

ROE in Banks : Myth and Reality

August 2013

Christophe Moussu¹
ESCP Europe, Labex Refi

Arthur Petit-Romec²
ESCP Europe

JEL Classification: G01, G21, G28, G32

Keywords: Return on equity, risk-taking, financial crisis, bank performance

¹Corresponding author: ESCP Europe, 79 avenue de la République 75543 Paris Cedex 11, France. Tel: +33 1 49 23 22 69; Fax: +33 1 49 23 20 80; E-mail: moussu@escpeurope.eu

² ESCP Europe, 79 avenue de la République 75543 Paris Cedex 11, France. Tel: +33 1 49 23 20 33; Fax: +33 1 49 23 20 80; E-mail: arthur.romec@escpeurope.eu

Abstract:

Return on Equity (RoE) is a central measure of performance in the banking industry, which is used to allocate capital inside and across divisions. The reliance on this metric emerged from the risk management approach to banking which underlies bank capital regulation. Using the financial crisis, we reveal that the pre-crisis RoE has a strong impact on the destruction of value for shareholders for a sample of large banks in 28 countries. This impact is very robust to the introduction of numerous observable risk variables, the restriction of the sample to deposit-taking banks and alternative definitions of RoE. We document a sensitivity of bank CEO compensation to RoE. Our results strongly suggest that the reliance on RoE as a performance measure is a key incentive to excessive risk-taking in banks.

JEL Classification: G01, G21, G28, G32

Keywords: Return on equity; risk-taking; financial crisis; bank performance

1. Introduction

A great deal of anecdotal evidence suggests that the return on equity (RoE) was a central measure of performance used in banks before the crisis. According to Jenkins³, “Still today, most banks around the world use return on equity – RoE – as their main metric of profitability. Despite the carnage of the crisis, and the lessons of excessive risk-taking it conveyed, some banks are even targeting higher RoEs than they achieved in the boom years.” As such, the reliance on RoE has obviously survived the financial crisis. Target RoEs are not only set at the bank level but are used to drive resource allocation across and even inside divisions.

This reliance on RoE has emerged through the regulation of bank capital and the belief that equity is costly and should be minimised. As Admati et al. (2011) argue, this belief is a fallacy, and the sole rationality for economising equity is related to the fact that deposits and debt are subsidised, given the existence of deposit insurance and bailout provisions. According to Admati et al. (2012), the strong resistance of banks to deleveraging reveals a real “addiction” of banks to leverage, which they attribute to a debt overhang effect.

In this paper we follow a different approach and choose to focus on the incentives conveyed by performance measurement in banks. Our main hypothesis is that, despite its legitimacy from a risk management and regulatory perspective, reliance on RoE as a central measure of performance is responsible for strategies of excessive risk-taking. If regulation was perfect or risk management strategies efficient, the level of equity should perfectly be adjusted upward to any incremental risk taken by the banks. If the risks are assessed correctly and if the capital constraint is binding, Kim and Santomero (1988) show that RoE should not increase as a result of a riskier portfolio of assets. Consequently, higher RoE would signal

³ *Financial Times*, 7th November 2011

higher rents or more value creation, but it should not be associated statistically with higher risk. This is the rationale for using RoE to assess bank performance and allocate capital across and inside divisions.

Nevertheless, as Rajan (2005) argues, evaluating the true nature of bank performance is a very complicated task, since it requires disentangling the part of the performance which is the result of a genuine value creation from the part which is the result of higher (and not easily observable) risks. Indeed, higher returns can always be obtained by taking more risks, and if risks are hidden or underestimated, risk-taking may seem value-enhancing as long as risks have not materialised. However, the financial crisis revealed the real risks taken by the banks through the huge losses borne by their shareholders. In order to test our main hypothesis, we examine whether the pre-crisis RoE of banks has an impact on the losses suffered by shareholders in the crisis. If RoE is a relevant performance measure, this association should be rejected.

Our results reveal that RoE has a strong and economically significant impact on the destruction of value for shareholders during the crisis, based on a sample of 273 large banks from 28 countries. In all our specifications we use country-variables to control for the differences in the intensity of financial regulation across countries. This result, which rejects the null hypothesis that RoE should not be associated with higher risk, casts serious doubt on the relevance of RoE as a performance measure to drive capital allocation inside banks and to assess bank performance. Our results are very robust to the introduction of numerous variables, controlling for risks, both on the asset and the liability side of bank balance sheets, and market measures of risk. Many of our risk variables have a significant impact on shareholder losses, which confirms that they definitively capture elements of risk that materialised during the crisis. However, the fact that a residual effect of RoE remains after the introduction of these variables strongly suggests that, on top of being a poor performance

measure, it was responsible for risk-taking in banks. RoE as a performance measure may also be responsible for risks captured by our control variables, biasing its impact downwards.

We conduct robustness tests and reveal that our results remain robust when we restrict the sample to deposit-taking banks. Results are also robust in regard to alternative measures of short-term performance, notably alternative definitions of RoE and the use of return on assets RoA. The results on RoA support the idea that excessive risk-taking flowed not only from the funding strategy of banks but also from tradeoffs on the asset side, thus favouring excessive risks.

In order to test the interest of managers in RoE maximisation, we investigate the impact of RoE on total CEO compensation for a reduced sample of 64 banks for which data on compensation are available. We find that total CEO compensation is sensitive to RoE, which suggests that monetary incentives to maximise RoE existed before the crisis. Our paper is related to the findings of Bhattacharyya and Purnanandam (2012) that the involvement of US commercial banks in mortgage-backed securities was negatively associated with stock performance but increased the earnings per share, with a higher sensitivity of their compensation to the latter than the former.

The rest of the paper is organised as follows. The next section describes the sample, the empirical methodology and the variables. In section 3, we present and interpret the empirical results. In section 4, we provide additional results on a sample restricted to deposit-taking banks and using alternative RoE measures. In section 5, we focus on CEO compensation and we conclude in section 6.

