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# Have more strictly regulated banking systems fared better during the recent financial crisis?

by  
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We assess whether during the recent financial crisis banking systems in countries with more stringent prudential banking regulation have proved more stable. We find indicators of regulatory strength to be relatively well correlated with the extent to which countries have escaped damage during the recent crisis, as measured either by the degree of equity value destruction in the banking sector or by the fiscal cost of financial sector rescue.

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*Keywords:* Prudential regulation; banking; stability; financial crisis; crisis cost; banking sector bail-out; banking share prices.

## 1. Introduction

If stability-oriented policies for the banking sector are effective, more stringent prudential banking regulation should, in principle, lead to more stable banking systems. The recent financial crisis provides one obvious opportunity for assessing whether this holds in practice. Among the features of the crisis likely to be remembered are the massive destruction of banking equity value and the substantial amounts of public funds that governments put up to banks' rescue. As countries differ significantly with respect to both the magnitude of share price declines and the size of the rescue packages, we exploit this variation to investigate the evidence of an empirical link between the severity of the crisis and prudential regulation. For measuring the strength of prudential regulation, we rely on a new set of policy indicators covering eight distinct areas of banking regulation.

## 2. Prudential regulation indicators

We have constructed indicators of banking regulation for 40 countries, including all OECD countries, drawing on pre-crisis information on regulatory policies assembled by the World Bank.<sup>2</sup> The indicators are

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  2. The World Bank surveys, which constitute the by far largest part of the underlying information set, were released in 2007, 2003 and 2001, and cover the periods 2005/2006, 2001/2002 and 1998/2000, respectively. The last update of the panel database was published in June 2008. The information used in the construction of the indicators was subsequently verified and corrected by OECD member countries, thus improving the reliability of the available information.

based on answers to over 100 individual questions which have been categorised into eight subject areas: Capital Requirements, Liquidity and Diversification Requirements, Accounting and Provisioning Requirements, External Auditing and Information Disclosure Requirements, Entry Rules and Ownership Structures, Exit Rules and Disciplining Devices, Depositor Protection, and the Strength of the Supervisory Authority. In addition to the eight area indicators we have built a summary indicator from the aforementioned area indicators.<sup>3</sup> The appendix briefly illustrates the information underlying each of the area indicators, and a detailed description can be found in Ahrend *et al.* (2009).

It is important to bear in mind that the information underlying the indicators generally reflects the *de jure* rather than *de facto* strength of rules. While data on the strength and independence of the supervisory institution is included, no information is available on how prudential regulations are implemented, or how well a regulatory regime works in practice. Even if for some areas of regulation only insufficient comparable cross-country information is available, the constructed indicators are relatively well correlated with available outcome-based measures of financial soundness in the banking sector.<sup>4</sup> For example, countries which – following our regulation indicators - have stricter capital requirements tend to have significantly higher capital to asset ratios, while banks in countries with more demanding accounting and provisioning rules (as measured by the indicators) have higher provisions relative to their loans. Similarly, where our indicators show liquidity and diversification requirements to be more stringent, banks' asset portfolios generally include a higher share of liquid assets.

### **3. Links between prudential regulation and the financial crisis**

#### *3.1 The crisis period*

Between the first quarter of 2007 and the first quarter of 2009 many banking share prices collapsed, wiping out large amounts of equity wealth. To examine whether there is a systematic link between the degree of equity value destruction and prudential regulation we compare share prices of more than 300 individual major banks from 32 countries with the indicators of prudential regulation.<sup>5</sup> More specifically, we regress the ratio of the share price at the end of the first quarter of 2009 to its price two years earlier on the 2005/06 value of the summary indicator for prudential banking regulation, as well as on each of the eight area indicators in separate regressions. On average, banking valuations in 2009 stood at 59% of their value two years earlier for the banks in our sample. We also include a non-financial share price index from Thomson Financial as a control variable in the regressions. This is meant to cover developments in country-related factors and differences in share price volatility that are not specific to the banking sector, even though it is not meant to represent a full-fledged model of banking share prices, for which additional data would be needed.

