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Effectiveness of Banking Regulation and Supervision in the Light of the Global Financial Crisis

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Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all the resources and literature I have used. I also proclaim that this thesis has not been used to obtain the same or any other degree.

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Acknowledgments

Abstract

In this paper we investigate the impact of banking regulation and supervision on the economy during crises and compare our results with current regulatory trends. Specifically, we employ a dataset consisting of 49,183 firms in 85 countries to estimate the influence on availability of credit and 642 banks in 48 countries to evaluate the influence on banking profits. We provide evidence that banks in countries with more independent regulators had higher profits, while the increased power of supervisory agency and disclosure requirements fostering private monitoring had a negative effect on profits. The evidence, on the other hand, suggests that private monitoring did increase the availability of credit during crisis. Although the current global approach to regulation does deal with many issues that arose from our analysis, the analysis did not provide any evidence of the beneficial effect of capital requirements that are at the core of this approach.

Bibliographic card

Abstrakt

Tato studie zkoumá dopad bankovní regulace a dohledu na ekonomiku během krize a porovnává empirické výsledky se současnými světovými regulačními trendy. Pro analýzu využíváme soubor 49.183 firem z 85 zemí pro odhad vlivu na dostupnost úvěrů a 642 banky ze 48 zemí abychom zhodnotili vliv na zisky bank. Náš model odhalil, že banky ze zemí s vyšší mírou nezávislosti regulačního orgánu dosahovaly během krize vyšších zisků. Naopak posilování pravomocí těchto regulačních orgánů a zákony nařizující zveřejňování informací, které podněcují tržní dohled, mají na zisky negativní vliv. Vyšší intenzita tržního dohledu nicméně také zlepšuje dostupnost půjček během krize. Přestože současné světové regulační trendy zohledňují mnohé z problémů, které výzkum odhalil, nenašli jsme žádné důkazy naznačující, že by jádro těchto tendencí - kapitálové požadavky - zvyšovaly zisky bank nebo dostupnost půjček během krize.

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Acronyms

BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BRSS	Banking Regulation and Supervision Survey
CPI	Consumer Price Index
EU	European Union
FSB	Financial Stability Board
GDP	Gross Domestic Product
IIF	Institute of International Finance
NBER	National Bureau for Economic Research
NIM	Net Interest Margin
ROAE	Return on Avergae Equity
SIFI	Systemically Important Fincncial Institution
SPV	Special Purpose Vehicle
WB	World Bank
WDI	World Development Indicators
WGI	World Governance Indicators

Introduction

Although the theory of business cycles is widely known and accepted among economists, the crisis originating in the American mortgage sector in 2007 has struck with immense power. The banking sector was at the core of the crisis, often blamed for its depth but also bearing a great deal of the costs (Fahlenbrach & Stulz, 2011). Banking is one of the most regulated industries (Chortareas, Girardone & Ventouri, 2012) and the crisis brought much attention to the question how exactly this regulation is carried out. The latest development in the field is chiefly represented by the Basel III accord by the Basel Committee on Banking Supervision (BCBS) which advances increased stringency of the regulation, supported by stronger and more independent supervisory agencies. Not all of the regulations, however, are based on systematic empirical research and some spur great controversy.

So far, given the fact that only recently did we obtain comprehensive information to study this field, there is only little evidence on how the bank performance during crises is affected by regulation and supervision. Novelty of this research field is caused the fact that until the turn of the millennium there was no global source of data on regulation. Only this change and the Great Recession, being the first financial crisis with a truly global impact since, enabled us to start empirical research on the effects of regulation and supervision in crises.

In this text we aim to expand this still narrow category by estimating the impact on bank profits and availability of credit during crisis. Our primary source is the Bank Regulation and Supervision Survey (BRSS) from year 2007, mapping the pre-crisis policies of 2005 and 2006. This survey is a third, updated version and contains results of 143 countries from all around the world. Although a great leap forward, this database does not provide us with all the details, therefore we will follow the lead of Barth, Levine & Caprio (2006), who estimate the effects of broader approaches to regulation and supervision, rather than testing specific rules and policies.

Ultimately, our results will be compared with the globally accepted regulatory advice, mostly represented by Basel III, to determine its impact on crisis profits and credit availability. Unfortunately, this research is limited by the structure of available data. The data from 2007 that we use and that have affected the banking sector performance during crisis do not precisely fit the regulation changes proposed later, because the crisis has revealed many aspects of regulation that had been long left out.

Nonetheless, we still believe that even with this handicap the data can provide useful lessons.

The paper is organized as follows. The next section discusses the reasoning of banking regulation and some of the most commonly used regulations. Section 3 introduces the results of preceding research in the field. Section 4 presents the data and our regressions. Section 5 compares our results with those presented by other authors and with policies advanced by supranational organizations. Section 6 concludes.

1 Theoretical Background

1.1 Do We Need to Regulate and Supervise the Banking Systems?

Today, banks are an integrated part of financial systems. Together with other intermediaries, markets on which claims are exchanged and infrastructure enabling the co-functioning of the former two, they facilitate resource allocation in market economies (Crockett, 2011). Among their greatest contributions belongs creation and management of payment system which allow funds to be directly transferred from one party to another without an unnecessary web of intermediary obligations (Cirasino & Garcia, 2008). The volume of operations then presents several more valuable functions, e. g. transformation of maturity (compiling a steady flow of short-term deposits, the bank can finance a long-term credit). Further, banks can overcome the problem of asymmetrical information in lending by combining the risk rising from individual claims and compensating for it with interest rate spread. Lastly, the large volume allows banks to provide hedging against unfavourable outcomes of investments, overcoming risk-aversion and boosting growth (Crockett, 2011). This positive effect, however, is conditioned by the fact that all the aforementioned functions are carried out properly. Only in that case does the financial system promote growth and channels funds to those that have the best potential to make use of them.

Such a view by itself is, however, very simplified and there are many obstacles for this goal to be accomplished. As pointed out by Groenwegen, Spithooven and Van den Berg (2010), there are five major market imperfections that we are dealing with.

- *Market power* and *natural monopolies* that lead to market power enable banks to increase their profits at the cost of consumers by setting the price above average costs as it would be in perfect competition. Furthermore, the firm can also abuse its power to protect its future position by means of dumping or other harmful activity. It is also important to stress that banking is very often considered a natural monopoly as bigger scope of operations enable banks to diversify their risks and higher cash flows provide them with a wider (and possibly more profitable) range of investments.