2. Sample construction, description of variables and summary statistics

2.1 Sample construction

The starting point for the construction of the sample is every financial institution available on the Bankscope database for the year 2006. First, we exclude from the sample the banks which are not listed, because our main dependent variable is the buy-and-hold stock return of banks during the crisis. However, we keep in our sample those banks which delisted after the crisis. Second, we only keep banks from those countries for which Djankov, La Porta, Lopez-de-Silanes and Shleifer (2008) provided revised data on anti-director rights and for which the regulation indices based on Barth, Caprio and Levine (2008) are available. Third, we focus our analysis on the largest banks, with assets over \$10 billion just before the crisis at the end of 2006. These large banks are likely to have more opaque assets and balance sheets and skirt capital regulation through regulatory arbitrage (Demirguc-Kunt, Detragiache and Merrouche 2010).

We collect market data from Datastream, and we drop any observation with a missing key variable (RoE, bank capital, etc) and exclude banks reporting losses for 2006. We end up with a sample of 273 banks from 28 countries (see Appendix A). In the empirical analysis, we also focus on a subsample including only deposit-taking institutions. Following Beltratti and Stulz (2012), we impose a customer-deposits to total assets ratio over 20%. To be consistent with the size criterion, the restriction on the level of deposits is imposed for the end of 2006. This subsample is composed of 245 banks.

3.2 Empirical Methodology

The main model we test is a simple OLS model, where the dependent variable is the buy-and-hold return in the crisis and the main independent variable is the RoE of the banks before the crisis. We control for various elements of risk-taking at the bank level, the size and the beta of the stock, which are all measured before the crisis. We also control for several country-level variables.

- *Dependent variable:*

To compute our buy-and-hold returns, we use weekly stock returns over a period of 18 months from July 2007 to the end of 2008, which corresponds to the crisis period. Of course, bank stocks continued to suffer in 2009 as a result of the crisis, however, consistent with numerous empirical studies (Aebi, Sabato, Schmid 2012, Beltratti and Stulz 2012, Erkens, Hung and Matos 2012, Fahlenbrach and Stulz 2011), we restrict the period to 2007-2008 because of the government interventions after this period, which would otherwise bias our return measure.

- *Main independent variable:*

The main independent variable in the analysis is RoE, defined as the ratio of pre-tax profit to equity. We choose to focus on a pre-tax RoE in order to smooth tax differences across countries and because banks often define their targets in terms of pre-tax RoE. To check the importance of RoE, we use the alternative return on assets (RoA), defined as the ratio of pre-tax profit to total assets⁴. We also use alternative measures of RoE in our complementary tests.

- *Control variables at the bank level:*

⁴ Demirguc-Kunt and Huizinga (2012) use the same definitions of RoE and RoA.

We focus on control variables at the bank level which have been highlighted previously in the literature as important determinants of stock returns during the crisis. We have three main categories of control variables: bank capital measures, additional funding structure variables and the share of non-interest income activities in the banks' operating income. We also use the ratio of risk-weighted assets to total assets or density, and the size of the banks, as risk control variables. To control for the risk of the stock, we use the beta, the volatility of stock returns and the stock return of the year prior the crisis.

We have two measures of leverage. The first measure is Tier 1, which corresponds to the main regulatory capital ratio and is defined as the ratio of Tier 1 capital⁵ to total risk-weighted assets. The measure depends both on the structure of risks of banks' assets and on the level of leverage. Our second measure is the ratio of tangible common equity to tangible assets, which removes intangibles from both the equity and total assets and preferred shares from the equity⁶, thus offering a more conservative approach to the banks' capital than the standard ratio of equity to assets⁷.

We use two other measures related to the capital structure of banks. The first measure is the ratio of total customer deposits to total assets. Contrary to funding received from financial markets or intermediaries, which can rapidly become expensive or unavailable, deposits are less subject to runs because they are insured and therefore represent a stable source of funding. Empirically, Beltratti and Stulz (2012) and Demirguc-Kunt, Detragiache and Merrouche (2010) confirm the positive impact of deposits on bank performance during

⁵ Tier 1 capital includes common equity and perpetual, non-cumulative preference shares.

⁶ More precisely, non-tangible common equity comprises tax-deferred assets, mortgage-servicing rights, minority interests in financial intermediaries and other items.

⁷ In unreported tests, we find that our results are unchanged if we consider the equity ratio.

the crisis. Our second measure is the funding fragility ratio proposed by Demirguc-Kunt and Huizinga (2010), which is defined as the ratio of the sum of deposits and short-term borrowing excluding customer deposits, to total deposits and short-term borrowing⁸.

Concerning the nature of activities, we focus on the importance of non-traditional activities using the ratio of non-interest income to total operating income. Non-interest income includes net fee income, net commission income and net trading income. The nature of the activities has been proven to have a significant impact on bank risk, notably by Baele, De Jonghe and Vander Venet (2007) for the beta of the stock and Stiroh (2004) for the Z-score⁹.

We also control for the stock return of 2006 before the crisis. The stock performance of the bank before the crisis is not a standard measure of risk per se but it can be considered as a proxy for certain risks rewarded by the market prior to the crisis but which eventually turned out badly during the crisis. Alternatively, following Rajan (2005), if we consider that stock returns prior to the crisis were inflated artificially by some hidden risks, stock performance before the crisis is likely to be associated with elements of risk-taking. Empirically, Beltratti and Stulz (2012) and Fahlenbrach et al. (2012) find that banks that performed well in 2006 suffered poor returns in the crisis.

We also control for the ratio of risk-weighted assets to total assets. The density can be seen as a measure of the risk on the assets. *Ceteris paribus*, a higher density would indicate

⁸ It is therefore inversely related to the importance of customer deposits in the short-term funding of banks, which is the most stable source of short-term funding.

⁹ Demirguc-Kunt and Huizinga (2010) show that expanding the share of non-interest activities can offer some risk diversification at very low levels but it quickly becomes very risky.

that the bank invests in riskier classes of assets. Alternatively, the density can be comprehended as a proxy for the regulatory arbitrage strategies pursued by banks in order to economise equity (Beltratti and Paladino 2013). In this case a lower density would reveal a more aggressive optimisation of risk weights in order to save capital.

Finally, we control throughout our analysis for the size and the beta. Size is defined as the natural logarithm of total assets and we compute the beta by estimating a market model on weekly returns from 2004 to 2006. We use the MSCI World Index as the market portfolio and the three-month T-bill as the risk-free rate.

