional work should be carried out to better understand the complex links between banking sector stability, fiscal policy and financial crisis. These complex inter-relations have led to the recent worldwide financial crisis and the subsequent sovereign debt crisis is Europe.

A. Data Appendix

We used a yearly unbalanced panel data set (1997-2009) of 20 OECD economies: Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and the US.

Financial soundness indicators

The financial soundness indicators are taken from successive issues of the IMF's Global Financial Stability Report (GFSR) from March 2002 to October 2010 (see e.g. the statistical appendix of the October 2010 GFSR, tables 22-27; IMF, 2010c).

Capital adequacy is measured by the following variables: Bank capital to assets, bank regulatory capital to risk-weighted assets. We measure asset quality with the ratio on bank non performing loans to total loans and bank provisions to non performing loans. Return on assets and Return on equity measure bank profitability**.**

The FSI data start in 1997, reflecting the fact that many countries began collecting FSI data in the context of the IMF's Financial Sector Assessment Programme (Babihuga 2007), which began in 1999. Despite the short time dimension of the dataset (1997-2009), the sample size (20 countries) is sufficient to allow for consistent estimators by taking into account the asymptotic properties (of the relatively larger sample of countries).

The second drawback which is also stated in Babihuga (2007), Cihak and Schaeck (2007) and IMF (2009b) is that FSI metadata is sourced from national sources, implying that due to differences in national accounting, taxation, and supervisory regimes, FSI data might not be strictly comparable across countries. However, contrary to Babihuga (2007) and Cihak and Schaeck (2007) we decided to focus on a smaller sample, i.e., 20 industrialized countries (excluding other emerging market and developing economies for which the IMF reports analogous data). This way we try to avoid major problems in terms of data quality, as well as in terms of non comparability or great diversity and heterogeneity of national definitions.

Macroeconomic variables

The fiscal and macroeconomic variables used extent from 1997 to 2009 and are taken from the Economic Outlook of the OECD (OECD, 2010).

The change in the debt ratio is calculated as the change in the debt ratio between t and t-1. The inflation rate is the percentage change in the GDP deflator (GDP deflator based inflation rate). The real short term interest rate is calculated as nominal short term interest rate minus the GDP deflator based inflation rate. The real long term interest rate is calculated as nominal long term interest rate minus the GDP deflator based inflation rate. The percentage change in real share prices is calculated as the percentage change in share prices minus the percentage change in GDP deflator. The real effective exchange rate variable used is the percentage change in the real effective exchange rate. As financial intermediation we use domestic credit to private sector as a percent of nominal GDP. Credit growth is the percentage change in the domestic credit to private sector.

The descriptive statistics of the variables used in the analysis are shown in Table A.1.

[Table A.1 about here]

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Table A.1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Severe financial crisis	0.1538	0.3615	0	1
Weak financial crisis	0.3808	0.4865	0	1
Change in debt ratio	1.1149	5.4293	-11.1118	21.9433
Output gap	-0.3880	2.2228	-9.1863	6.2350
Debt ratio	69.6086	30.671	13.6087	192.856
Inflation rate	2.4697	2.4661	-3.8385	19.7877
Change in real share prices	4.707	24.621	-45.406	95.432
Change in real long term interest rate	-0.0882	2.0252	-6.7814	9.3808
Change in real short term interest rate	-0.2763	2.3249	-9.9056	9.5158
Credit growth	9.2662	20.772	-41.925	313.855
Financial intermediation	104.6605	45.3401	30.77	231.629
Change in real effective exchange rate	0.4277	5.8117	-26.644	20.3667
Regulatory capital/risk weighted assets	12.061	1.5895	9.1	19.1
Capital/assets	5.8189	1.6420	2.4	11
Nonperforming loans/total loans	2.6386	2.4197	0.2	15.5
Provisions to non performing loans	79.038	45.763	24.1	322.1
Return on assets	0.6452	0.4393	-1.3	2.4
Return on equity	11.654	8.1573	-36.5	29

Table 1: Severe financial crisis definition – how key macroeconomic and other variables behaved in the 2008-2009 financial crisis

	Change in real share prices		Change in debt ratio		Change in real GDP		Change in unemployment rate		
	cumulative	Average per year	cumulative	Average per year	cumulative	Average per year	cumulative	Average per year	Number of severe financial crisis episodes
Australia	**-43.9**	**-22.0**	4.9	**2.5**	3.6	**1.8**	1.2	0.6	2
Austria	**-66.2**	**-33.1**	9.6	**4.8**	-1.9	**-0.9**	0.9	0.5	2
Belgium	**-63.6**	**-31.8**	12.9	**6.5**	-1.9	**-0.9**	0.4	0.2	2
Canada	**-28.9**	**-14.5**	17.5	**8.7**	-2.2	**-1.1**	2.2	1.1	2
Switzerland	**-43.7**	**-21.9**	-4.3	**-2.1**	0.0	**0.0**	0.9	0.5	2
Germany	**-49.1**	**-24.6**	10.9	**5.4**	-4.0	**-2.0**	-0.9	-0.4	2
Denmark	**-53.4**	**-26.7**	17.7	**8.8**	-5.8	**-2.9**	0.5	0.2	2
Spain	**-42.1**	**-21.1**	20.3	**10.1**	-2.9	**-1.4**	9.8	4.9	2
Finland	**-59.1**	**-29.5**	11.1	**5.5**	-7.1	**-3.6**	1.4	0.7	2
France	**-50.8**	**-25.4**	16.4	**8.2**	-2.5	**-1.2**	1.1	0.6	2
UK	**-36.2**	**-18.1**	24.9	**12.5**	-4.4	**-2.2**	2.2	1.1	2
Greece	**-71.4**	**-35.7**	21.5	**10.8**	-1.0	**-0.5**	1.2	0.6	2
Ireland	**-83.6**	**-41.8**	42.0	**21.0**	-11.1	**-5.6**	7.3	3.6	2
Italy	**-64.0**	**-32.0**	16.4	**8.2**	-6.4	**-3.2**	1.7	0.9	2
Japan	**-53.8**	**-26.9**	25.8	**12.9**	-6.5	**-3.2**	1.2	0.6	2
Netherlands	**-57.9**	**-28.9**	16.5	**8.2**	-2.0	**-1.0**	0.3	0.2	2
Norway	**-50.2**	**-25.1**	-9.4	**-4.7**	0.3	**0.1**	0.6	0.3	2
Portugal	**-48.8**	**-24.4**	17.5	**8.8**	-2.5	**-1.3**	1.5	0.7	2
Sweden	**-43.1**	**-21.6**	4.4	**2.2**	-5.8	**-2.9**	2.2	1.1	2
US	**-38.8**	**-19.4**	21.1	**10.6**	-2.6	**-1.3**	4.7	2.3	2
Un-weighted average		**-26.2**		**7.4**		**-1.7**		**1.0**	**2 (total: 40)**

Table 2: Weaker financial crises definition – how key macroeconomic and other variables behaved in these 99 country year-observations