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3. This overall indicator is obtained by taking the average of the normalised area indicators. Normalised indicators are obtained by subtracting, for a given area indicator, for each country the cross-country mean from the indicator value, and dividing the result by the cross-country standard deviation.
  4. A set of intermediate outcome indicators of financial stability has been assembled from the “Financial Soundness Indicators” and the “Global Financial Stability Report” of the International Monetary Fund, and tested for cross-country correlations with the regulation indicators. See Ahrend *et al.* (2009) for details.
  5. Only banks that are included in the Datastream Banking Share Price Index DSBANKS for the respective country were retained.

**Table 1. Prudential Regulation and Bank Share Prices during Crisis Times**

Dependent Variable: Individual Bank Shares 2009q1 relative to 2007q1

Prudential Regulation Indicator	1	2	3	4	5
Summary Indicator Prudential Regulation	0.31 *** (0.10)				
Area Indicator: Entry/ Ownership		0.14 *** (0.04)			0.10 ** (0.04)
Area Indicator: Exit/ Disciplining Rules			0.05 ** (0.02)		0.03 ** (0.01)
Area Indicator: Strength of Supervisor				0.09 *** (0.03)	0.05 ** (0.02)
Share Price Development in Non-Financials	0.32 (0.26)	0.54 ** (0.21)	0.60 ** (0.21)	0.82 *** (0.20)	0.64 *** (0.19)
Observations	322	322	322	322	322
R-squared	0.17	0.20	0.13	0.15	0.24

Robust standard errors, clustered at the level of countries, in brackets.

The results presented in Table 1 suggest a significant cross-country link between the pre-crisis stance in prudential regulation and the remaining bank valuations after the crisis had hit, relative to the pre-crisis equity values. The size of the estimated coefficient for the overall indicator (column 1) suggests that improving regulation from the level of a country with moderately low regulation (which we define as being the country at the 25<sup>th</sup> percentile of the cross-country distribution) to the level of a country with moderately high regulation (*i.e.* the country at the 75<sup>th</sup> percentile) would have been associated with a 19% higher share value at the beginning of 2009, relative to 2007 share prices. Looking in more detail at the area indicators suggests that in particular stricter regulation with respect to entry and ownership rules (column 2), exit and disciplining rules (column 3) and the strength of the supervisor (column 4) were helpful in limiting the meltdown in banking equity values.

We also estimate alternative specifications to check for robustness of the obtained results: All three indicators with a significant coefficient in individual regressions remain significant when entered simultaneously as explanatory variables in the estimated equation (column 5). Moreover, for all these areas we also obtain significant results when replacing the area indicators by binary variables indicating the lowest quartile of countries with respect to each area indicator. Finally, results are basically unchanged when using for each bank the overall amplitude of the share price swing, *i.e.* the distance between maximum and the minimum values instead of the value between early 2007 and 2009. These robustness checks are presented in Ahrend *et al.* (2009).

### 3.2 A longer-term perspective

Steep declines in banks' share prices during the recent crisis had often been preceded by spectacular share price increases in earlier years. With the benefit of hindsight, these increases may have partly reflected a financial bubble, with differences in price developments across countries possibly related to the stance of prudential regulation. In order to explore this possibility, we replicate the earlier analysis over the 2002-07 period that corresponds to the run-up to the crisis, using the 2001 vintage of our indicators.<sup>6</sup> As before, share-price developments in non-financial sectors are controlled for and appear to be significant. We find that a stronger prudential stance has been associated with smaller share price increases pre-crisis,

6. These results, which are only described verbally here, are available in Ahrend *et al.* (2009).

with prudential regulations found to matter in the area of exit and disciplining rules and, to a weaker extent, as regards the strength of the supervisory authority.

To the extent that the strong share price increases in the banking sector in the years preceding the crisis had a “bubble” element, we can interpret a combination of smaller pre-crisis price increases and lower subsequent declines as indicative of a more stable banking system. However, less pronounced pre-crisis increases are clearly preferable only if they are associated with larger share price increases over the pre-crisis and crisis period *taken together*. Another set of regressions, presented in Table 2, therefore considers as dependent variable the ratio of share prices at the end of the first quarter of 2009 to its respective value in 2002.<sup>7</sup> The results in column 1 suggests that, *ceteris paribus*, a country with moderately strong average prudential regulation had about 30% more banking equity left in 2009 relative to the 2002 value, compared with a country with moderately weak pre-crisis regulatory settings (note that this figure relates to the 2002 levels of share prices, which was substantially below the 2007 level used as reference earlier). In particular, accounting and provisioning requirements (column 2) as well as entry and ownership rules (column 3) are positively and significantly related with the post-crisis level of banking equity prices compared to their value seven years earlier.