- *Control variables at the country level:*

On top of our previous control variables, we also control for six institutional variables at the country level which may influence risk-taking behaviour and stock performance in the crisis. Two variables are general governance variables and four variables are variables specific to the banking industry. The two governance variables are the updated anti-director rights index (ADRI), compiled by Djankov, La Porta, Lopez-de-Silanes and Shleifer (2008), and a second variable which measures the quality of legal institutions (Kaufmann, Kraay and Mastruzzi 2008). Our four regulation variables are indices from Caprio, Leaven and Levine (2007), using revised data from Barth, Caprio and Levine (2008). Appendix B provides a precise description of these variables. All variables are included at the same time in the regressions and the main results are unchanged when entering country variables separately.

3.3. Summary statistics

Table 1 reports descriptive statistics for the main variables described previously. Except for buy-and-hold returns, variables apply to the year 2006, just before the beginning of the crisis. As expected, performance during the crisis was extremely poor with a median buy-and-hold stock return for the period of 0.59 (0.63 on average), which signifies that 1 dollar

invested at the beginning of July 2007 was worth 0.59 dollar at the end of 2008. In other words, in our sample, bank shares lost around 40% of their value within 18 months. However, the standard deviation of the buy-and-hold stock returns during the crisis is rather high (around 32.3%) indicating strong heterogeneity in bank performance, in line with the figures of Aebi, Sabato and Schmid (2012) and Beltratti and Stulz (2012). Interestingly, the important dispersion of the returns is not a particular feature of the crisis period, since the standard deviation of the buy-and-hold for the year 2006 is also large (34%). However, stock performance in 2006 is good and differs significantly from the buy-and-hold during the crisis, with an average buy-and-hold return for the year 2006 of 1.18.

The RoE is high at an average 20.12%. As for buy-and-hold stock return, some heterogeneity exists across banks since the standard deviation of the RoEs is 11% and the highest RoEs reach more than 50%. These high levels of returns on equity contrast with the level of returns on assets. The average RoA is barely higher than 1.5%, with a standard deviation of 1%. This discrepancy in the levels of RoE and RoA is related to the leverage of banks.

The average Tier 1 ratio is 9.08% and is higher than the regulatory minimum of 4%. All the banks are compliant with the regulation in terms of Tier 1, since the minimum Tier 1 ratio is 4.82%. In contrast, the tangible equity ratio is much lower at an average of 6.25%.

The portion of deposits in the financial structure is important, with an average deposit ratio of 57.2%. However, the standard deviation is high (27%), as our sample includes both commercial banks and investment banks¹⁰. Similarly, the average funding fragility ratio is 24.4%, with a standard deviation of almost 13%. The analysis of these two variables confirms

¹⁰ Heterogeneity in the share of deposits remains quite high when we restrict the sample to deposit-taking banks.

the existence of important differences in the funding strategies of banks, which have to be controlled for in the crisis.

The statistics for the non-interest income are comparable to those for deposits. The average share of non-interest income is around 38.7% but the standard deviation is rather high (22.7%), revealing again substantial heterogeneity in the nature of activities across banks¹¹. The average ratio of risk-weighted assets to total assets is 0.6. This level of density is equivalent to that reported by Beltratti and Paladino (2013). Even if the analysis focuses on large banks (with more than \$10 billion assets), there are important size disparities in the sample as the largest banks in the sample are more than 100 times larger than the smallest ones. The average bank has \$186 billion assets before the crisis.

The examination of the correlation coefficients between our different variables reveals some interesting facts which we have to take into account when designing our tests. First, as expected, funding fragility and deposits are highly correlated and should not be entered at the same time in the regressions. They are also highly correlated with non-interest income. This is consistent with the analysis by Kashyap, Rajan and Stein (2002), predicting that interest income generation and deposit funding are complementary, as well as with Demirguc-Kunt and Huizinga (2010), who provide empirical evidence on the links between fee income and non-deposit funding shares. As a result, we enter these three variables separately into our regressions. Second, RoE is correlated weakly with the ratio of tangible equity and uncorrelated with the Tier 1 capital ratio, which may appear surprising, as one component of

¹¹ Heterogeneity in the share of non-interest income remains quite high when we restrict the sample to deposit-taking banks.

the RoE is the level of leverage. On the contrary, RoA and RoE appear highly correlated¹². The weak or null correlation between bank capital measures and RoE makes it possible to enter into our regressions bank capital and RoE at the same time. Finally, the ratio of risk-weighted assets correlates highly with our two bank capital measures, which makes it impossible to enter them simultaneously. Interestingly, it is positively correlated with the tangible equity ratio and respectively negatively related with the Tier 1 ratio. In a risk management and regulation perspectives, higher risks should lead to higher density and higher equity requirements, explaining the positive correlation between equity ratio and density. However, the negative relation between density and the Tier 1 ratio suggests that banks that were taking more risks on the asset side were also the more aggressive in terms of regulatory capital optimization.

3. Presentation and interpretation of the results

In Table 2 we present the results of nine regressions in which buy-and-hold return (BHR) is regressed separately on RoE and each control variables. We control for size, the beta of the stock (except for the first regression) and country-level variables in all the specifications. Most of our control variables have a significant impact on bank performance during the crisis, which confirms that they are capturing elements of risk-taking that materialised during the crisis. Consistent with Beltratti and Stulz (2012), BHR is positively affected by Tier1 and deposits and negatively by funding fragility and stock performance before the crisis. We also document negative effects of size, non-interest income and density.

¹² Of course, the huge discrepancy between the average levels of RoE and RoA are clearly achieved thanks to leverage, and the rise in RoE over time for banks is attributed to leverage (Haldane et al. 2010).

The result on size is in line with the hypothesis that larger banks had more opaque asset and funding structures, which were uncovered during the crisis. It also adds to the evidence of Fahlenbrach, Prilmeier and Stulz (2012) documenting that US banks that performed poorly, both in the 1998 crisis and the recent crisis, experienced a higher growth in size in the years preceding each crisis. The negative impact of non-interest income is consistent with Stiroh (2004) and Demirguc-Kunt and Huizinga (2010), showing that the share of non-interest income-generating activities is associated with higher risk. Tangible equity has a negative impact on BHR but this effect may result from the fact that banks with higher equity also had higher risks on the assets side, as the positive correlation between the tangible equity and the density suggests. In any case, the effect of tangible equity disappears totally in more complete models.