- *Externalities*, the costs of conduct inflicted upon actors originally not involved, are another example of market failures. A bank that goes bankrupt may cause unjustified panic among the depositors and a consequential bank run resulting in another bank becoming insolvent.

- *Imperfect information* renders contractual parties unable to anticipate all possible outcomes and realize all consequences. In the case of banking this can result in the inability to properly assess the risk of a transaction. A depositor who has no knowledge of the bank's structure and current financial standing has no way of determining the risk related with such a transaction. Then he faces a situation of uncertainty and cannot properly determine the interest rate he would demand in case of perfect information.

- *Pure public goods* may not seem as a pressing matter in our context, but the regulation and supervision as a whole can be seen as a pure public good. The reason for this is that the effects of complying with given set of rules are both non-rivalrous and non-excludable. In other words enjoying the benefits coming from it does not decrease the benefit for others and one cannot be effectively prevented from enjoying them.

In order to deal with mentioned market imperfections, support the basic allocation role of banking system and minimize the costs, governments all around the world employ sets of rules and their control and enforcement – regulation and supervision. But although the existence of market imperfections is a widely accepted fact, there are two different paradigms about the nature of human behavior, shaping the final outcome.

1.2 Public and Private Interest Views

Any person working in the public service faces a choice. This situation is often explained as the principal-agent problem. The principals (voters) directly or through political intermediaries choose an agent (regulator) to represent their interest. On the one hand, he can try to selflessly work with the aim of maximizing total social welfare. On the other hand, he has the opportunity to use the power vested in him by his mandate and maximize his own welfare. This choice represents the two paradigms described in the following paragraphs.

The public interest view has long been taken for the only one. It assumes that regulators pursue the goal of maximizing the efficiency, stability and development of banks, given the constraints and market failures they face. As an illustrative example

we will present an entry barrier for new banks. If a regulator presents reasonable requirements for new bank entry, it is a way of protecting depositors from banks that would be potentially unstable or even fraudulent. For this reason most countries have set some basic capital, qualification and other requirements to protect their citizens, who do not have the capacity to obtain and evaluate all the necessary information.

The very same regulation could also be viewed as an act of private (vested) interest if seen from different viewpoint. That would be, for one, a situation when the regulator in charge of drafting new laws is approached by representative of a bank. This bank is threatened by a foreign bank planning to enter the market and new regulation would make such an expansion more difficult. In such case bribes or "gifts" can be present, but it could also be a much simpler incentive. Especially in smaller countries, there are not that many people in the top level of financial companies. This comes at a prize. It is probable that the regulated will be possibly the next (and maybe even former) employer of the regulators, who must weigh the regulatory actions against the bad or good will of their future employer. Also we could use a situation, where rules are in place, but the supervisors are not enforcing them effectively. There is a very indirect way of doing that by deliberately decreasing the supervisory agency capacity (The World Bank, 2012a).

It can often be hidden details that draw the fine line between the public and private interest views, but in the final hour, it is crucial to know, whether we can rely unconditionally on the public servants or whether there needs to be an additional set of rules and controlling mechanisms to ensure the desired outcome.

Although there is no definitive proof of either of the views, this text will work mostly on the grounds provided by private interest view, drawing its confidence from findings of Barth, Caprio & Levine (2006, p. 314) who claim that the data they present "provide ample support for the private interest view of government and surprisingly little support for the public interest view" and that "[a]cross the world there are insufficient checks and balances on government officials to induce them to behave in a way that boosts the functioning of banks."

1.3 Basic Approaches to Bank Regulation and Supervision

The following classification of regulation and supervisionis is certainly a generalized one and does neither aim to contain all the policies, nor the consequences connected with them. It is important to keep in mind the existence of many others, but the

author of this text believes, that it will provide the reader with the basic insights and underlying logic that will be used in the analytical part further in the text.

Probably the most straightforward way of regulation is upright bank ownership. Some may argue that the ownership itself does not necessarily mean different regulatory approach, but Barth et al. (2006) show that indeed when bank is owned by the government, different policies tend to be implemented. In such case the regulations are stricter in terms of activity restrictions, the supervisory authority is usually more independent and the deposit insurance schemes are not so common. The main upside of ownership is a direct and powerful channel of influencing the behavior of the bank. For a regulatory authority obtaining such a power is very difficult, if not impossible. Secondly, through ownership the government has easier access to information and does not need to undergo lengthy processes of obtaining it. There is a long lasting debate whether government ownership ultimately enhances the functioning of allocation process and boosts the economic growth (Gerschenkron, 1962), or decreases it and is subject to political cycles (Dinc, 2005). Recent research, however, indicates rather the pessimistic view of adverse effect of government ownership (La Porta, Lopez-de-Silanes & Schleifer, 2002).

On the other side of the regulatory spectrum is private monitoring where it is the role of the market to evaluate the available information and assess risks connected with possible transaction. By means of interest rate the investors and depositors appraise this risk and force banks to either lower it or face higher price of funding (Peria, Schmukler & Soledad, 2001). This does not mean that the regulators have an entirely passive role. They have numerous ways of strengthening the private monitoring power. Firstly, they can oblige banks to disclose reliable, relevant and up-to-date information to enable the functioning of market forces. Secondly, certain standards (e.g. accounting standards), if followed, help decrease the cost of obtaining information and subsequent efficiency of private monitoring (Fernández & González, 2005). Thirdly, as done in many countries, the banks have the obligation to order an external audit at their own expenses and prove that they are not taking any excessive risks. Fourthly, by decreasing their own activity, the regulators decrease the feeling of security and thus create a pressure on the market to create institutions which would deal with this problem. Herring (2004) argues, that such private control "is forward-looking and inherently flexible and adaptive. Market surveillance is continuous impersonal and non-bureaucratic. ... In contrast, official oversight usually is rule-based, episodic, bureaucratic and slow to change."