	Change in real share prices		Change in debt ratio		Change in real GDP		Change in unemployment rate		
	cumulative	Average per year	cumulative	Average per year	cumulative	Average per year	cumulative	Average per year	Number of weak financial crisis episodes
Australia	-56.4	**-14.1**	1.5	0.4	10.9	**2.7**	0.4	0.1	4
Austria	-83.9	**-21.0**	12.3	3.1	5.1	**1.3**	-0.4	-0.1	4
Belgium	-117.1	**-19.5**	-3.3	-0.6	4.8	**0.8**	-1.8	-0.3	6
Canada	-59.6	**-14.9**	15.9	4.0	2.5	**0.6**	3.1	0.8	4
Switzerland	-90.4	**-18.1**	0.2	0.0	1.4	**0.3**	2.8	0.6	5
Germany	-122.1	**-24.4**	15.8	3.2	-2.8	**-0.6**	2.8	0.6	5
Denmark	-80.9	**-20.2**	15.5	3.9	-4.6	**-1.1**	-0.2	0.0	4
Spain	-86.6	**-17.3**	9.2	1.8	6.6	**1.3**	4.5	0.9	5
Finland	-142.2	**-28.4**	10.2	2.0	-1.1	**-0.2**	-2.2	-0.4	5
France	-119.2	**-23.8**	22.2	4.4	1.5	**0.3**	0.5	0.1	5
UK	-84.5	**-16.9**	21.3	4.3	3.0	**0.6**	1.8	0.4	5
Greece	-158.4	**-26.4**	32.4	5.4	17.0	**2.8**	-1.3	-0.2	6
Ireland	-116.6	**-29.1**	38.7	9.7	-0.2	**0.0**	7.9	2.0	4
Italy	-122.7	**-24.5**	11.6	2.3	-4.1	**-0.8**	0.0	0.0	5
Japan	-120.9	**-20.2**	62.1	10.3	-6.5	**-1.1**	2.6	0.4	6
Netherlands	-137.5	**-27.5**	14.5	2.9	0.3	**0.1**	3.1	0.6	5
Norway	-93.1	**-15.5**	7.2	1.2	6.8	**1.1**	1.4	0.2	6
Portugal	-132.5	**-22.1**	20.6	3.4	3.3	**0.6**	3.3	0.5	6
Sweden	-109.1	**-21.8**	-0.6	-0.1	0.6	**0.1**	2.4	0.5	5
US	-57.2	**-14.3**	23.4	5.9	0.3	**0.1**	6.4	1.6	4
Un-weighted average		-21.0		3.4		0.4		0.4	4.95 (Total 99)

Table 3: FSIs in crisis and non crisis periods – average effects for the 20 OECD countries of the sample

	1	2	3	4	5	6
	Average in the 2008-2009 financial crisis (severe financial crisis definitions)	**Average in all periods excluding the 2008-2009 crisis**	**Difference**	**Average in all financial crisis (weak financial crisis definition)**	**Average excluding periods where financial crisis occurred**	**Difference**
Regulatory capital/risk weighted assets	12.884	12.011	0.873	12.007	11.879	0.127
Capital/assets	5.584	5.858	-0.274	5.672	5.7198	-0.047
Nonperforming loans/total loans	2.766	2.713	0.052	2.754	2.5772	0.176
Provisions to non performing loans	62.826	77.690	-14.864	60.454	74.147	-13.693
Return on assets	0.2205	0.701	-0.481	0.438	0.739	-0.300
Return on equity	3.523	12.967	-9.443	7.352	14.024	-6.672

Table 4: FSIs in times of financial crisis – average effects for the 20 OECD countries of the sample

	1	**2**	**3**
	2008-2009 financial crisis (severe financial crisis definition)	**All financial crisis (weak financial crisis definition)**	**Late 1990s and early 2000s financial crisis**
Regulatory capital/risk weighted assets	12.884	12.007	11.975
Capital/assets	5.584	5.672	5.936
Nonperforming loans/total loans	2.766	2.754	2.831
Provisions to non performing loans	62.826	60.454	78.990
Return on assets	0.220	0.438	0.632
Return on equity	3.523	7.352	10.675

Table 5: Regulatory capital/risk weighted assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Regulatory capital/risk weighted assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Regulatory capital/risk weighted assets (t-1)	0.864 (9.34)***	0.792 (8.89)***	0.868 (9.51)***	0.873 (8.82)***	0.849 (6.26)***	0.869 (7.63)***	0.846 (6.05)***	0.853 (6.15)***
Output gap (t)	-0.124 (-2.32)**	-0.176 (-3.44)***	-0.123 (-2.34)**	-0.097 (-1.67)	-0.110 (-1.27)	-0.113 (-1.38)	-0.104 (-1.18)	-0.082 (-0.61)
Inflation rate (t-1)	-0.011 (-0.33)	0.003 (0.04)	-0.012 (-0.37)	-0.002 (-0.06)	-0.025 (-0.58)	-0.027 (-0.54)	-0.020 (-0.53)	-0.015 (-0.31)
Change in real effective exchange rate (t-1)	-0.011 (-0.91)	-0.0009 (-0.06)	-0.010 (-0.88)	-0.011 (-0.95)	-0.012 (-1.12)	-0.012 (-1.04)	-0.012 (-1.05)	-0.011 (-0.87)
Change in real short term interest rate (t-1)	0.049 (2.17)**		0.049 (2.15)**	0.054 (2.65)**	0.018 (0.45)		0.017 (0.46)	0.031 (0.96)
Change in real long term interest rate (t-1)		-0.029 (-0.79)				-0.036 (-1.03)		
Debt ratio (t-1)			-0.001 (-0.43)				-0.00004 (-0.01)	
Change in debt ratio (t-1)				0.019 (0.88)				0.020 (0.60)
Credit growth (t)	-0.0002 (-0.02)	0.008 (0.91)	0.0003 (0.03)	-0.0004 (-0.04)	0.009 (0.64)	0.014 (0.94)	0.009 (0.61)	0.009 (0.68)
Financial intermediation (t-1)	-0.0003 (-0.13)	0.0004 (0.23)	-0.0003 (-0.12)	-0.0009 (-0.39)	-0.0004 (-0.18)	-0.0004 (-0.18)	-0.0003 (-0.12)	-0.0007 (-0.24)
Change in real share prices (t-1)	-0.005 (-1.98)**	-0.003 (-1.00)	-0.005 (-1.82)*	-0.004 (-1.78)*	-0.008 (-1.48)	-0.011 (-2.26)**	-0.008 (-1.45)	-0.008 (-1.45)
Severe financial crisis (short run)	***0.587 (2.07)****	***0.497 (1.53)***	***0.596 (2.15)****	***0.609 (1.97)****	***0.489 (1.02)***	***0.547 (1.20)***	***0.506 (1.06)***	***0.512 (0.88)***
Severe financial crisis (long run)	***4.314 (1.45)***	***2.393 (1.52)***	***4.497 (1.46)***	***4.815 (1.24)***	***3.249 (0.86)***	***4.186 (1.02)***	***3.299 (0.87)***	***3.477 (0.75)***
Constant	1.795 (1.59)	2.459 (2.30)**	1.818 (1.59)	1.729 (1.47)	1.939 (1.29)	1.687 (1.32)	1.939 (1.25)	1.928 (1.24)

Table 5 (continued)

Obs.	226	226	226	225	226	226	226	225
Wald –Chi2 (df) (p-value)	Wald chi2(8) : 425.85 (0.000)	Wald chi2(8) : 434.65 (0.0000)	Wald chi2(9) : 500.63 (0.000)	Wald chi2(9) : 464.34 (0.000)	Wald chi2(9) : 122.86 (0.000)	Wald chi2(9) : 192.75 (0.0000)	Wald chi2(10) : 265.35 (0.0000)	Wald chi2(10) : 211.99 (0.0000)
Residual's 2nd order AR (p-values)	0.988	0.925	0.989	0.978	0.960	0.964	0.965	0.946
Hansen test of overidentifying restrictions (p-values)	0.396	0.307	0.375	0.382	0.246	0.285	0.262	0.215
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 6: Regulatory capital/risk weighted assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Regulatory capital/risk weighted assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Regulatory capital/risk weighted assets (t-1)	**0**.903 (9.30)***	0.863 (7.21)***	0.908 (9.81)***	0.902 (8.16)***	0.851 (4.38)***	0.883 (5.37)***	0.849 (4.31)***	0.869 (4.54)***
Output gap (t)	-0.157 (-3.09)***	-0.201 (-4.61)***	-0.159 (-3.04)***	-0.158 (-2.75)***	-0.161 (-2.67)***	-0.170 (-3.45)***	-0.162 (-2.64)***	-0.168 (-2.28)**
Inflation rate (t-1)	0.008 (0.17)	0.028 (0.41)	0.006 (0.12)	0.018 (0.35)	0.001 (0.04)	0.0002 (0.00)	0.002 (0.05)	0.002 (0.05)
Change in real effective exchange rate (t-1)	-0.011 (-0.95)	-0.009 (-0.67)	-0.011 (-0.90)	-0.013 (-0.97)	-0.013 (-1.15)	-0.014 (-1.24)	-0.013 (-1.16)	-0.014 (-1.07)