Our results reveal a negative impact of the level of RoE on BHR in the crisis. The economic significance of this relation is very strong, as a one-standard-deviation increase in RoE is associated with an 8.35% decline in BHR, which corresponds to 26% of its standard deviation. This finding is clearly inconsistent with the null hypothesis that RoE should not be associated with higher risk, and conversely it indicates that regulation and risk management strategies are not sufficiently efficient for the RoE per se to be an appropriate risk-adjusted measure of performance. Since RoE does not incorporate risks, we obviously have to control for elements or measures of risk-taking at the bank level, in order to assess specifically whether the reliance on RoE induced excessive risk-taking. It is worth remarking that, if the addition to RoE did indeed induce the risk-taking strategies taken into account in our empirical design, the true impact of the reliance on RoE on risk-taking is likely to be biased downwards.

Table 3 presents the results of 10 models explaining BHR, in which we always include our main independent variable RoE, as well as size, the beta and our six country-level

variables¹³. We alternate deposits, funding fragility and non-interest income, which are highly correlated. We also alternate the two measures of bank capital as well as density, which are significantly correlated. In the last regressions of Table 3, we also control for the stock performance of 2006. All the previous results hold concerning the control variables, except for the tangible equity, which is significant in none of our specifications, and for BHR 2006, which is no longer significant when we enter it at the same time as RoE. One possible reason why tangible equity has no impact on BHR is that the levels of tangible equity were so small that differences in terms of equity did not make a great deal of difference in protecting shareholders in the crisis. Another reason is that banks' assets are so diverse that this ratio is not particularly informative, while the Tier 1 ratio, taking into account risk-weighted assets, tends to provide a more accurate picture of bank capital.

The striking result is that RoE remains highly significant in all models, with a rather strong stability in its coefficients, which are even increased in the specifications using Tier 1 as a measure of bank capital. The economic significance remains very high as a one-standard-deviation increase in RoE is associated with a 5.7% to 9.2% decline in BHR depending on the specifications, which corresponds to between 18 % and 29 % of the BHR standard deviation. All the control variables besides the RoE take into account several aspects of the banks' risk, but the effect of the RoE clearly remains in place. RoE can thus be considered as a proxy for additional risk-taking on top of the risk-taking captured by our various control variables. Therefore, our results strongly suggest that on top of being an inadequate measure of performance, RoE is responsible for excessive risk-taking. The excessive reliance on RoE as a central performance measure in the banking industry is thus likely to have been a contributing factor in the crisis.

¹³ Our results are unchanged if we take the volatility of the stock return instead of the beta.

4. Complementary tests

In order to assess the robustness of our results, we run the regressions in Table 3 on a subsample restricted to deposit-taking banks (into which the customer deposits amounts of at least 20% of total assets) in Table 4. The very interesting fact is that our results are globally unchanged. In all the specifications, the results on RoE hold at the 1% or 5% levels and its economic significance is roughly unchanged. At the level of the control variables, the deposits and Tier 1 still have a positive impact on BHR, respectively negative for the size.

In Table 5, we provide additional robustness checks by considering alternative RoE and the RoA definitions. All the specifications are based on our main sample.

In regressions 1 and 2, we use an alternative measure of RoE defined as the ratio of Net Income to Equity. In regressions 3 and 4, we use a third measure of RoE defined as the ratio of pre-tax-profit to average equity for the years 2005 and 2006¹⁴. In all specifications, RoE holds at the 1% or 5% levels and its economic significance is roughly unchanged compared to our main measure of RoE. The results on the control variables are similar to those of previous regressions.

In regressions 5 and 6, we replace RoE with RoA (defined as the ratio of pre-tax profit to total assets) as our main independent variable. The two regressions include the Tier 1 ratio as a measure of bank capital, because RoA is highly correlated with tangible equity. This strong correlation is consistent with results from Haldane, Brennan and Madouros (2010) showing that RoA and leverage are negatively related. Interestingly, RoA has a strong negative impact

¹⁴ We only present two main specifications of our model for each alternative performance measure but the results remain unchanged when using alternative control variables.

on BHR, significant at the 1% level. Its economic significance is also very strong and is roughly the same as for RoE. This result confirms that risk-taking strategies were not limited purely to funding strategies but also flowed from tradeoffs on the asset side in favour of excessive risks. However, it does not necessarily imply that RoA would have induced the same incentives as RoE, if it were the main metric followed in banks.

5. Bank managers' compensation and RoE

So far, our results strongly suggest that RoE captures risk-taking on top of various other risk measures and that reliance on this metric is likely to have induced risk-taking which materialised during the crisis. However, they do not reveal whether the incentives to maximise RoE resulted from direct monetary incentives or from the fact that RoE is prevalent everywhere, in and across banks.

A prolific body of literature has investigated the links between compensation and risk-taking at banks. Previous studies have documented that risk-taking decreases with the horizon of compensation (Bolton, Mehran and Shapiro 2011) and increases with the portion of compensation not explained by size (Cheng, Hong and Scheinkman 2011), the vega or pay-for-risk sensitivity of compensation (Chesney, Stromberg and Wagner 2010, DeYoung, Peng and Yan 2012), or the emphasis placed on equity-based compensation (Mehran and Rosenberg 2007, Balachandran, Kogut and Harnal 2010). More closely related to our study, Bhattacharyya and Purnanandam (2012) show that the compensation of US commercial banks' executives was more sensitive to the earnings per share (EPS) than to the stock return, which led them to become more involved in mortgage activities that were destroying value for shareholders.

In this section, we investigate the link between CEO compensation and RoE for a small subsample of 64 banks for which CEO compensation information is available on BoardEx for the year 2006. Anecdotal evidence suggests that the RoE is related to the level of bonus but that its level also has a role in the amount of equity-based compensation allocated to bank managers. Consequently, in all specifications, our dependent variable is total CEO compensation which is the sum of direct compensation and equity-linked compensation.

The results are provided in Table 6 and reveal that RoE has a strong positive impact on CEO compensation significant at the 5% level. Economic significance is strong, since a one-standard-deviation increase in RoE is associated with an increase of 0.3 in the log of total compensation, which corresponds to almost 30% of its standard deviation. The impact of RoE remains significant, both statistically (at the 5% or 10% levels) and economically, when we control for the size of banks and the BHR of 2006. In line with Bhattacharyya and Purnanandam (2012), our results suggest that the structure of CEO compensation may have prompted them to maximise RoE by taking excessive risks. Moreover, the absence of any impact of RoA and BHR 2006 on CEO compensation further supports the idea that the objective was specifically to inflate the RoE and not another metric.