Although the debate is fierce and many different opinions are being confronted, the broad approach is relatively agreed upon. It is a mix of private monitoring and governmental regulation and supervision, which is believed to provide the benefits of both. One of the ways to regulate the banking sector is by its very legal definition, in other words the status of a bank may bring along certain advantages. Such advantages will not be provided to every institution. Apart from defining the rules for an institution to be a bank, there are activities forbidden for banks. The main areas that we will also focus on are the scope of operations (are banks allowed to take part in trade with real estate, securities or insurance?) and ownership limits (can a bank own another firm and *vice versa*?). The less allowing such regulations are the lesser is the complexity of banking and other financial conglomerates. This in turn means more transparent conditions and easier work for regulators, which may be especially valuable in less developed countries where the financial and personal capacity is constrained. Also, as Turner (2009) argues, a legal distinction of "narrow banking" servicing the classical commercial and retail banking activities and not taking part in investment banking would increase overall stability. Economists advocating the contrasting approach on the other hand present evidence that activity restrictions decrease system stability (Barth, Caprio & Levine, 2006).

The fields that have drawn probably the most attention in the last decade were capital requirements, leverage ratios and liquidity requirements. Setting the minimum level of capital as a percentage of risk-weighted assets aims to cover the risks connected to lending activities, in other words it forces banks to anticipate that a certain fraction of issued loans will not be repaid and to have the means to deal with such a situation (most commonly a bank does face such stress caused by an increased amount of bad loans during crises). This needs not to be viewed only from purely altruistic standpoint. It is means for government to protect itself and the taxpayers from externalities borne by potential failure of the bank (Berger, Herring & Szeg, 1995). Minimal capital requirements, by increasing equity, also increase the value at risk for investors (relative to possible profits), who therefore have stronger incentives to oversee the management and prevent any excessive risk-taking (Gale, 2010; Hellwig, 2010).

The minimum leverage ratio aims to reduce the scope of activities in relation to bank equity. It deals with banks using strategies (usually borrowing disproportionate sums of money) that enable them to undergo higher risks. But while the risk is rising, the equity that can absorb potential loss remains the same. Recently these topics were in the very centre of the interest of economic research along with the liquidity issue, which has been also underpinned by the recent crisis. Liquidity requirements require

banks to have some amount of capital "readily at hand" to cover financial outflows. All these measures serve to (a) decrease the probability that they will default as a result of their inability to meet their liabilities either because of another bank failure or overall economic distress; (b) prevent management from taking excessive risks; (c) protect the crucial role of banks outlined earlier in the text. But while the system resilience is reinforced, such measures can impede its potential efficiency and vitality (Gorton & Winton, 2000). Although some present evidence that the cost of holding more capital is modest (Kashyap, Stein & Hanson, 2010), others argue that capital requirements decrease the maximum flexibility and incur costs which may be substantial (IIF, 2010).

In case all the precautionary measures fail, there needs to be a plan how to minimize the damage inflicted. For this purpose deposit insurance schemes are used. They usually protect minor depositors for whom life savings may be at stake rather than big investors, employing a maximum amount possibly reimbursed. The data, however, are very critical to this policy and often show that it decreases the incentives for private monitoring and increases moral hazard[1] (Barth, Caprio & Levine, 2004; Demirgüç-Kunt & Detragiache, 2002).

For rules to be respected and have an impact there is one crucial condition – enforcement. Theory of institutional economics says that rules that have no enforcement mechanisms have no real impact (Groenwegen, Spithooven & van den Berg, 2010). Although in general the mechanisms need not be formal, in banking sector the stakes are so high that governments tend not to rely on conscience or society pressure and grant supervisors different instruments to force banks to behave according to the regulation. We will refer to these instruments as to official supervisory power. As we have seen for the other means of regulation, the supervisory power also brings along both advantages and disadvantages. While the power is essential for regulation to work and boost the allocation function, in an unevolved institutional framework where rule of law is not present it may have the exact opposite impact. For example Haber, Noel & Razo (2003) describe that in Mexico the regulatory agency has long been cooperating with the authoritative regime and banks to create rents for prominent parties and ultimately hurting the economy.

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[1] Moral hazard is a situation in which one is taking risks and acquires possible benefits but in case of failure somebody else bears the costs.

The economists do agree that some degree of regulation is necessary to overcome the market imperfections and do not endorse the absolute *laissez-faire approach.* However, the degree of regulation itself is a very hot topic (The World Bank, 2012a). It is logical – if on one side there are market imperfections destroying the value added brought by banks and presenting immense risks, and on the other side is overregulation which can thwart possible prosperity and growth brought by efficient allocation, we need to find a middle ground. But for the time being, the data have not provided us with an answer where exactly this middle ground is and how to work with it and a fiery debate provides much needed motivation for researchers to persist and find a solution.

1.4 Crisis Lessons

It is in the very nature of crises that they are more or less unexpected and show us weak spots in our system. If the crises lacked this attribute, it would be possible to prevent them effectively and smooth the business cycles. Among others Laeven (2011) and Wren-lewis (2010) argue that the some of the weak spots and major contributors to the financial crisis of 2007-2009 were erroneous regulation and supervision. They reveal areas of regulation and supervision that had not mostly been even considered as factors until recent years and claim that their omission was costly and should be rectified. We will briefly introduce the major recognized cases and their background.

Firstly, we have witnessed a major failure of regulation and supervision in risk assessment for individual institutions by disregarding the fact that banks are a part of a complex economic structure where risks are easily transmitted via contagion effects. Although the pre-crisis regulations, mainly represented by Basel II, did greatly improve the processes of risk estimation, they only saw banks as isolated islands and omitted the effects of systemic risk. Connected with this is also the issue of too-big-to-fail banks (systematically important financial institutions or SIFIs) (BIS, 2011). Commonly, SIFIs were only seen as endangering the economy with their extensive assets. Recently the topic has also been newly evaluated as a problem of interconnectedness. Some smaller banks are so integrated in the financial system that their seemingly unimportant failure (as measured by their assets) could cause considerably higher damage than failure of those with higher asset value but less systemic importance (Battiston, Puliga, Kaushik, Asca & Caldarelli, 2012).

Secondly, under Basel II the regulations were specified very narrowly for deposit-taking institutions, trying to insulate this sector from possibly riskier ones. But to the

contrary of the original intentions, complex ownership structures and channeling of risk through special purpose vehicles (SPVs) only hid the cumulating risk from possible supervision and gave rise to shadow banking. Once again we see a narrow approach that misses out the global picture. To make the situation even more serious and chaotic, banking regulation and supervision is mostly concentrated on a national level, while banks, especially those bigger and systematically more important, are working on an international basis.