Table 6(continued)

Change in real short term interest rate (t-1)	0.049 (1.33)		0.053 (1.39)	0.052 (1.45)	0.025 (0.46)		0.026 (0.47)	0.035 (0.73)
Change in real long term interest rate (t-1)		-0.058 (-1.31)				-0.050 (-0.90)		
Debt ratio (t-1)			-0.0006 (-0.25)				-0.001 (-0.34)	
Change in debt ratio (t-1)				-0.00006 (-0.00)				0.0005 (0.02)
Credit growth (t)	-0.00007 (-0.01)	0.005 (0.56)	0.0009 (0.07)	0.0004 (0.03)	0.006 (0.42)	0.009 (0.60)	0.006 (0.40)	0.006 (0.45)
Financial intermediation (t-1)	0.0004 (0.19)	0.0004 (0.23)	0.0005 (0.29)	0.0003 (0.16)	0.0004 (0.15)	0.0004 (0.16)	0.0004 (0.16)	0.0004 (0.16)
Change in real share prices (t-1)	-0.003 (-0.91)	-0.004 (-1.35)	-0.003 (-0.82)	-0.002 (-0.69)	-0.005 (-1.24)	-0.007 (-1.64)	-0.005 (-1.22)	-0.005 (-1.28)
Weak financial crisis (short run)	***0.218 (0.80)***	***0.206 (0.78)***	***0.201 (0.73)***	***0.172 (0.56)***	***0.136 (0.48)***	***0.221 (0.91)***	***0.125 (0.45)***	***0.116 (0.40)***
Weak financial crisis (long run)	***2.235 (0.49)***	***1.502 (0.50)***	***2.192 (0.47)***	***1.762 (0.37)***	***0.912 (0.34)***	***1.883 (0.46)***	***0.830 (0.33)***	***0.887 (0.29)***
Constant	1.209 (0.94)	1.566 (1.12)	1.161 (0.88)	1.182 (0.84)	1.755 (0.80)	1.344 (0.74)	1.842 (0.79)	1.551 (0.71)
Obs.	226	226	226	225	226	226	226	225
Wald –Chi2 (df) (p-value)	Wald chi2(8): 372.99 (0.000)	Wald chi2(8): 217.27 (0.000)	Wald chi2(9): 568.30 (0.000)	Wald chi2(9): 398.62 (0.000)	Wald chi2(9): 103.73 (0.000)	Wald chi2(9): 128.79 (0.000)	Wald chi2(10): 161.66 (0.0000)	Wald chi2(10): 153.76 (0.000)
Residual's 2nd order AR (p-values)	0.988	0.990	0.988	0.984	0.988	0.964	0.990	0.978
Hansen test of overidentifying restrictions (p-values)	0.274	0.341	0.266	0.254	0.216	0.294	0.214	0.206
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 7: Capital/Assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable : Capital/Assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Capital/Assets (t-1)	0.128 (0.73)	0.152 (0.84)	0.139 (0.75)	0.147 (0.91)	0.116 (0.80)	0.118 (0.84)	0.139 (0.98)	0.105 (0.83)
Output gap (t)	0.019 (0.34)	0.020 (0.35)	0.008 (0.15)	0.089 (1.00)	-0.021 (-0.31)	-0.025 (-0.42)	-0.029 (-0.42)	0.049 (0.59)
Inflation rate (t-1)	0.037 (0.70)	0.028 (0.59)	0.021 (0.48)	0.034 (0.57)	0.027 (0.46)	0.022 (0.38)	0.011 (0.22)	0.034 (0.52)
Change in real effective exchange rate (t-1)	-0.020 (-1.36)	-0.019 (-1.35)	-0.023 (-1.40)	-0.019 (-1.36)	-0.029 (-1.06)	-0.029 (-1.12)	-0.033 (-1.19)	-0.025 (-1.06)
Change in real short term interest rate (t-1)	0.015 (1.31)		0.011 (0.84)	0.011 (0.89)	-0.007 (-0.37)	0.011 (0.42)	-0.015 (-0.57)	-0.004 (-0.18)
Change in real long term interest rate (t-1)		0.029 (1.32)						
Debt ratio (t-1)			-0.006 (-0.69)				-0.007 (-0.76)	
Change in debt ratio (t-1)				0.045 (1.14)				0.036 (0.81)
Credit growth (t)	0.0004 (0.07)	0.0005 (0.08)	-2.97e-06 (-0.00)	0.0009 (0.16)	0.004 (0.44)	0.004 (0.44)	0.004 (0.43)	0.005 (0.51)
Financial intermediation (t-1)	-0.004 (-0.49)	-0.004 (-0.54)	-0.004 (-0.54)	-0.004 (-0.50)	-0.005 (-0.79)	-0.005 (-0.89)	-0.005 (-0.71)	-0.005 (-0.73)
Change in real share prices (t-1)	-0.002 (-0.60)	-0.001 (-0.29)	-0.002 (-0.45)	-0.003 (-0.78)	-0.002 (-0.60)	-0.002 (-0.44)	-0.002 (-0.47)	-0.003 (-0.91)
Severe financial crisis (short run)	***-0.209 (-1.36)***	***-0.195 (-1.20)***	***-0.224 (-1.30)***	***-0.056 (-0.27)***	***-0.204 (-0.91)***	***-0.236 (-1.09)***	***-0.191 (-0.76)***	***-0.121 (-0.58)***
Severe financial crisis (long run)	***-0.239 (-1.32)***	***-0.229 (-1.22)***	***-0.261 (-1.30)***	***-0.065 (-0.27)***	***-0.230 (-0.90)***	***-0.267 (-1.10)***	***-0.222 (-0.77)***	***-0.136 (-0.57)***
Constant	5.233 (2.93)***	5.158 (2.75)***	5.605 (3.15)***	5.116 (3.10)***	5.569 (3.89)***	5.622 (4.07)***	5.932 (3.78)***	5.643 (4.05)***
Obs.	222	222	222	221	222	222	222	221
Wald –Chi2 (df) (p-value)	Wald chi2(8) :52.62 (0.000)	Wald chi2(8) : 102.76 (0.000)	Wald chi2(9) : 58.37 (0.000)	Wald chi2(9) : 39.55 (0.000)	Wald chi2(9) : 61.71 (0.000)	Wald chi2(9) : 74.63 (0.0000)	Wald chi2(10) : 71.68 (0.0000)	Wald chi2(10) : 62.21 (0.0000)

Table 7 (continued)