However, the scope of the results is limited due to the small number of banks for which CEO compensation data are available. Furthermore, aside from monetary incentives associated with RoE, the belief that it was a good measure of performance could have given rise to excessive risk-taking. In line with this argument, a recent paper by Cheng, Raina and Xiong (2013) documents the role of beliefs, using the private decisions of securitisation agents in the subprime crisis.

6. Conclusion

The bank business model which emerged more than four decades ago, following risk management and regulatory approaches to bank capital, crystallised RoE as the main performance metric in the banking sector. RoE is not only the main measure of bank performance but it also drives the allocation of resources across and inside bank divisions. Given the very strong dependence of the asset and liability sides of banks resulting from the bank business model, it also clearly affects its funding strategies. In theory, from a risk management perspective, RoE could be a good performance measure if the measurement and disclosure of risks led to a perfect adjustment of the level of bank equity.

However, the extreme focalisation on RoE may drive managers to take higher risks, in an industry where complexity and opacity considerably alter the ability of outsiders to observe them accordingly. Numerous experts have raised their voice to criticise the use of RoE. Jenkins¹⁵ begs the questions: “But what if more fundamental change is needed to the way everyone thinks about bank profitability? What if RoE is the wrong measure entirely?” Admati¹⁶ goes even further, writing “RoE is a flawed and misleading measure that should not be used to measure value creation and profitability, or to determine managerial compensation [...]The fixation on RoE in the banking sector reflects and breeds a love of leverage and risk that is dangerous for society as a whole.”

Using the financial crisis as a risk revelation event, we document a very strong negative effect of pre-crisis RoE of banks on the shareholders’ returns, controlling for numerous bank characteristics associated with the risk of shareholders. Our results indicate that RoE was a

¹⁵ *Financial Times*, 7th of November 2011

¹⁶ See the article “Rethinking how banks create value” available at:

<http://www.gsb.stanford.edu/news/packages/PDF/%20AdmatiFocusJune.pdf>

clear aggravating factor in the financial crisis, as it provided incentives for managers to develop excessive risk-taking strategies. Tests performed on a subsample of banks reveal that incentive compensation is highly related to the level of RoE, which tends to prove that monetary incentives were directly associated with the maximisation of this metric. The incentives to maximise RoE could also have resulted from the fact that references to ROE are prevalent everywhere, in and across banks. Further research is definitively called upon to better disentangle these two sources of incentives.

The low return environment and the reinforcement of bank capital requirements seem to have strengthened the risk management approach of banks, from a perspective of “economising” equity. Given this evolution, the role of RoE is even more important as a performance measure in banks. From a policy perspective, the response of the regulator may prove to be counterproductive unless it is accompanied by a radical change in the way performance is assessed in the banking sector.

References

Admati A.R., Demarzo P.R., Hellwig M.F. and Pfleiderer P.C., 2011. Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is not Expensive. Working Paper 86. Rock Center for Corporate Governance at Stanford University, and Research Paper 2065. Stanford Graduate School of Business, , Stanford, CA; Preprint 2010/42, Max Planck Institute for Research on Collective Goods, Bonn, Germany.

Admati A.R., Demarzo P.R., Hellwig M.F. and Pfleiderer P.C., 2012. Debt Overhang and Capital Regulation. Working Paper, Rock Center for Corporate Governance at Stanford University; and research paper, Stanford Graduate School of Business, Stanford, CA; Preprint 2012/05, Max Planck Institute for Research on Collective Goods, Bonn, Germany.

Aebi V., Sabato G., Schmid M., 2012. Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking & Finance* Vol. 36, Issue 12, p. 3213-3226.

Baele L., De Jonghe O. and Vander Venet R., 2007. Does the stock market value bank diversification?. *Journal of Banking & Finance* Vol. 31, Issue 7, p. 1999-2023.

Balachandran S., Kogut B. and Harnal H., 2010. The Probability of Default, Excessive Risk, and Executive Compensation: A Study of Financial Services Firms from 1995 to 2008, *Working paper*, Columbia Business School.

Barth, J.R., Caprio Jr., G., Levine, R., 2008. Banking regulations are changing: for better or worse? *Comparative Economic Studies* 50, 537–563.

Beltratti A. and Paladino G., (2013). Why do banks optimize risk weights? The relevance of the cost of equity capital. Working paper.

Beltratti A. and Stulz, R., 2012. The credit crisis around the globe: Why did some banks perform better?, *Journal of Financial Economics*. Vol. 105, Issue 1, p. 1-17.

Bhattacharyya S. and Purnanandam A., 2012. Risk-taking by banks: What did we know and when did we know it? *Working paper*, University of Michigan.

Bolton P., Mehran H. and Shapiro J., 2011. Executive Compensation and Risk-Taking, Mimeo, Federal Reserve of New York.

Caprio, G., Laeven, L., Levine, R., 2007. Governance and bank valuation. *Journal of Financial Intermediation* 16, 584–617.

Cheng IH., Hong H. and Scheinkman J., 2009. Yesterday's heROEs: compensation and creative risk-taking, *Working paper*, Princeton University, Princeton, NJ.

Cheng IH., Raina S. and Xiong W., 2013. Wall Street and the Housing Bubble, *Working Paper*, University of Michigan.

Chesney M., Stromberg J. and Wagner A., 2010. Risk-Taking Incentives, Governance, and Losses in the Financial Crisis, *Research Paper 10-18*, Swiss Finance Institute, Zurich.

Demirguc-Kunt A., Detragiache E. and Merrouche O., 2010. Bank capital: Lessons from the Financial Crisis. *World Bank Working Paper 5473*, The World Bank.

Demirguc-Kunt A. and Huizinga H., 2010. Bank activity and funding strategies: The impact on risk and returns. *Journal of Financial Economics* Vol. 98, Issue 3, p. 626-650.

Demirguc-Kunt A. and Huizinga H., 2012. Do we need big banks? Evidence on performance, strategy and market discipline. *European Banking Center Discussion Paper no. 2011-005*.

De Young R., Peng E. and Yan M., Forthcoming. Executive compensation and business policy choices at U.S. commercial banks, *Journal of Financial and Quantitative Analysis*.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The law and economics of self-dealing. *Journal of Financial Economics* Vol 88, Issue 3, p. 430–465.