Thirdly, some of the risk-weights commonly adopted before the crisis were seriously miscalculating the risks. The brightest examples are certainly securitized mortgages that were considered riskless and allowed banks to reduce capital held to withstand upcoming shocks. Acharya & Richardson (2009) even claim that this was one of two main reasons, "[w]hy did the popping of the housing bubble bring the financial sector rather than just the housing sector of the economy to its knees".

Fourthly, the supervisory performance was unsatisfactory in many cases due to three reasons. (i) Insufficient financial or personal capacity, (ii) insufficient independence and regulatory capture[2] and (iii) lack of incentives to carry out the supervisory duties conscientiously (The World Bank, 2012a). Some countries may have a set of well defined rules and regulations but as we have discussed earlier, the absence of proper enforcement can paralyze the whole system.

1.5 Current Regulatory Orientation

The regulatory response was proportional to the shock that the recession had caused in society and among economists. The two largest initiatives representing this response are certainly international regulatory framework for banks (Basel III) issued by the Bank for International Settlements (BIS) (BCBS, 2011, 2013)and the Financial Stability Board (FSB) established in 2009 by the G20 countries. Although, except for the 12 Key International Standards and Codes by FSB[3], the advice is not binding, it is much respected and taken as a standard to which countries should converge. This benchmarking, however, can sometimes be undesirable, as documented in 2004 when "a number of developing country officials stated that they felt under pressure to adopt

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[2] Regulatory capture is a situation in which the agency promotes policies systematically benefiting certain interest group rather than the economy as a whole.

[3] For more information on the 12 Key International Standards and Codes by FSB, see http://www.financialstabilityboard.org/cos/key_standards.htm

Basel II, with some pressure coming from international rating agencies" (Barth, Caprio & Levine, 2006, p. 71). The reason why such pressure is undesirable is that some of the regulatory specifics are very advanced and a developing country with insufficient means faces a choice between lower rating and blind implementation of unenforceable regulations, both harmful to the economy.

The primary source of debates and most influential of aforementioned is Basel III. Its main focus lies with increasing the amount and quality of bank capital while implementing some of the crisis lessons and taking into consideration trading counterparty risks and systemic risk (BCBS, 2011). The flagship is a minimum level of common equity as a percentage of risk weighted assets set on 4.5% and further increased by multiple criterions. In periods of abundant credit the limit is raised by capital conservation buffer to 7% to withstand future stress conditions. Should banks draw from this buffer, their earnings distribution will be constrained to restore the 7% common equity requirement. Further, according to national circumstances, the regulatory authority can impose another 2.5% increase on grounds of excess aggregate credit growth associated with system-wide risk (countercyclical capital buffer). Lastly, the FSB has indentified 29 SIFIs (FSB, 2012) that are required to maintain additional common equity level ranging between 0 and 2.5% (the most stringent 'bucket' imposing additional 3.5% is currently empty). The total regulatory capital therefore ranges from 7 to 13% and comprises of:

$$Total\ Regulatory\ Capital =$$
$$\{Tier\ 1\ Capital\ Ratio\} + \{Capital\ conservation\ Buffer\} +$$
$$\{Countercyclical\ capital\ buffer\} + \{SIFI\ buffer\}$$

This criterion is complemented by minimal leverage ratio of 3%, stricter definition of capital, improved risk-assessment and some expansion on information disclosure requirements. The banks further need to be prepared to withstand a stress scenario (Liquidity Coverage Ratio) and to use more stable sources of funding (Net Stable Funding Ratio), both of which address the need for high-quality liquid assets in time horizon of one month and one year, respectively (BCBS, 2013).

Finally, the FSB has presented a number of proposals that aim to deal with some of the other issues contributing to the unexpected impact of crisis. Specifically, it is addressing market discipline failures (FSB, 2009a), reliance on credit rating agencies (FSB, 2010a), dealing with SIFIs (FSB, 2010b), alignment of supervisory incentives (FSB, 2009b) and the shortage of reliable data.

1.6 Conclusion

If markets were perfect, negotiations costless and contracts could be drafted to cover every possible option there would be no need for regulators supervising the process of allocation of resources. But market imperfections impede this process and in many cases it is expedient to invest in regulation to prevent or at least mitigate them. We have come a long way since the regulations of Roman banking more than two thousand years ago, yet our approach is still by far not perfect (Temin, 2002). The crisis has proven us wrong in many ways, when institutions that were considered to be in a good shape and even so certified by external auditors were not able to resist the downturn, some of them even standing at its very beginning. The newest lesson, so dearly paid for, is a lack of context in which we worked and the researchers have many new tasks to carry out. We should, however, not forget the basic approaches of which many are not resolved either. As the data are slowly cumulating and the portfolio is widening, we can perform progressively more thorough analyses, one of which will be presented further in the paper.

2 Literature Review

The research on our topic could be roughly divided into three periods. The early studies mostly relied on developing theoretical reasoning for different policies with sporadic empirical models. We could say that the central topics were quite similar at that time, much revolving around capital regulation and the extent of official supervisory power. The second period began with assembling the first comprehensive database on bank regulation and supervision by Barth, Caprio and Levine (2001) which is currently administered by the World Bank (mapping the policies in four rounds of the survey stretching from 1998 to 2012). This opened up the door for more precise studies and comparison of their results. The latest period is marked by the Great Recession that revealed many drawbacks of our regulatory approach and also gave us the first opportunity to assess the regulatory impact in crisis conditions.

Similarly to the current debate, controversy was common from the very beginning. While Dewatripont & Tirole (1993) made the case for capital adequacy requirements, presenting its stabilizing effect shielding debt holders from losses, Blum (1999) warned that with high cost of equity the bank needs to undergo riskier ventures to raise it. The same heterogeneity of opinions, fuelled by the unresolved issue of private/public interest views, applied for supervisory power. For policy choices the public interest was widely assumed, but numerous studies present the opinion that such a view is too narrow and private interest is a strong force, too, if not the major motivation (Hansen, 2001; Kroszner & Strahan, 1999; Shleifer & Vishny, 1989). The opposite held for information disclosure that facilitates private monitoring. Although left out entirely by Basel I, it was considered an important factor strengthening prudential regulation and supervision (Herring, 2004; Kane, 2000; Nelson, 2001).