Residual's 2nd order AR (p-values)	0.406	0.381	0.408	0.362	0.463	0.451	0.458	0.452
Hansen test of overidentifying restrictions (p-values)	0.554	0.616	0.514	0.605	0.322	0.334	0.276	0.342
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 8: Capital/Assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable : Capital/Assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Capital/Assets (t-1)	**0**.169	0.188	0.191	0.143	0.175	0.188	0.181	0.152
	(0.85)	(1.03)	(0.95)	(0.81)	(1.11)	(1.19)	(1.28)	(1.03)
Output gap (t)	0.023	0.025	0.013	0.083	-0.031	-0.034	-0.038	0.029
	(0.40)	(0.46)	(0.26)	(1.02)	(-0.43)	(-0.55)	(-0.59)	(0.34)
Inflation rate (t-1)	0.040	0.033	0.013	0.031	0.021	0.020	-0.007	0.020
	(0.77)	(0.68)	(0.28)	(0.56)	(0.44)	(0.45)	(-0.15)	(0.37)
Change in real effective exchange rate (t-1)	-0.020	-0.019	-0.023	-0.020	-0.026	-0.026	-0.031	-0.024
	(-1.60)	(-1.58)	(-1.65)	(-1.50)	(-1.15)	(-1.19)	(-1.39)	(-1.16)
Change in real short term interest rate (t-1)	0.011		0.009	0.009	-0.019		-0.024	-0.018
	(0.58)		(0.39)	(0.69)	(-0.74)		(-0.83)	(-0.78)
Change in real long term interest rate (t-1)		0.024				-0.005		
		(1.45)				(-0.16)		
Debt ratio (t-1)			-0.007				-0.007	
			(-0.91)				(-0.88)	
Change in debt ratio (t-1)				0.042				0.029
				(0.99)				(0.70)
Credit growth (t)	0.001	0.001	0.001	0.002	0.005	0.006	0.005	0.006
	(0.20)	(0.18)	(0.14)	(0.27)	(0.47)	(0.49)	(0.44)	(0.53)
Financial intermediation (t-1)	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005	-0.006	-0.005
	(-0.53)	(-0.56)	(-0.62)	(-0.55)	(-0.81)	(-0.84)	(-0.85)	(-0.71)

Table 8 (continued)

Change in real share prices (t-1)	-0.002 (-0.73)	-0.002 (-0.51)	-0.002 (-0.59)	-0.002 (-0.80)	-0.001 (-0.28)	-0.0007 (-0.19)	-0.0007 (-0.20)	-0.002 (-0.51)
Weak financial crisis (short run)	***-0.121 (-0.72)***	***-0.139 (-1.07)***	***-0.131 (-0.79)***	***-0.043 (-0.27)***	***-0.006 (-0.04)***	***-0.031 (-0.21)***	***-0.023 (-0.16)***	***0.041 (0.24)***
Weak financial crisis (long run)	***-0.145 (-0.62)***	***-0.171 (-0.88)***	***-0.162 (-0.67)***	***-0.050 (-0.26)***	***-0.008 (-0.04)***	***-0.039 (-0.20)***	***-0.028 (-0.16)***	***0.048 (0.25)***
Constant	5.0619 (2.68)***	5.012 (2.59)***	5.458 (2.98)***	5.152 (3.23)***	5.180 (3.69)***	5.127 (3.64)***	5.786 (3.70)***	5.313 (3.80)***
Obs.	222	222	222	221	222	222	222	221
Wald –Chi2 (df) (p-value)	Wald chi2(8): 74.58 (0.000)	Wald chi2(8): 94.30 (0.000)	Wald chi2(9): 112.81 (0.000)	Wald chi2(9): 30.39 (0.000)	Wald chi2(9): 69.19 (0.0000)	Wald chi2(9): 85.00 (0.0000)	Wald chi2(10): 86.91 (0.0000)	Wald chi2(10): 57.47 (0.0000)
Residual's 2nd order AR (p-values)	0.404	0.377	0.392	0.389	0.447	0.429	0.447	0.444
Hansen test of overidentifying restrictions (p-values)	0.549	0.636	0.529	0.546	0.296	0.307	0.263	0.305
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample orrection have been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 9: Non performing loans to total loans –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Non performing loans to total loans	Transformation: first differencing				Transformation: forward orthogonal deviations			
Nonperforming loans to total loans (t-1)	0.838 (15.11)***	0.819 (14.10)***	0.883 (12.37)***	0.848 (14.59)***	0.866 (14.85)***	0.878 (13.89)***	0.887 (13.33)***	0.875 (11.98)***
Output gap (t)	-0.147 (-2.18)**	-0.121 (-2.12)**	-0.151 (-2.00)**	-0.129 (-1.96)*	-0.118 (-1.94)*	-0.103 (-1.94)*	-0.121 (-2.07)**	-0.119 (-1.81)*
Inflation rate (t-1)	0.002 (0.10)	-0.005 (-0.30)	0.009 (0.61)	0.003 (0.21)	0.0004 (0.02)	-0.007 (-0.24)	0.003 (0.08)	0.001 (0.04)
Unemployment rate (t-1)	0.003 (0.09)	0.011 (0.37)	-0.012 (-0.66)	-0.002 (-0.09)	0.0006 (0.03)	0.002 (0.09)	-0.005 (-0.24)	-0.001 (-0.06)
Change in real effective exchange rate (t-1)	-0.008 (-1.07)	-0.008 (-0.94)	-0.006 (-0.76)	-0.009 (-1.25)	-0.009 (-0.86)	-0.007 (-0.63)	-0.009 (-0.84)	-0.009 (-0.84)
Change in real short term interest rate (t-1)	0.083 (3.60)***		0.092 (3.85)***	0.090 (3.58)***	0.096 (3.45)***		0.099 (3.47)***	0.099 (3.74)***
Change in real long term interest rate (t-1)		0.084 (3.17)***				0.097 (3.41)***		
Debt ratio (t-1)			0.002 (0.34)				0.0009 (0.18)	
Change in debt ratio (t-1)				0.002 (0.08)				-0.001 (-0.05)
Credit growth (t)	-0.0007 (-0.08)	0.002 (0.26)	-0.002 (-0.22)	-0.003 (-0.31)	0.002 (0.20)	0.006 (0.67)	0.002 (0.23)	0.002 (0.23)
Financial intermediation (t-1)	0.001 (0.53)	0.001 (0.71)	0.0009 (0.47)	0.0009 (0.40)	0.003 (1.17)	0.003 (1.49)	0.003 (1.23)	0.003 (1.17)
Severe financial crisis (short run)	***0.486 (3.14)****	***0.591 (3.73)****	***0.540 (3.50)****	***0.502 (3.31)****	***0.465 (2.30)****	***0.548 (2.77)****	***0.460 (2.28)****	***0.463 (2.24)****
Severe financial crisis (long run)	***2.989 (1.95)****	***3.263 (2.08)****	***4.604 (1.36)***	***3.310 (1.92)****	***3.475 (1.73)****	***4.499 (1.64)***	***4.063 (1.48)***	***3.695 (1.66)****
Constant	0.147 (0.41)	0.090 (0.24)	0.025 (0.07)	0.190 (0.58)	-0.153 (-0.44)	-0.264 (-0.78)	-0.261 (-0.75)	-0.179 (-0.46)
Obs.	223	223	223	222	223	223	223	222

Table 9 (Continued)