Erkens D.H., Hung M. and Matos P., 2012. Corporate Governance in the Recent Financial Crisis: Evidence from Financial Institutions Worldwide. *Journal of Corporate Finance* 18: 389-411.

Fahlenbrach, R., Prilmeier, R. and Stulz, R., 2012. This time is the same: using bank performance in 1998 to explain bank performance during the recent financial crisis. *Journal of Finance*, Vol 67., Issue 6, 2139-2185.

Fahlenbrach R. and Stulz R., 2011. Bank CEO incentives and the credit crisis. *Journal of Financial Economics*, Vol. 99, Issue 1, p. 11-26.

Gropp, R. and Köhler, M., 2010. Bank Owners or Bank Managers: Who is Keen on Risk? Evidence from the Financial Crisis. *ZEW Discussion paper 10-013*. University of Mannheim, Mannheim.

Haldane A., Brennan S. and Madouros V., 2010. What is the Contribution of the Financial Sector: Miracle or Mirage? *The Future of Finance*, Chapter 2, 87-121, LSE.

John, K., Litov, L., Yeung, B., 2008. Corporate governance and risk-taking. *Journal of Finance* 63, 1679–1728.

Kashyap, A.K., Rajan, R., Stein, J.C., 2002. Banks as liquidity providers: an explanation for the coexistence of lending and deposit-taking. *Journal of Finance* 57, 33–73.

Kaufmann, D., Kraay, A., Mastruzzi, M., 2008. Governance Matters VII: Aggregate and Individual Governance Indicators, 1996–2007. *Unpublished working paper*. World Bank, Washington, DC.

Kim D. and Santomero A.M., 1988. Risk in Banking and Capital Regulation. *The Journal of Finance* vol.43 No.05,1219-1233.

Mehran H. and Rosenberg J., 2007. The effect of employee stock options on bank investment choice, borrowing and capital. *Staff report 305*, Federal Reserve Bank of New York, New York.

Rajan, R., 2005. Has financial development made the world riskier? Paper presented at the Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole.

Stiroh, K.J., 2004. Diversification in banking: is noninterest income the answer? *Journal of Money, Credit and Banking* 36, 853-882.

Table 1: Summary statistics

This table reports statistics for the whole sample of 273 banks. All variables (except BHR) are computed for 2006, prior to the beginning of the crisis. BHR is the weekly buy-and-hold return from July 2007 to the end of 2008. BHR 2006 is the weekly buy-and-hold return for the year 2006. RoE is the ratio of pre-tax-profit to equity. RoA is the ratio of the pre-tax-profit to total assets. Tangible equity is the ratio of equity minus intangible assets divided by total assets. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets. Deposits is the ratio of customer deposits to total assets. Funding fragility is the ratio between the sum of deposits from banks, other deposits and short-term borrowing to total deposits and short-term borrowing. Non-interest income is the ratio of non-interest income to total operating income. Density is the ratio of risk-weighted assets to total assets. Size refers to the natural logarithm of total assets. Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return from 2004 to 2006. ADRI is the anti-director index, as revised in Djankov et al. (2008). Institution is the average of the six following indicators provided by Kaufmann et al. (2008): voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Official is an index of the power of supervisory authorities. Private monitoring is an index of the intensity of monitoring by the private sector. Capital is an index of regulatory oversight of bank capital. Restrict is an index of regulatory restrictions on the activities of banks. The regulation variables are from Caprio et al. (2007).

	Number of observations	Mean	Median	Std. dev	Min	Max
BHR	273	0.636	0.593	0.323	0.012	1.411
BHR 2006	273	1.185	1.19	0.341	0.343	2.747
RoE (%)	273	20.12	18.49	11.06	0.57	52.39
RoA (%)	273	1.41	1.24	1.08	0.04	9.89
Tangible equity (%)	273	6.25	5.76	4.01	-0.34	41.65
Tier 1 (%)	212	9.08	8.57	2.39	4.82	22.9
Deposits (%)	273	57.18	61.57	27.11	0.00	93.40
Funding Fragility (%)	273	24.40	12.83	26.66	0.00	100.00
Non-interest income (%)	273	38.71	35.60	22.66	0.76	109.80
Density	190	0.60	0.59	0.17	0.15	1.21
Size	273	10.92	10.54	1.40	9.21	14.49
Beta	273	1.02	0.98	0.42	0.23	2.39
ADRI	273	3.82	4	0.94	1	5
Institution	273	1.13	1.24	0.50	-0.76	1.83
Official	273	11.07	12	2.15	5	14
Private monitoring	273	7.12	7	0.80	4	8
Capital	273	6.11	6	1.35	2	9
Restrict	273	9.91	11	2.11	4	15

Table 2: OLS regressions of BHR on RoE and each control variables

This table reports the OLS regressions of the buy-and-hold return to the RoE and our different control variables introduced separately. In each specification, the dependent variable is the weekly buy-and-hold return from July 2007 to the end of 2008 and we control for the size and the beta. RoE is the ratio of pre-tax-profit to equity. Tangible equity is the ratio of equity minus intangible assets divided by total assets. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets. Deposits is the ratio of customer deposits to total assets. Funding fragility is the ratio between the sum of deposits from banks, other deposits and short-term borrowing to total deposits and short-term borrowing. Non-interest income is the ratio of non-interest income to total operating income. Density is the ratio of risk-weighted assets to total assets. BHR 2006 is the weekly buy-and-hold return for the year 2006. Size refers to the natural logarithm of total assets. Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return from 2004 to 2006. Country variables include ADRI, Institution, Official, Private monitoring, Capital and Restrict. Below the regression coefficient is reported the standard error in parentheses and to the right of the regression coefficient its significance (***) significant at 1%, **significant at 5%, * significant at 10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.877*** (0.262)	0.875*** (0.261)	0.829*** (0.313)	0.070 (0.316)	0.289 (0.244)	0.540** (0.244)	0.640*** (0.237)	1.014** (0.404)	1.401***
RoE	-0.764*** (0.182)	-0.755*** (0.181)							
Tangible equity			-0.012** (0.005)						
Tier 1				0.016* (0.010)					
Deposits					0.496*** (0.089)				
Funding fragility						-0.338*** (0.076)			
Non-interest income							-0.514*** (0.104)		
Density								-0.479*** (0.124)	
BHR2006									-0.282*** (0.072)
Size	-0.067*** (0.012)	-0.066*** (0.013)	-0.095*** (0.014)	-0.073*** (0.014)	-0.057*** (0.020)	-0.068*** (0.011)	-0.061*** (0.013)	-0.090*** (0.015)	-0.071*** (0.012)
Beta		-0.015 (0.049)	-0.056 (0.049)	-0.076 (0.057)	0.006 (0.045)	-0.013 (0.048)	0.030 (0.050)	-0.133** (0.062)	-0.063 (0.047)
Country variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	273	273	273	212	273	273	273	190	273
R ²	0.337	0.338	0.306	0.387	0.388	0.351	0.380	0.424	0.335