**Table 2. Prudential Regulation and Bank Share Prices in a Long-term Perspective**

Dependent Variable: Individual Bank Shares 2009q1 relative to 2002q1			
Prudential Regulation Indicator	1	2	3
Summary Indicator Prudential Regulation	0.50 * (0.29)		
Area Indicator: Accounting/ Provisioning Requirements		0.17 ** (0.07)	
Area Indicator: Entry/ Ownership			0.19 * (0.1)
Share Price Development in Non-Financials	1.24 *** (0.24)	1.28 *** (0.25)	1.30 *** (0.26)
Observations	284	284	284
R-squared	0.35	0.36	0.35

Robust standard errors, clustered at the level of countries, in brackets.

### 3.2 Banking sector rescue costs

Beyond price declines in banking equity, another salient aspect of the recent financial crisis has been the high cost to taxpayers of bank rescue packages. IMF analysis carried out in 2009 put the expected net cost from direct support to imperilled financial institutions, guarantees made by governments or central banks, and liquidity provisions at 4% of GDP on average across our sample of countries, ranging from close to zero up to 14% of GDP.<sup>8</sup> To check for correlations with prudential regulation, we regress the estimated net fiscal cost on the 2005/06 value of the overall indicator, as well as separately on each of the eight area indicators (Table 3). We include two sets of control variables. At a minimum, we find it useful

7. Alternatively, this analysis can be replicated using the third quarter of 2009, with very similar results. These results are available from the authors upon request.

8. See IMF (2009), Table 4. “Recovery rates”, which critically influence the cost of direct interventions, are estimated based on historical data from former banking crises. Estimates of the expected cost of guarantees are broadly based on the Contingent Claims Approach. The size of rescue packages likely reflects not only the severity of the financial crisis, but also other factors including *inter alia* the responsiveness of policy makers.

to control for the fact that some jurisdictions host important global financial centers. On average, countries with global financial centers such as the United States, the United Kingdom and Switzerland have faced an above average net cost. A possible explanation could be that particular interests have been especially strong in financial centers, resulting in *de jure* based regulatory indicators portraying an unduly strong regulatory stance.<sup>9</sup> Other specifications also examined different measures of the size of the financial sector as additional controls but these turned out to be insignificant. In a second set of regressions, we also add a control variable reflecting the monetary stance in the pre-crisis years.<sup>10</sup>

**Table 3. Prudential Regulation and the Fiscal Cost of Financial Sector Rescue Packages**

Dependent Variable: Net Cost of Financial Sector Support Measures								
Prudential Regulation Indicator	1a	1b	2a	2b	3a	3b	4a	4b
Summary Indicator Prudential Regulation	-2.10 *** (0.61)	-5.91 *** (1.17)						
Area Indicator: Capital Requirements			-0.95 * (0.53)	-1.16 *** (0.38)				
Area Indicator: Accounting and Provisioning Requirements					-1.25 *** (0.21)	-1.56 *** (0.22)		
Area Indicator: Entry Rules and Ownership Restrictions							-2.02 *** (0.54)	-2.08 *** (0.50)
Monetary Policy		0.08 *** (0.02)		0.05 ** (0.02)		0.08 ** (0.03)		0.05 ** (0.02)
Financial Center Dummy	4.80 (2.85)	5.57 ** (1.92)	5.83 * (3.17)	5.67 * (3.13)	3.78 * (2.11)	3.99 *** (1.09)	4.57 (2.81)	4.89 * (2.52)
Observations	26	19	26	19	26	19	26	19
R-squared	0.331	0.65	0.292	0.49	0.447	0.74	0.583	0.67

Standard errors in brackets.