Wald –Chi2 (df) (p-value)	Wald chi2(8) : 704.73 (0.000)	Wald chi2(8) : 522.65 (0.000)	Wald chi2(9) : 1296.16 (0.000)	Wald chi2(9) : 904.15 (0.000)	Wald chi2(9) : 616.43 (0.000)	Wald chi2(9) : 560.18 (0.000)	Wald chi2(10) : 873.12 (0.000)	Wald chi2(10) : 1191.50 (0.000)
Residual's 2nd order AR (p-values)	0.178	0.155	0.168	0.255	0.189	0.124	0.180	0.233
Hansen test of overidentifying restrictions (p-values)	0.293	0.346	0.220	0.281	0.270	0.278	0.246	0.259
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 10: Non performing loans to total loans –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Non performing loans to total loans	Transformation: first differencing				Transformation: forward orthogonal deviations			
Nonperforming loans to total loans (t-1)	0.777 (16.68)***	0.757 (14.48)***	0.818 (13.03)***	0.759 (13.13)***	0.845 (12.91)***	0.839 (12.37)***	0.869 (12.79)***	0.877 (11.38)***
Output gap (t)	-0.125 (-1.53)	-0.122 (-1.75)*	-0.158 (-1.73)*	-0.135 (-1.58)	-0.156 (-1.86)*	-0.157 (-1.87)*	-0.152 (-1.92)*	-0.187 (-1.73)*
Inflation rate (t-1)	0.014 (0.73)	0.011 (0.51)	0.025 (0.99)	0.012 (0.57)	0.006 (0.20)	0.004 (0.18)	0.0009 (0.03)	0.007 (0.20)
Unemployment rate (t-1)	0.024 (0.78)	0.034 (0.84)	0.003 (0.12)	0.026 (0.74)	0.010 (0.36)	0.017 (0.56)	0.012 (0.46)	0.002 (0.08)
Change in real effective exchange rate (t-1)	-0.009 (-1.00)	-0.011 (-1.00)	-0.007 (-0.62)	-0.008 (-0.86)	-0.014 (-1.08)	-0.012 (-0.89)	-0.013 (-1.05)	-0.016 (-1.05)
Change in real short term interest rate (t-1)	0.074 (2.19)**		0.091 (2.80)***	0.084 (2.48)**	0.096 (2.45)**		0.097 (2.58)**	0.103 (2.45)**

Table 10 (Continued)

Change in real long term interest rate (t-1)		0.069 (2.09)**				0.081 (2.06)**		
Debt ratio (t-1)			0.005 (0.62)				-0.002 (-0.33)	
Change in debt ratio (t-1)				0.014 (0.51)				-0.017 (-0.51)
Credit growth (t)	-0.003 (-0.36)	-0.001 (-0.14)	-0.003 (-0.38)	-0.006 (-0.57)	-0.001 (-0.10)	0.003 (0.30)	-0.002 (-0.16)	-0.0001 (-0.02)
Financial intermediation (t-1)	0.002 (0.92)	0.003 (1.08)	0.001 (0.64)	0.001 (0.44)	0.004 (1.35)	0.005 (1.65)*	0.004 (1.41)	0.005 (1.61)
Weak financial crisis (short run)	***0.188 (1.55)***	***0.194 (2.14)****	***0.144 (1.05)***	***0.145 (1.00)***	***0.129 (0.85)***	***0.151 (0.98)***	***0.137 (0.96)***	***0.083 (0.43)***
Weak financial crisis (long run)	***0.844 (1.55)***	***0.798 (1.85)****	***0.794 (0.99)***	***0.604 (1.09)***	***0.836 (0.83)***	***0.936 (0.94)***	***1.049 (0.82)***	***0.673 (0.45)***
Constant	-0.016 (-0.03)	-0.120 (-0.22)	-0.172 (-0.38)	0.212 (0.38)	-0.294 (-0.52)	-0.423 (-0.79)	-0.235 (-0.44)	-0.352 (-0.67)
Obs.	223	223	223	222	223	223	223	222
Wald –Chi2 (df) (p-value)	Wald chi2(8) : 519.99 (0.0000)	Wald chi2(8) : 388.89 (0.0000)	Wald chi2(9) : 1018.10 (0.0000)	Wald chi2(9) : 655.53 (0.0000)	Wald chi2(9) : 449.48 (0.0000)	Wald chi2(9) : 448.56 (0.0000)	Wald chi2(10) : 924.24 (0.0000)	Wald chi2(10) : 800.85 (0.000)
Residual's 2nd order AR (p-values)	0.404	0.418	0.316	0.392	0.248	0.227	0.234	0.370
Hansen test of overidentifying restrictions (p-values)	0.388	0.295	0.195	0.259	0.153	0.152	0.171	0.137
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 11: Provisions to non performing loans –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable : Provisions to non performing loans	Transformation: first differencing				Transformation: forward orthogonal deviations			
Provisions to non performing loans (t-1)	0.992 (8.69)***	1.002 (8.49)***	0.999 (9.48)***	0.984 (8.31)***	0.877 (11.05)***	0.889 (14.99)***	0.886 (10.04)***	0.894 (10.98)***
Output gap (t)	-1.657 (-1.83)*	-1.628 (-1.83)*	-1.626 (-1.74)*	-1.377 (-1.20)	-0.598 (-0.58)	0.095 (0.07)	-0.649 (-0.61)	-1.518 (-1.62)
Inflation rate (t-1)	-0.911 (-2.25)**	-0.906 (-2.39)**	-0.894 (-2.00)**	-1.022 (-2.79)***	-0.695 (-0.60)	-1.232 (-0.98)	-0.947 (-0.74)	-1.001 (-1.23)
Unemployment rate (t-1)	-0.268 (-0.62)	-0.266 (-0.55)	-0.226 (-0.58)	-0.256 (-0.57)	0.163 (0.21)	2.026 (1.19)	0.316 (0.40)	0.063 (0.08)
Change in real effective exchange rate (t-1)	-0.277 (-2.19)**	-0.256 (-2.51)**	-0.272 (-2.13)**	-0.222 (-2.04)**	-0.087 (-0.29)	0.039 (0.17)	-0.140 (-0.62)	-0.141 (-0.58)
Change in real short term interest rate (t-1)	-0.219 (-0.50)		-0.203 (-0.45)	-0.204 (-0.37)	0.354 (0.24)	0.545 (0.68)	0.216 (0.15)	-0.153 (-0.12)
Change in real long term interest rate (t-1)		-0.047 (-0.05)						
Debt ratio (t-1)			0.008 (0.15)				-0.052 (-0.48)	
Change in debt ratio (t-1)				0.187 (0.43)				-0.371 (-0.81)
Credit growth (t)	-0.307 (-1.29)	-0.321 (-1.78)*	-0.312 (-1.30)	-0.287 (-1.09)	-0.312 (-1.32)	-0.343 (-1.45)	-0.319 (-1.35)	-0.298 (-1.29)
Financial intermediation (t-1)	-0.095 (-2.18)**	-0.094 (-2.26)**	-0.087 (-1.79)*	-0.097 (-1.90)*	-0.069 (-1.72)*	-0.081 (-1.93)*	-0.071 (-1.82)*	-0.051 (-1.35)
Severe financial crisis (short run)	***-12.337 (-1.70)****	***-12.294 (-1.72)****	***-12.260 (-1.66)***	***-12.033 (-1.59)***	***-15.196 (-2.12)*****	***-18.829 (-3.10)******	***-14.106 (-2.03)*****	***-14.796 (-1.94)****
Severe financial crisis (long run)	***-1559.27 (-0.07)***	***6465.947 (0.02)***	***-33141.56 (-0.00)***	***-756.819 (-0.13)***	***-123.3674 (-1.31)***	***-169.621 (-1.54)***	***-123.622 (-1.07)***	***-139.703 (-1.13)***
Constant	21.091 (1.97)**	20.344 (1.78)*	19.003 (2.02)**	21.785 (1.97)*	23.785 (2.55)**	24.049 (2.41)**	26.595 (2.05)**	21.013 (2.56)**
Obs.	184	184	184	183	184	184	184	183

Table 11 (Continued)