Table 3: OLS regressions of BHR on RoE and control variables

This table reports the OLS regressions of the buy-and-hold return to the RoE and our different control variables. In each specification, the dependent variable is the weekly buy-and-hold return from July 2007 to the end of 2008 and we control for the size and the beta. RoE is the ratio of pre-tax-profit to equity. Tangible equity is the ratio of equity minus intangible assets divided by total assets. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets. Deposits is the ratio of customer deposits to total assets. Funding fragility is the ratio between the sum of deposits from banks, other deposits and short-term borrowing to total deposits and short-term borrowing. Non-interest income is the ratio of non-interest income to total operating income. Density is the ratio of risk-weighted assets to total assets. BHR 2006 is the weekly buy-and-hold return for the year 2006. Size refers to the natural logarithm of total assets. Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return from 2004 to 2006. Country variables include ADRI, Institution, Official, Private monitoring, Capital and Restrict. Below the regression coefficient is reported the standard error in parentheses and to the right of the regression coefficient its significance (***) significant at 1%, **significant at 5%, * significant at 10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	0.706** (0.302)	1.006*** (0.275)	0.953*** (0.278)	0.275 (0.355)	0.648* (0.351)	0.511 (0.348)	1.073*** (0.358)	1.270** (0.376)	1.019*** (0.370)	0.544 (0.449)
RoE	-0.690*** (0.184)	-0.752*** (0.178)	-0.518*** (0.196)	-0.761*** (0.213)	-0.864*** (0.214)	-0.622*** (0.238)	-0.616*** (0.234)	-0.552** (0.279)	-0.586*** (0.183)	-0.665*** (0.225)
Tangible equity	-0.004 (0.005)	-0.006 (0.005)	-0.005 (0.005)						-0.003 (0.005)	
Tier1 ratio				0.016** (0.008)	0.013 (0.008)	0.019** (0.008)				0.017** (0.008)
Deposits	0.444*** (0.101)			0.559*** (0.159)			0.557*** (0.167)		0.422*** (0.099)	0.497*** (0.168)
Funding fragility		-0.295*** (0.081)			-0.226 (0.152)					
Non-interest income			-0.398*** (0.108)			-0.361** (0.158)		-0.254 (0.172)		
Density							-0.351*** (0.133)	-0.348*** (0.131)		
BHR 2006									-0.123* (0.069)	-0.095 (0.083)
Size	-0.051*** (0.015)	-0.063*** (0.013)	-0.062*** (0.015)	-0.031** (0.015)	-0.052*** (0.014)	-0.047*** (0.015)	-0.050** (0.017)	-0.069*** (0.015)	-0.049*** (0.014)	-0.033** (0.015)
Beta	0.025 (0.046)	0.008 (0.048)	0.030 (0.052)	-0.028 (0.055)	-0.037 (0.057)	-0.041 (0.058)	-0.062 (0.063)	-0.083 (0.069)	0.012 (0.047)	-0.044 (0.059)
Country variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	273	273	273	212	212	212	190	190	273	212
R ²	0.428	0.401	0.399	0.494	0.449	0.464	0.514	0.471	0.435	0.498

Table 4: OLS regressions of BHR on RoE and control variables for deposit-taking banks

This table reports the OLS regressions of the buy-and-hold return to the RoE and our different control variables. In each specification, the dependent variable is the weekly buy-and-hold return from July 2007 to the end of 2008 and we control for the size and the beta. RoE is the ratio of pre-tax-profit to equity. Tangible equity is the ratio of equity minus intangible assets divided by total assets. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets. Deposits is the ratio of customer deposits to total assets. Funding fragility is the ratio between the sum of deposits from banks, other deposits and short-term borrowing to total deposits and short-term borrowing. Non-interest income is the ratio of non-interest income to total operating income. Density is the ratio of risk-weighted assets to total assets. BHR 2006 is the weekly buy-and-hold return for the year 2006. Size refers to the natural logarithm of total assets. Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return from 2004 to 2006. Country variables include ADRI, Institution, Official, Private monitoring, Capital and Restrict. Below the regression coefficient is reported the standard error in parentheses and to the right of the regression coefficient its significance (*** significant at 1%, **significant at 5%, * significant at 10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	0.684* (0.366)	1.112*** (0.325)	0.956*** (0.339)	0.178 (0.402)	0.578 (0.397)	0.511 (0.378)	1.053*** (0.429)	1.270** (0.376)	0.810* (0.441)	0.385 (0.518)
RoE	-0.804*** (0.197)	-0.855*** (0.195)	-0.658*** (0.218)	-0.705*** (0.226)	-0.838*** (0.226)	-0.635*** (0.243)	-0.596** (0.258)	-0.587** (0.283)	-0.765*** (0.209)	-0.648*** (0.235)
Tangible equity	-0.002 (0.007)	-0.005 (0.006)	-0.002 (0.008)						-0.002 (0.007)	
Tier1 ratio				0.019** (0.09)	0.017** (0.008)	0.021*** (0.008)				0.020** (0.009)
Deposits	0.621*** (0.138)			0.541*** (0.164)			0.529*** (0.174)		0.596*** (0.146)	0.492*** (0.175)
Funding fragility		-0.441*** (0.115)			-0.179 (0.151)					
Non-interest income			-0.438*** (0.122)			-0.375** (0.146)		-0.270* (0.158)		
Density							-0.349*** (0.135)	-0.372*** (0.132)		
BHR 2006									-0.045 (0.069)	-0.066 (0.085)
Size	-0.039** (0.016)	-0.057*** (0.014)	-0.052*** (0.016)	-0.035** (0.016)	-0.057*** (0.014)	-0.049*** (0.015)	-0.054*** (0.017)	-0.071*** (0.016)	-0.039** (0.016)	-0.037** (0.016)
Beta	0.011 (0.049)	0.009 (0.051)	0.030 (0.054)	-0.002 (0.055)	-0.009 (0.057)	-0.008 (0.056)	-0.033 (0.063)	-0.048 (0.066)	0.005 (0.051)	-0.013 (0.059)
Country variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	245	245	245	206	206	206	184	184	245	206
R ²	0.442	0.411	0.415	0.497	0.456	0.476	0.513	0.471	0.443	0.499