The central body of research since 2004 have been the works by Barth et al. (2004, 2006, 2008, 2012) who introduce the survey results along with several models assessing the impact of regulation and supervision on bank development, efficiency, governance, performance, corruption in lending and probability of crisis occurrence. Their results are consistently confirming the beneficial effect of private monitoring on bank development, performance and stability, although the regulation changes do not reflect this finding. Moreover, according to their models restrictions on non-lending activities have adverse effects on bank efficiency and development and they state that "[f]ollowing Basel guidelines many countries strengthened capital

regulations and official supervisory agencies, but existing evidence suggests that these reforms will not improve bank stability or efficiency." (Barth et al., 2008)

Contrary to these findings, Barth, Lin, Ma, Seade and Song (2010) present evidence that official supervisory power (if combined with independence) and capital stringency is associated with higher efficiency, drawing from the same dataset on regulation and operating with a sample of 4,050 banks from 72 countries. Chortareas, Girardone and Ventouri (2012) confirm their findings, using a sample of 22 EU countries over the years 2000-2008, further stressing the importance of institutions that enhance the positive effect. Similar research on 1,400 banks in 72 countries, using net interest margin (NIM) and overhead costs as efficiency measures, indicates that activity restrictions have a negative effect on bank efficiency (Demirguc-Kunt, Laeven & Levine, 2003). Pasiouras, Tanna & Zopounidis (2009) examine 615 banks from 74 countries between 2000 and 2004, again drawing from the dataset by Barth et al., and find out that empowering both private monitoring and official supervisors increase cost- and profit-efficiency of banks.

As opposed to times of growth, some evidence supports the claim that during the crisis activity restrictions did help banks perform better (measured by stock returns from July 2007 to December 2008) and mitigate the decrease in loans (Beltratti & Stulz, 2012). They, however, did not find any evidence that other regulations have a significant effect on performance and the amount of loans. Ahrend, Arnold and Murtin (2011) on the other hand, found "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." Finally, Cihak and Demirguc-Kunt (2012) present evidence based on the latest round of the regulatory survey that non-crisis countries did have stricter capital requirements, stronger private monitoring incentives and less restrictions on activities.

There is also a group of papers focusing on more specific aspects of regulation, namely the alignment of CEO incentives and their compensation (Fahlenbrach & Stulz, 2011), architecture of supervisory agencies (Masciandaro, Pansini & Quintyn, 2011) or calculation of contagion effects and diversification benefits (Elliott, Golub & Jackson, 2013). We shall, however, adopt the broader approach and focus on the effect of banking regulation and supervision on indicators of banking sector health and performance during the crisis.

3 The Influence of Regulations on Banking in Time of a Crisis

It is most difficult to evaluate such a complex matter; we could examine number of different indicators and still not see the whole picture, merely just a handful of tiny pieces of the mosaic of real banking performance and effectivity. But rather than trying to encompass all of them, the aim of this text is to choose few and find out if different approaches to regulation and supervision do affect them. The trend of information aggregation and disclosure did provide a great push for research in this field, but unfortunately we still lack data detailed enough to analyze specific laws, rules and regulations. Therefore we will construct indices much similar to the categories introduced earlier in the text, representing a broader approach of restrictiveness and power allocation.

This text has two main foci in order to tackle the issue of banking results during crisis. Firstly, we will examine how banks fared during crisis from a financial viewpoint. It is our assumption that banks well prepared and possibly expecting a shock will have better financial results when such a situation comes. Not necessarily does every bank with sound finances have to maintain profitability even during such a severe crisis, but it should converge to better results than a bank undergoing excessive risks and neglecting all precautionary measures. Governments, imposing certain minimal standards and distributing powers to oversee and enforce them, play an important role as they can 'force' a bank to expect the worst. Regulations do not have to exactly define how a bank will behave; in some cases they may be so mild that there will be no effect at all, but they have the potential and this potential will be the subject of our first analysis.

Secondly, we will test how banks perform one of their core roles in the economy – redistribution of funds. We do this, bearing in mind that a financially good result of a bank can come at a cost for the rest of the economy - in this case of the entrepreneurs who get cut off from credit for their enterprises. The two measures are in many ways complementary and in the long run the government has to hold them in balance. Should banks deteriorate, there will be no intermediary to effectively carry out the resources allocation. Should the entrepreneurial activity decline, the ultimate goal of providing nurturing financial environment is defeated and the government is risking an economic slowdown (Wennekers & Thurik, 1999).

For the sake of interpretation clarity we will employ one more assumption - for both our indicators higher values are better during the crisis. This is, however, not as straightforward as it might seem. In times of booming economy there are very good reasons to reduce them (Gersbach & Rochet, 2012a). Not necessarily does that mean that banks should be deprived of all profits, rather that they should not be allowed to undergo excessive risks that often produce such profits. Similarly, regulators should slow down credit boom in times of prosperity to protect myopic market participants from future inability to pay back. In turn, banks being more prudent during growth should have less bad loans and fewer losses due to excessive risk exposure and thus they should have higher profits and continue distributing capital better than those suffering from a major shock. Finally, we will disregard the case of overregulation in which banks would behave so prudentially that the profits and loan availability would be even higher but coming at a much higher costs during growth (thus we find ourselves on the left of optimal regulatory prudence; for illustration see Figure 3.1). Given the assumptions we adopted, the hypothesis we will test is that the regulations have significant impact on credit availability and bank profits during periods of stress and this fact is reflected in the current approach to regulation and supervision.