Wald –Chi2 (df) (p-value)	Wald chi2(8) : 196.52 (0.000)	Wald chi2(8) : 221.79 (0.0000)	Wald chi2(9) : 305.87 (0.000)	Wald chi2(9): 209.10 (0.000)	Wald chi2(9) : 600.10 (0.000)	Wald chi2(9) : 759.74 (0.0000)	Wald chi2(10) : 573.46 (0.0000)	Wald chi2(10) : 494.65 (0.0000)
Residual's 2nd order AR (p-values)	0.165	0.159	0.161	0.161	0.143	0.111	0.146	0.190
Hansen test of overidentifying restrictions (p-values)	0.501	0.501	0.491	0.423	0.300	0.430	0.313	0.320
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 12: Provisions to non performing loans –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable : Provisions to non performing loans	Transformation: first differencing				Transformation: forward orthogonal deviations			
Provisions to non performing loans (t-1)	1.017 (7.37)***	1.034 (7.23)***	1.018 (7.99)***	1.009 (7.13)***	0.878 (9.76)***	0.872 (9.97)***	0.881 (10.11)***	0.899 (9.65)***
Output gap (t)	-1.525 (-2.02)**	-1.472 (-2.18)**	-1.516 (-2.00)**	-0.682 (-0.65)	-0.439 (-0.49)	0.164 (0.11)	-0.429 (-0.49)	-0.124 (-0.10)
Inflation rate (t-1)	-1.099 (-1.63)	-1.129 (-1.86)*	-1.035 (-1.53)	-1.186 (-1.85)*	-0.685 (-0.65)	-0.589 (-0.57)	-0.819 (-0.65)	-1.012 (-1.03)
Unemployment rate (t-1)	-0.459 (-1.08)	-0.423 (-0.84)	-0.490 (-1.81)*	-0.471 (-1.22)	-0.139 (-0.19)	-0.068 (-0.08)	-0.034 (-0.05)	-0.236 (-0.30)
Change in real effective exchange rate (t-1)	-0.246 (-1.30)	-0.225 (-1.35)	-0.235 (-1.24)	-0.213 (-1.17)	-0.164 (-0.71)	-0.145 (-0.62)	-0.175 (-0.87)	-0.089 (-0.37)
Change in real short term interest rate (t-1)	-0.521 (-1.20)		-0.523 (-1.21)	-0.509 (-0.94)	-0.794 (-0.52)		-0.809 (-0.55)	-0.967 (-0.73)

Table 12 (Continued)

Change in real long term interest rate (t-1)		-0.228 (-0.26)				0.705 (0.31)		
Debt ratio (t-1)			0.015 (0.29)				-0.032 (-0.34)	
Change in debt ratio (t-1)				0.463 (1.20)				0.248 (0.55)
Credit growth (t)	-0.176 (-0.64)	-0.192 (-0.87)	-0.178 (-0.67)	-0.208 (-0.65)	-0.173 (-0.95)	-0.328 (-2.05)**	-0.169 (-0.90)	-0.157 (-0.76)
Financial intermediation (t-1)	-0.111 (-2.45)**	-0.109 (-2.35)**	-0.110 (-2.35)**	-0.122 (-2.43)**	-0.074 (-1.77)*	-0.090 (-2.17)**	-0.072 (-1.88)*	-0.079 (-1.75)*
Weak financial crisis (short run)	***-5.591 (-1.97)****	***-5.616 (-2.00)****	***-5.585 (-1.99)****	***-4.559 (-1.69)****	***-3.555 (-0.68)***	***-6.396 (-1.38)***	***-3.344 (-0.67)***	***-2.749 (-0.51)***
Weak financial crisis (long run)	***321.478 (0.12)***	***166.434 (0.23)***	***310.623 (0.14)***	***487.609 (0.07)***	***-29.193 (-0.84)***	***-49.824 (-1.28)***	***-28.043 (-0.81)***	***-27.120 (-0.65)***
Constant	22.320 (1.67)*	20.753 (1.48)	21.222 (1.52)	24.264 (2.08)**	23.478 (1.87)*	27.706 (2.53)**	24.840 (1.76)*	23.524 (1.82)*
Obs.	184	184	184	183	184	184	184	183
Wald –Chi2 (df) (p-value)	Wald chi2(8) : 451.53 (0.000)	Wald chi2(8) : 454.64 (0.0000)	Wald chi2(9) : 522.19 (0.0000)	Wald chi2(9) : 389.62 (0.0000)	Wald chi2(9) : 562.36 (0.000)	Wald chi2(9) : 481.27 (0.0000)	Wald chi2(10) : 510.03 (0.000)	Wald chi2(10) : 656.49 (0.0000)
Residual's 2nd order AR (p-values)	0.180	0.173	0.178	0.157	0.172	0.142	0.173	0.174
Hansen test of overidentifying restrictions (p-values)	0.525	0.556	0.533	0.439	0.385	0.381	0.384	0.372
No of instruments	19	19	20	20	19	19	20	20

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-3 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable.

Table 13: Returns on assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Returns on assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Returns on assets (t-1)	0.597 (3.10)***	0.592 (2.84)***	0.703 (2.71)***	0.566 (2.55)**	0.419 (2.83)***	0.417 (3.03)***	0.449 (2.16)**	0.469 (2.15)**
Output gap (t)	-0.007 (-0.27)	-0.008 (-0.30)	-0.024 (-0.90)	0.0004 (0.01)	-0.019 (-0.55)	-0.026 (-0.98)	-0.021 (-0.47)	-0.019 (-0.70)
Inflation rate (t-1)	-0.007 (-0.29)	-0.008 (-0.33)	0.005 (0.16)	-0.008 (-0.39)	0.030 (1.13)	0.029 (1.21)	0.022 (0.73)	0.019 (0.76)
Change in real effective exchange rate (t-1)	0.006 (1.26)	0.004 (0.74)	0.004 (0.87)	0.005 (0.91)	0.0002 (0.03)	-0.0004 (-0.07)	-0.0002 (-0.02)	0.001 (0.22)
Change in real short term interest rate (t-1)	-0.006 (-0.39)		-0.003 (-0.17)	-0.005 (-0.26)	-0.027 (-1.91)*		-0.026 (-1.38)	-0.024 (-1.69)*
Change in real long term interest rate (t-1)		-0.014 (-0.86)				-0.029 (-2.67)**		
Debt ratio (t-1)			0.001 (0.33)				-0.001 (-0.54)	
Change in debt ratio (t-1)				0.004 (0.23)				0.002 (0.16)
Credit growth (t)	-0.004 (-1.80)*	-0.004 (-1.58)	-0.003 (-1.00)	-0.004 (-1.27)	-0.005 (-2.11)**	-0.005 (-2.42)**	-0.004 (-1.84)*	-0.005 (-2.26)**
Financial intermediation (t-1)	-0.001 (-0.64)	-0.001 (-0.55)	0.00007 (0.02)	-0.001 (-0.50)	-0.002 (-1.30)	-0.002 (-1.43)	-0.002 (-1.08)	-0.002 (-1.45)
Severe financial crisis (short run)	***-0.360 (-4.84)******	***-0.339 (-4.01)******	***-0.428 (-4.59)******	***-0.395 (-3.20)******	***-0.419 (-3.94)******	***-0.432 (-4.97)******	***-0.452 (-3.32)******	***-0.405 (-4.06)******
Severe financial crisis (long run)	***-0.895 (-1.87)****	***-0.833 (-1.87)****	***-1.442 (-1.03)***	***-0.906 (-2.11)*****	***-0.722 (-3.49)******	***-0.742 (-4.09)******	***-0.822 (-2.62)******	***-0.762 (-2.43)*****
Capital/assets (t)	0.128 (2.22)**	0.147 (1.96)*	0.049 (0.69)	0.084 (1.20)	-0.007 (-0.07)	-0.008 (-0.08)	-0.035 (-0.27)	-0.003 (-0.04)
Non performing loans to total loans (t)	-0.029 (-0.39)	-0.035 (-0.42)	-0.019 (-0.24)	-0.011 (-0.10)	-0.056 (-1.16)	-0.063 (-1.42)	-0.044 (-1.04)	-0.059 (-1.12)
Constant	-0.198 (-0.30)	-0.279 (-0.33)	-0.139 (-0.21)	0.026 (0.04)	0.881 (1.06)	0.890 (1.14)	1.112 (0.99)	0.855 (1.12)
Obs.	224	224	224	223	224	224	224	223
Wald –Chi2 (df) (p-value)	Wald chi2(9) : 440.49 (0.000)	Wald chi2(9) : 256.74 (0.000)	Wald chi2(10) : 397.79 (0.000)	Wald chi2(10) : 189.80 (0.000)	Wald chi2(10) : 257.14 (0.000)	Wald chi2(10) : 495.43 (0.000)	Wald chi2(11) : 370.23 (0.000)	Wald chi2(11) : 226.72 (0.000)