The simple regression analysis seems to support the view that more stringent prudential financial regulation has helped to reduce the extent to which the financial sector had to be rescued. Our findings in column 1b suggest that the fiscal costs of the crisis would be about 1.5% of GDP lower in a country with moderately strong prudential regulation, compared with one having moderately weak regulatory settings (again defined as the 75<sup>th</sup> and 25<sup>th</sup> percentile of the distribution). In particular, stricter regulatory requirements with respect to capital (columns 2a and 2b) or accounting and provisioning (columns 3a and 3b), as well as a stricter stance on entry rules and ownership structures (columns 4a and 4b) are associated with a lower expected cost of the financial crisis. As newly entering banks are typically expected to rely more on wholesale finance and less on deposits, more stringent entry rules may have led the banking sector to rely more heavily on depository funding, a feature that has been shown to increase the resilience of banks during the crisis (Ratnovski and Huang 2009). Additional unreported results suggest that both a more uneven stance across fields of prudential regulation,<sup>11</sup> as well as a particularly lax stance in any one

9. As such, the financial center dummy would pick up a bias in the indicators. Alternatively, governments with financial centers may be particularly willing to put up the resources to guarantee the survival of a strong financial sector.

10. The degree to which imbalances (as bubbles in housing or credit markets) build up prior to a crisis may be thought to affect the strength of the crisis. During the recent pre-crisis period, a (downward) deviation from a Taylor rule, which under certain circumstances could be interpreted as overly accommodating monetary policy, has been associated with strong price increases in real estate, and concomitant developments of housing investment and mortgage credit (see Ahrend 2010). A (downward) pre-crisis deviation from a Taylor rule may hence be expected to result in a larger need for financial sector bail-out, and hence a larger net fiscal cost, and this result is indeed found in our analysis.

11. As measured by the standard deviation of the normalised area indicators.

field are associated with a substantially higher fiscal cost. This suggests that particularly weak regulation in one area and lack of overall regulatory consistency have been factors that could have added to the cost of the crisis.

#### **4. Conclusion**

We have presented evidence that financial sectors in countries with more stringent prudential regulation, as captured by a set of newly built indicators, were less affected by the recent crisis. While numerous factors have influenced the impact of the crisis on a given country, our findings provide evidence that even in a world where a country may not be able to fully insulate from global financial shocks, its system of prudential regulation can still be an important factor in reducing their impact.

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## APPENDIX

With a detailed description of the indicator construction being provided in Ahrend et al. (2009), the area indicators roughly cover the following aspects of prudentially-oriented regulatory policies:

- *Capital requirements* include minimum capital to asset ratios, variations of capital to asset ratios according to individual banks' credit, market or operational risks, the application of simple leverage ratios, the acceptability of subordinated debt and of revaluation gains as capital.
- *Liquidity and diversification requirements* include limits on exposures to single or related borrowers, limits on sectoral concentration of lending and liquidity reserves.
- *Accounting and provisioning requirements* include information on accounting standards, definitions of nonperforming loans, disclosure of off-balance sheet items.
- *External auditing and information disclosure requirements* include information on external auditing requirements and their disclosure to supervisors, the scope of legal action against auditors in the case of negligence and against directors in the case of erroneous or misleading information
- *Entry rules and ownership structures* includes e.g. information on the granting procedure and requirements for entry licenses, disclosure of and limitations on the source of funds, ownership restrictions for related parties, limits to engagement in securities, insurance and real estate activities, and limits to foreign lending and ownership of nonfinancial voting shares by banks
- *Exit rules and disciplining devices* include e.g. measures relating to the forced exit of banks, bankruptcy procedures for banks, and the powers of supervisors to override management decisions if the solvency of a bank is under threat
- *Depositor protection* includes e.g. information on the existence and limits of explicit deposit insurance protection systems, the collection of premia to such schemes, and whether fees depend on banks' risk profiles and co-insurance provisions
- *Strength of the supervisory authority* include e.g. the budget and number of professional supervisors relative to the size of the sector, the number and frequency of onsite inspections, the ability of supervisors to change banks' internal organisation structures, the protection of the supervisory agency from political interference and the protection of individual agency staff from law suits by banks