Figure 3.1: Illustration of the optimal level of regulation
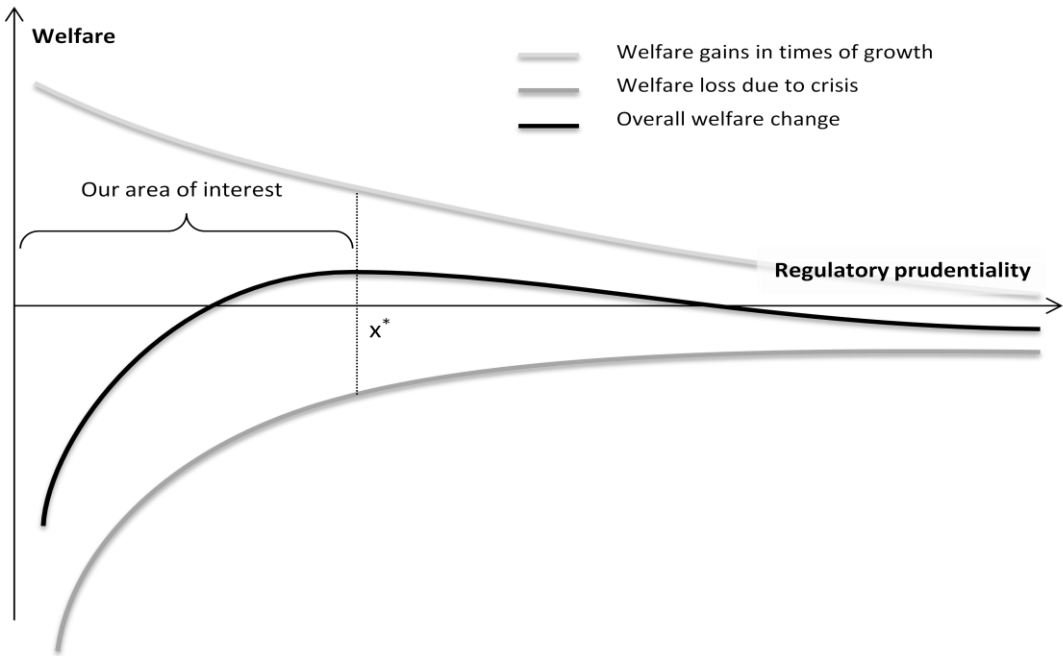
Source: author's estimation.

3.1 The Regulation

Since 1999 World Bank has been collecting and releasing data on banking regulation and supervision around the world. This public database provides firm foundations for researchers who strive to find answers about regulatory policies. It is especially beneficial for three reasons: (i) this database is first of its kind and scope and allows for statistical testing of hypotheses that could not have been tested before, (ii) to the contrary of private datasets, the public access gives rise to a number of different studies, their comparison and gradual convergence to the optimal specifications that reveal most of what we are looking for, (iii) repeating the survey, the World Bank both has the opportunity to correct possible mistakes from previous trials and with time presents an increasingly comprehensive dataset which may allow for time-series estimations.

For our own estimations we will utilize a revised version of the third of four surveys, conducted in years 2005 and 2006 and published in year 2007. The data were collected from 143 countries by questioning the principal contacts in each country of the Basel Committee on Bank Supervision (Barth et al., 2008), which presents conditions for cautious use. Firstly, it is not guaranteed that it has always reached the most well-founded person, especially for countries with a complex set of complicated regulations. Secondly, some countries could have abused the opportunity and state inaccurate information or do not answer some questions. Thirdly, given the fact that it is a third one, the survey fatigue could have manifested in less diligent answers. The survey did understandably undergo some clearing and verification procedures, but we cannot rely on them entirely and have to bear in mind possible flaws of the dataset.

The aim of this paper is to estimate the impact of broader regulatory approaches on banking system health during crisis. To do this we will employ indices created by combining multiple questions from the survey into one variable (for the exact construction see Appendix table 1). In this regard we roughly follow the lead of Barth, Levine and Caprio (2006), which will also enable a more direct comparison of the results as a vast body of research adopts the same method (Barth et al., 2006, 2008, 2012, 2013; Beltratti & Stulz, 2012; Cihak & Demirguc-Kunt, 2012). Namely, the indices are:

- *Activity restrictions index* captures the amount of complementary activities that banks are not allowed to perform, limiting the complexity of financial products offered;

- *Conglomerate restrictions* indicate how much are banks limited in ways of owning and being owned by other entities, be it financial or non-financial entity, and thus limit of complexity in ownership structures;

- *Private monitoring power index* represents the amount and clarity of information that is available to the public, adherence to standards in accounting and financial flows categorization and requirements for external audits conducted by third party;

- *Official supervisory power index* captures the ability of supervisors to take action in case some of the rules are broken, both by way of obtaining more information and granting them specific authorities to steer the banks course and punish it or its representatives;

- *Independence of supervisors* indicates the extent to which the supervisory agency is protected against pressure from either the banking industry or political bodies;

- *Capital stringency index* quantifies how strictly capital for minimal capital requirements is defined by determining which items are not allowed or required to be included in its calculation.

Table 3.1: Averages of selected variables by income level

Income level	Low	Mid-low	Mid-high	High	Total	SD
Activity Rest.	8.7	9.0	8.5	7.2	8.2	1.8
Conglomerate Rest.	6.2	6.3	5.6	5.3	5.8	1.2
Private Monitoring	8.0	8.2	7.9	8.4	8.1	1.5
Official Power	10.6	10.9	10.5	10.4	10.6	1.6
Independence	0.8	1.0	1.2	1.2	1.1	0.8
Capital Stringency	3.7	4.0	4.4	4.9	4.4	1.9
Rule of Law	-0.8	-0.5	-0.1	1.2	0.1	1.0
Regulatory Quality	-0.7	-0.4	0.1	1.2	0.2	1.0
Gov. Effectiveness	-0.8	-0.4	0.1	1.2	0.2	1.0
Voice and Acc.	-0.6	-0.5	0.3	0.8	0.1	1.0
GDP Growth	4.6	3.8	1.6	-0.8	1.8	3.9
CPI	10.7	7.3	7.7	3.4	6.6	5.1

Sources: Bank Regulation and Supervision Survey (The World Bank, 2007), World Governance indicators (The World Bank, 2011) and World Development Indicators (The World Bank, 2012b).

Notes: The dataset consists of 136 countries for which we had all the data from abovementioned sources. The income groups are divided according to 2007 GDP per capita. The groups are: low income, $1,205 or less; lower middle income, $1,206 - $4,035; higher middle income, $4,036 - $12,475; high income, $12,476 or more.

Exploring our data, we find out that many of the regulatory approaches are specific for country groups of different income levels. Generally, countries with higher income levels impose lower restrictions on both activities and ownership structures of banks. More developed and competitive markets in high income countries could supplement this regulation, and there is greater capacity to actually control such structures which should also decrease the possible adverse effects and allow for more tolerant regulation. The capital requirements, on the other hand, are stricter in such countries, as compared with the lower-income groups that may be less dependent on the banking sector and thus need not to be so protective of it. Regulatory agencies also tend to be more independent in high income countries. This fact may be caused by higher importance of the banking sector in some countries as well.