Table 13 (Continued)

Residual's 2nd order AR (p-values)	0.221	0.323	0.187	0.182	0.227	0.282	0.294	0.214
Hansen test of overidentifying restrictions (p-values)	0.577	0.355	0.505	0.520	0.555	0.787	0.654	0.518
No of instruments	21	21	22	22	21	21	22	22

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-2 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable and the lagged values of capital-to-assets and non-performing loans to total loans ratios.

Table 14: Returns on assets –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Returns on assets	Transformation: first differencing				Transformation: forward orthogonal deviations			
Returns on assets (t-1)	0.444 (4.66)***	0.501 (2.77)***	0.460 (3.09)***	0.445 (3.17)***	0.485 (3.99)***	0.501 (5.33)***	0.524 (3.21)***	0.474 (2.78)***
Output gap (t)	0.003 (0.14)	0.008 (0.27)	0.009 (0.40)	0.009 (0.44)	-0.0003 (-0.01)	0.0006 (0.02)	-0.011 (-0.36)	-0.011 (-0.38)
Inflation rate (t-1)	0.034 (1.15)	0.017 (0.67)	0.029 (0.89)	0.033 (1.07)	0.023 (0.57)	0.022 (0.66)	0.018 (0.49)	0.027 (0.70)
Change in real effective exchange rate (t-1)	0.002 (0.33)	0.0005 (0.08)	0.005 (0.79)	0.002 (0.48)	0.007 (1.15)	0.007 (1.46)	0.007 (1.22)	0.004 (0.83)
Change in real short term interest rate (t-1)	-0.008 (-0.40)		-0.006 (-0.33)	-0.008 (-0.40)	-0.010 (-0.43)		-0.011 (-0.52)	-0.017 (-0.78)
Change in real long term interest rate (t-1)		0.006 (0.26)				-0.005 (-0.41)		
Debt ratio (t-1)			-0.0008 (-0.29)				0.0009 (0.23)	
Change in debt ratio (t-1)				0.003 (0.22)				-0.004 (-0.21)
Credit growth (t)	-0.002 (-0.71)	-0.002 (-0.64)	-0.001 (-0.80)	-0.002 (-0.71)	-0.0005 (-0.18)	-0.001 (-0.42)	-0.0009 (-0.43)	-0.0009 (-0.31)
Financial intermediation (t-1)	-0.001 (-0.56)	-0.001 (-0.45)	-0.0007 (-0.75)	-0.001 (-0.62)	0.0005 (0.25)	0.0002 (0.11)	0.0003 (0.11)	-0.0002 (-0.08)

Table 14 (Continued)

Weak financial crisis (short run)	***-0.266 (-6.44)******	***-0.275 (-4.91)******	***-0.260 (-4.91)******	***-0.258 (-4.94)******	***-0.248 (-3.69)******	***-0.247 (-5.00)******	***-0.238 (-3.30)******	***-0.242 (-2.65)******
Weak financial crisis (long run)	***-0.478 (-4.28)******	***-0.551 (-2.01)****	***-0.482 (-2.81)******	***-0.466 (-2.77)******	***-0.481 (-2.24)****	***-0.494 (-3.11)******	***-0.501 (-1.83)****	***-0.459 (-1.57)***
Capital/assets (t)	0.080 (0.57)	0.077 (0.67)	0.139 (1.12)	0.090 (0.82)	0.286 (1.76)*	0.266 (1.75)*	0.289 (2.23)**	0.224 (1.53)
Non performing loans to total loans (t)	-0.001 (-0.01)	0.016 (0.17)	0.002 (0.04)	0.003 (0.04)	-0.002 (-0.05)	-0.003 (-0.08)	-0.023 (-0.46)	-0.019 (-0.27)
Constant	0.061 (0.05)	0.020 (0.02)	-0.289 (-0.32)	-0.0009 (-0.00)	-1.301 (-1.09)	-1.158 (-1.03)	-1.304 (-1.16)	-0.814 (-0.67)
Obs.	224	224	224	223	224	224	224	223
Wald –Chi2 (df) (p-value)	Wald chi2(9): 212.15 (0.000)	Wald chi2(9): 187.81 (0.000)	Wald chi2(10): 435.91 (0.000)	Wald chi2(10): 295.26 (0.000)	Wald chi2(10): 298.72 (0.000)	Wald chi2(10): 173.99 (0.000)	Wald chi2(11): 622.16 (0.000)	Wald chi2(11): 185.06 (0.000)
Residual's 2nd order AR (p-values)	0.307	0.304	0.378	0.305	0.896	0.803	0.900	0.743
Hansen test of overidentifying restrictions (p-values)	0.725	0.753	0.622	0.724	0.743	0.728	0.791	0.713
No of instruments	21	21	22	22	21	21	22	22

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-2 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable and the lagged values of capital-to-assets and non-performing loans to total loans ratios.

Table 15: Returns on equity –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Returns on equity	Transformation: first differencing				Transformation: forward orthogonal deviations			
Returns on equity (t-1)	0.504 (2.76)***	0.535 (3.29)***	0.497 (2.13)**	0.638 (3.30)***	0.418 (2.83)***	0.453 (3.38)***	0.507 (3.31)***	0.436 (2.64)**
Output gap (t)	0.027 (0.05)	-0.332 (-0.65)	0.021 (0.02)	0.326 (0.75)	-0.128 (-0.25)	-0.296 (-0.80)	-0.199 (-0.40)	-0.479 (-1.17)
Inflation rate (t-1)	0.153 (0.50)	0.151 (0.50)	0.312 (0.44)	0.369 (0.88)	0.569 (0.86)	0.234 (0.37)	0.777 (1.08)	0.281 (0.56)
Change in real effective exchange rate (t-1)	0.122 (1.44)	0.115 (1.50)	0.127 (0.95)	0.149 (1.90)*	0.161 (2.13)**	0.193 (3.29)***	0.245 (2.56)**	0.096 (0.79)
Change in real short term interest rate (t-1)	-0.319 (-0.91)		-0.356 (-0.95)	-0.468 (-2.00)**	-0.672 (-2.73)***		-0.757 (-2.85)***	-0.825 (-3.32)***
Change in real long term interest rate (t-1)		-0.377 (-1.49)				-0.747 (-3.60)***		
Debt ratio (t-1)			-0.008 (-0.09)				0.011 (0.24)	
Change in debt ratio (t-1)				0.231 (0.96)				-0.109 (-0.37)
Credit growth (t)	-0.078 (-1.60)	-0.086 (-1.60)	-0.080 (-1.60)	-0.055 (-0.98)	-0.074 (-1.30)	-0.089 (-1.87)*	-0.066 (-1.27)	-0.087 (-2.14)**
Financial intermediation (t-1)	-0.021 (-0.44)	-0.021 (-0.67)	-0.017 (-0.23)	-0.025 (-0.78)	-0.026 (-0.83)	-0.029 (-1.09)	-0.028 (-0.84)	-0.047 (-1.55)
Severe financial crisis (short run)	***-6.892 (-3.77)******	***-7.025 (-5.30)******	***-6.947 (-3.18)******	***-2.657 (-1.06)***	***-6.871 (-3.58)******	***-5.915 (-3.93)******	***-4.849 (-2.49)****	***-6.178 (-2.88)******
Severe financial crisis (long run)	***-13.908 (-2.59)****	***-15.107 (-2.94)******	***-13.809 (-2.52)****	***-7.336 (-1.39)***	***-11.809 (-3.35)******	***-10.803 (-3.39)******	***-9.834 (-2.70)******	***-10.95611 (-3.15)******
Capital/assets (t)	1.303 (0.54)	1.753 (0.98)	1.592 (0.55)	-0.213 (-0.15)	0.924 (0.36)	2.359 (1.14)	1.767 (0.71)	0.054 (0.02)
Non performing loans to total loans (t)	-0.206 (-0.15)	-0.464 (-0.39)	-0.432 (-0.25)	0.152 (0.10)	-0.816 (-1.02)	-1.269 (-1.63)	-0.894 (-1.11)	-1.257 (-1.19)
Constant	2.163 (0.11)	-0.117 (-0.01)	0.816 (0.03)	7.648 (0.92)	6.933 (0.42)	0.245 (0.02)	-0.387 (-0.02)	15.797 (0.80)
Obs.	224	224	224	223	224	224	224	223