Table 5: OLS regressions of BHR on alternative measures of RoE, RoA and control variables

This table reports the OLS regressions of the buy-and-hold return to the RoE and our different control variables. In each specification, the dependent variable is the weekly buy-and-hold return from July 2007 to the end of 2008 and we control for the size and the beta. RoE is the ratio of pre-tax-profit to equity. RoA is the ratio of the pre-tax-profit to total assets. Tangible equity is the ratio of equity minus intangible assets divided by total assets. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets. Deposits is the ratio of customer deposits to total assets. Non-interest income is the ratio of non-interest income to total operating income. Size refers to the natural logarithm of total assets. Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return from 2004 to 2006. Country variables include ADRI, Institution, Official, Private monitoring, Capital and Restrict. Below the regression coefficient is reported the standard error in parentheses and to the right of the regression coefficient its significance (***) significant at 1%, **significant at 5%, * significant at 10%).

	RoE=Net income/equity (1)	RoE=Net income/equity (2)	Pretax RoAE (3)	Pretax RoAE (4)	RoA (5)	RoA (6)
Constant	0.678** (0.301)	0.109 (0.380)	0.613*** (0.245)	0.162 (0.352)	0.179 (0.343)	0.420 (0.347)
RoE	-0.897*** (0.259)	-0.686** (0.221)	-0.675*** (0.206)	-0.759*** (0.249)		
RoA					-9.052*** (2.449)	-6.967*** (2.612)
Tangible equity	-0.003 (0.005)		-0.004 (0.005)			
Tier 1		0.018** (0.009)		0.017** (0.008)	0.026** (0.008)	0.026*** (0.008)
Deposits	0.474*** (0.087)	0.565*** (0.167)	0.446*** (0.101)	0.556*** (0.158)	0.569*** (0.152)	
Non-interest income						-0.363** (0.153)
Size	-0.046*** (0.014)	-0.032** (0.015)	-0.052*** (0.015)	-0.032** (0.015)	-0.039** (0.015)	-0.054*** (0.015)
Beta	0.031 (0.047)	-0.024 (0.054)	0.017 (0.046)	-0.038 (0.058)	-0.057 (0.055)	-0.065 (0.058)
Country variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	273	212	273	212	212	212
R ²	0.432	0.474	0.418	0.484	0.492	0.460

Table 7: CEO compensation regressions

This table reports the OLS regressions of the natural logarithm of total CEO compensation on RoE and other complementary variables. In each specification, the dependent variable is the natural logarithm of total CEO compensation for 2006, composed of direct compensation and equity-linked compensation. RoE is the ratio of pre-tax-profit to equity. RoA is the ratio of the pre-tax-profit to total assets. BHR 2006 is the weekly buy-and-hold return for the year 2006. Below the regression coefficient is reported the standard error in parentheses and to the right of the regression coefficient its significance (***) significant at 1%, **significant at 5%, * significant at 10%).

	(1)	(3)	(4)	(5)	(6)	(7)
Constant	8.267*** (0.313)	8.854*** (0.206)	8.640*** (0.992)	6.379*** (0.642)	6.060*** (0.673)	7.039*** (0.877)
ROE	2.929** (1.210)				2.289* (1.182)	2.698** (1.189)
ROA		9.160 (9.669)				
BHR 2006			0.323 (0.801)			-1.393* (0.746)
Size				0.223*** (0.057)	0.200*** (0.062)	0.252*** (0.072)
N	64	64	64	64	64	64
R ²	0.09	0.02	0.003	0.161	0.214	0.253

Appendix A: Distribution of banks by countries

Countries	Number of banks (Main sample)
Australia	3
Austria	5
Belgium	2
Brazil	2
China	1
Denmark	4
France	14
Germany	11
Great Britain	9
Greece	5
Hong Kong	7
India	15
Ireland	3
Israel	5
Italy	12
Japan	75
Malaysia	1
Netherlands	2
Norway	4
Portugal	3
Russia	2
Singapore	3
South Africa	5
Spain	7
Sweden	4
Switzerland	13
United States	46
Taiwan	10
TOTAL	273

Appendix B: presentation of country-level variables

Our first country-level governance variable is the updated anti-director rights index (ADRI), compiled by Djankov, La Porta, Lopez-de-Silanes and Shleifer (2008) and measures shareholder protection.

Our second variable measures the quality of legal institutions, based on the six country-level indicators posited by Kaufmann, Kraay and Mastruzzi (2008). These indicators are voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption. The ADRI is an important control variable which can be related both to stock performance and to RoE. For example, John, Litov and Yeung (2008) provide empirical evidence that risk-taking is affected by shareholders protection. On the other hand, Gropp and Khöler (2010) document that ADRI has a positive impact on the average RoE of banks in the years preceding the crisis.

Our four country variables specific to the banking industry are indices provided by Caprio, Leaven and Levine (2007) using revised data from Barth, Caprio and Levine (2008).

Capital is an index of the regulatory oversight of bank capital. It is based on indicators capturing information such as whether the sources of funds considered as regulatory capital can include assets other than cash and government securities, whether the sources of funds to be used as capital are verified by the regulatory and supervisory authorities or whether the minimum risk-weighted capital-asset ratio requirement is in line with the Basel guidelines.

Restrict is an index of the regulatory restrictions on bank activities. It is based on indicators capturing the ability of banks to engage in securities market activities, insurance activities and real estate activities or to own nonfinancial firms.

Official is an index of official supervisory power. It measures the power of the supervisory authorities to take specific actions to prevent or correct problems, such as the right of the supervisory authorities to demand information from auditors or to force the bank to change its internal organisational structure.

Private monitoring is an index of the private sector monitoring of banks. It measures the extent to which monitoring by the private sector is promoted and facilitated by the regulation.