The economic development is also positively correlated with governance scores as expressed by Rule of Law, Voice and Accountability, Government effectiveness and Regulatory Quality indices of year 2008 from the World Governance Indicators database (The World Bank, 2011), which are presented in standardized form. While the GDP growth was balanced for all the groups over the ten years preceding the crisis, we see that the crisis did mainly hit the high-income group (also by definition of Laeven & Valencia (2012) who assesses the crisis impact, 19 out of 23 countries that suffered systemic crisis were from the top-income group).

Figure 3.2: Government Effectiveness by GDP per capita
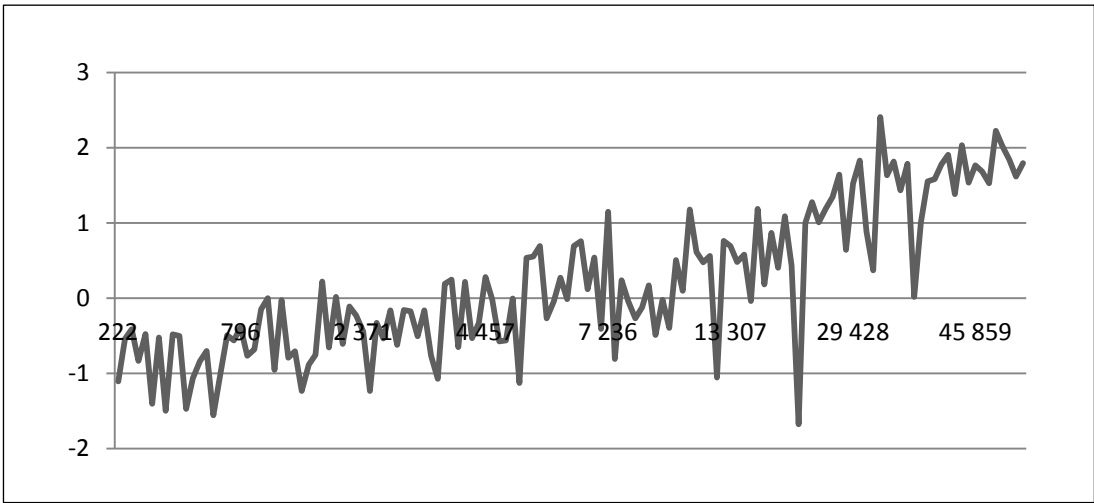
Source: World Governance indicators (The World Bank, 2011) and World Development Indicators (The World Bank, 2012b).

Figure 3.3: Regulatory Quality by GDP per capita
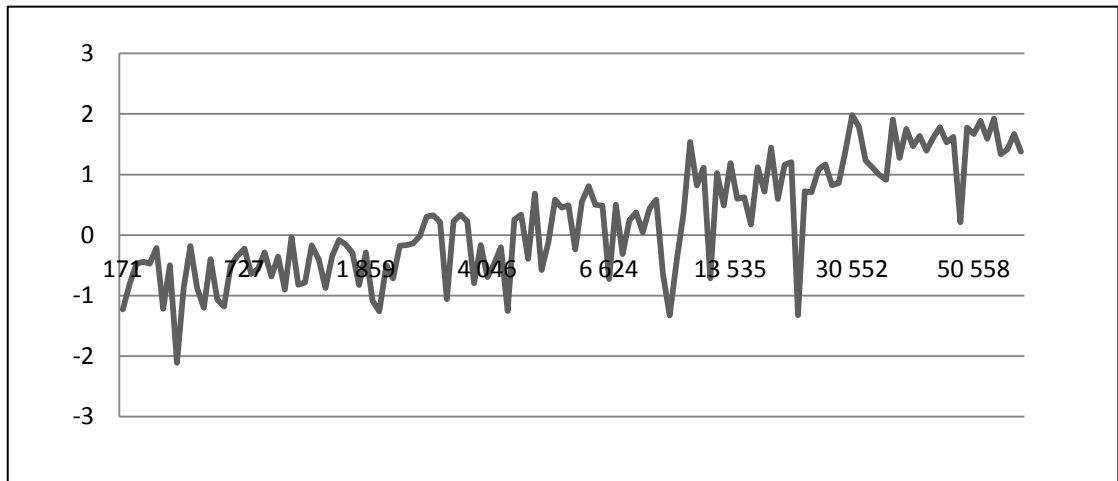
Source: World Governance indicators (The World Bank, 2011) and World Development Indicators (The World Bank, 2012b).

Figure 3.4: Average GDP growth by income level
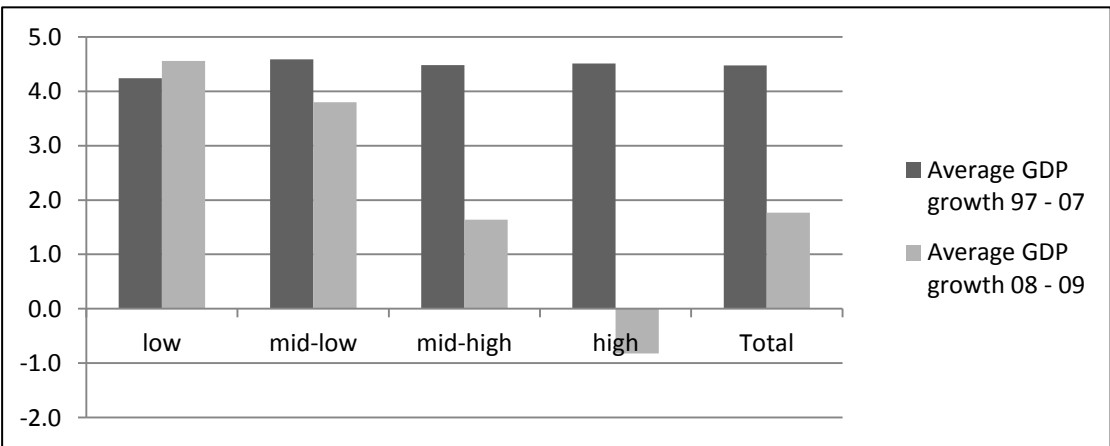
Source: World Development Indicators (The World Bank, 2012b).