Table 15: (Continued)

Wald –Chi2 (df) (p-value)	Wald chi2(9) : 213.28 (0.000)	Wald chi2(9) : 212.99 (0.000)	Wald chi2(10) : 227.51 (0.000)	Wald chi2(10) : 542.73 (0.000)	Wald chi2(10) : 267.35 (0.000)	Wald chi2(10) : 247.14 (0.000)	Wald chi2(11): 194.55 (0.000)	Wald chi2(11) : 282.07 (0.000)
Residual's 2nd order AR (p-values)	0.131	0.187	0.156	0.097	0.153	0.269	0.157	0.187
Hansen test of overidentifying restrictions (p-values)	0.339	0.448	0.357	0.726	0.312	0.469	0.623	0.395
No of instruments	21	21	22	22	21	21	22	22

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-2 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable and the lagged values of capital-to-assets and non-performing loans to total loans ratios.

Table 16: Returns on equity –two step system GMM estimations

	1	2	3	4	5	6	7	8
Dependent variable :Returns on equity	Transformation: first differencing				Transformation: forward orthogonal deviations			
Returns on equity (t-1)	0.500 (4.75)***	0.535 (4.99)***	0.525 (4.84)***	0.519 (4.49)***	0.470 (5.01)***	0.471 (4.73)***	0.513 (4.27)***	0.380 (3.13)***
Output gap (t)	-0.026 (-0.07)	0.021 (0.06)	-0.113 (-0.33)	0.145 (0.38)	0.081 (0.15)	0.149 (0.31)	-0.114 (-0.18)	0.129 (0.38)
Inflation rate (t-1)	0.618 (1.47)	0.529 (1.35)	0.617 (1.15)	0.576 (1.22)	0.655 (0.78)	0.368 (0.73)	0.706 (0.66)	0.413 (0.67)
Change in real effective exchange rate (t-1)	0.078 (0.89)	0.068 (0.90)	0.093 (1.11)	0.081 (1.00)	0.191 (0.91)	0.249 (2.72)***	0.236 (1.81)*	0.235 (3.26)***
Change in real short term interest rate (t-1)	-0.339 (-1.08)		-0.380 (-1.87)*	-0.321 (-1.22)	-0.344 (-0.83)		-0.457 (-1.28)	0.056 (0.11)
Change in real long term interest rate (t-1)		-0.247 (-0.91)				-0.169 (-0.59)		
Debt ratio (t-1)			0.002 (0.05)				0.028 (0.55)	
Change in debt ratio (t-1)				0.205 (1.11)				-0.032 (-0.20)
Credit growth (t)	-0.049 (-0.98)	-0.056 (-0.83)	-0.053 (-1.24)	-0.057 (-0.96)	-0.011 (-0.26)	-0.026 (-0.68)	-0.006 (-0.15)	0.009 (0.16)

Table 16: (Continued)

Financial intermediation (t-1)	-0.040 (-1.65)	-0.038 (-1.37)	-0.037 (-2.08)**	-0.042 (-2.24)**	-0.019 (-0.53)	-0.017 (-0.63)	-0.004 (-0.08)	-0.017 (-0.74)
Weak financial crisis (short run)	***-4.909 (-5.85)******	***-4.948 (-5.68)******	***-4.777 (-4.21)******	***-4.672 (-4.05)******	***-5.024 (-5.43)******	***-4.806 (-9.14)******	***-4.695 (-4.13)******	***-7.441 (-2.72)******
Weak financial crisis (long run)	***-9.822 (-4.14)******	***-10.652 (-4.74)******	***-10.048 (-3.48)******	***-9.711 (-3.30)******	***-9.485 (-3.55)******	***-9.078 (-4.48)******	***-9.636 (-2.55)****	***-12.009 (-3.64)******
Capital/assets (t)	-0.157 (-0.10)	0.346 (0.30)	0.448 (0.27)	-0.106 (-0.08)	2.267 (0.53)	3.227 (1.21)	3.638 (0.84)	3.059 (2.48)**
Non performing loans to total loans (t)	-0.229 (-0.19)	-0.036 (-0.03)	-0.645 (-0.60)	-0.242 (-0.20)	-0.080 (-0.13)	-0.139 (-0.22)	-0.502 (-0.76)	-0.060 (-0.11)
Constant	12.849 (0.91)	8.871 (0.85)	9.424 (0.64)	12.699 (1.14)	-4.096 (-0.14)	-9.535 (-0.52)	-15.268 (-0.54)	-6.917 (-0.72)
Obs.	224	224	224	223	224	224	224	223
Wald –Chi2 (df) (p-value)	Wald chi2(9): 542.84 (0.000)	Wald chi2(9): 1117.82 (0.000)	Wald chi2(10): 752.04 (0.000)	Wald chi2(10): 391.29 (0.000)	Wald chi2(10): 392.45 (0.000)	Wald chi2(10): 386.06 (0.000)	Wald chi2(11): 319.59 (0.000)	Wald chi2(11): 683.76 (0.000)
Residual's 2nd order AR (p-values)	0.078	0.111	0.100	0.072	0.382	0.463	0.593	0.441
Hansen test of overidentifying restrictions (p-values)	0.645	0.615	0.657	0.708	0.643	0.763	0.683	**0.889**
No of instruments	21	21	22	22	21	21	22	22

Notes: z-statistics in parenthesis, standard errors are robust in the presence of any pattern of heteroskedasticity and autocorrelation within panels; the Windmeijer finite-sample correction has been used. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Estimators used: Two step system GMM; see Arelano and Bond 1991, Arellano and Bover, 1995; Blundell and Bond (1998) and Roodman (2009a, 2009b). To remove fixed effects we use both first differencing transformation (columns 1-4) and forward orthogonal deviations transformation (columns 5-8); forward orthogonal deviations perform better in unbalanced panels. In system GMM with orthogonal deviations, the levels, or untransformed, equation is still instrumented with differences. A collapsed subset of the available instrument matrix was used: namely the t-1 to t-2 lags of the lagged output gap, the lagged credit growth, and the lagged dependent variable and the lagged values of capital-to-assets and non-performing loans to total loans ratios.

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