Exploring the correlations we find that there should be no major setback among the regulatory variables that would threaten us with collinearity. The only correlation that stands out is that of activity restrictions and conglomerate restrictions indices (0.44), which is understandable as it captures an overall effort to keep the financial system less complex. On the contrary, we find very high correlation among the governance indicators and should be warned that inclusion of more of them could artificially increase our p-values.

Table 3.2: Correlations among selected variables

	Activity restrictions	Conglomerate restricitions	Capital stringency	Official Power	Independe-nce	Private Monitoring	Voice and Accountability	Government Effec-tiveness	Regulatory Quality	Rule of Law	In Crisis	GDP Growth	CPI
Activity rest.	1												
Conglomerate rest.	0.3827***	1											
Capital stringency	-0.0231	0.1557*	1										
Official Power	0.1853**	0.1038	0.0608	1									
Independence	-0.1267	0.0387	-0.1126	-0.0665	1								
Private Mon.	-0.096	0.1391	0.0479	0.0115	0.0147	1							
Voice and Acc.	-0.3347***	-0.1928**	0.2160**	-0.1261	0.1466*	0.0478	1						
Gov. Effectiveness	-0.4507***	-0.1910**	0.2920***	-0.1291	0.0959	0.1959**	0.8030***	1					
Reg. Quality	-0.4579***	-0.2519***	0.2440***	-0.0594	0.1709**	0.1770*	0.8059***	0.9405***	1				
Rule of Law	-0.4510***	-0.2175**	0.2549***	-0.1507*	0.0991	0.1573*	0.8041***	0.9516***	0.9129***	1			
In Crisis	-0.4180***	-0.2389***	0.1757**	-0.1710*	0.0765	0.0731	0.3987***	0.4170***	0.4375***	0.4417***	1		
GDP Growth	0.4098***	0.2737***	-0.132	0.1325	-0.2291***	-0.1419	-0.5286***	-0.5084***	-0.5493***	-0.4969***	-0.4131***	1	
CPI	0.3185***	0.2486***	-0.0454	-0.0857	0.0132	-0.1783*	-0.4350***	-0.4529***	-0.5062***	-0.4581***	-0.2071**	0.3542***	1

Note: Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, *, respectively.

3.2 Methodology

In both models, we (i) use existing research to identify and control for a number of country and firm-level factors influencing our dependent variable, (ii) include variables which, if omitted, would threaten us with biased results and (iii) use models with clustering on the country level to allow for possible correlation of errors and thus make up for the fact that our dataset on regulation only contains 144 countries and the regulatory variables lack variability on firm-level. In the first part we will run separate regression for each of the variables. In the second part we will include several variables to control for partial effects and get a more complex picture of the mechanisms. Lastly, we will test for theories stated in literature and construct more sophisticated models with interactions and quadratic terms to allow for nonlinear relationships in which regulations are not perceived as having isolated effects but rather interacting with other processes and conditions.

3.3 The Model: Access to Credit

In our first regression we examine the effect of regulation and supervision on the availability of credit for firms. We work with a pooled cross-sectional dataset, combining our regulation data with firm-level data from the latest update of the Enterprise Survey (The World Bank, 2013)[4]. This choice brings about certain specifics, namely the fact that the survey focuses on developing countries and although it has a wide scope of 121 countries, it does omit a specific group of higher income countries and we cannot completely generalize our conclusions. The advantage of this survey is a broad portfolio of firms, vastly represented by small and medium-size firms (Beck, Demirguc-Kunt & Levine, 2006).

As the dependent variable we choose an answer to the question whether the firm "consideres access to finance a major constraint to doing business", denoted **Obstacle** taking on discrete value from 0 to 4 where 0 means no obstacle at all and 4 a very severe obstacle. On one hand, the variable is not optimal as there can be number of influences determining the subjective answer, Beck et al. (2006), however, argue that error caused by firms giving different answers in the same conditions would rather bias the results in the direction of insignificance, we try to control for number of factors to decrease these shortcomings. On the other hand, contrary to some often used approaches, it gives us direct information about the rel availability

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[4] We use updated version from March 3., 2013.

and does not use a different variable to estimate it as done for example by Beltratti & Stulz (2012) who take into account the growth of loan-to-assets ratio but can not determine whether the sum was was distributed effectively. In our model we use an ordered logistic estimation with robust standard errors and allowed clustering on country level. The coefficients, however, cannot be directly interpreted as one-unit increase effect of the independent variable on the dependent variable; the marginal effects can be calculated as $\phi(\eta'x)\ \eta$, with η being the estimated coefficient and ϕ denoting the stadard normal density at $\eta'x$. In our model we denote the estimated parameters $\alpha,\ \beta,\ \gamma$ and δ, the error term u, $\mathbf{X}$ the vector of regulatory variables and $\mathbf{Y}$ the vector of bank-specific control variables and $\mathbf{Z}$ vector of country specific control variables. The basic multivariate model wil therefore be:

$$Obstacle_{i,j} = \alpha + \beta \mathbf{X}_i + \gamma \mathbf{Y}_{i,j} + \delta \mathbf{Z}_i + u_{i,j},$$

Vector $\mathbf{Y}$ consists of several characteristics: the **Size** measured by the number of full time employees with values 1, 2 and 3 (less than 20, 20 to 99 and more than 99 employees, respectively) and **Sales,** logarithm of total sales as of last year. Both these measures could help firms get credit by way of stronger influence and the ability to provide higher collateral. This might be helpful especially in smaller closed economies where the portfolio of potential borrowers is not so broad. Further, we include a dummy variable for **Exports**, ownership type representation in percentage points (Private **Foreign** and Private **Domestic,** government ownership omitted to avoid perfect multicollinearity) and months of firm's top management's **Experience** in the sector which we believe influence the social connectedness and stable relationships that may grant the firm an advantage in access to credit.

Vector $\mathbf{Z}$ is constructed to control for several country specifics: **GDP Growth** which we define as average over the years 2008 and 2009 to mitigate potential one-time extreme observations that could divert our models. We control for this indicator, as in times of economic expansion the difficulty of obtaining credit may be lower because markets tend to be optimistic and more capitalized as opposed to undercapitalization and distrust in downturns. In some cases we also control for **GDP per capita** as of year 2007 to proxy for economic development of the country. Further in some cases we include the **Rule of Law, Voice and Accountability, Government effectiveness and Regulatory Quality** as they should help us distinguish whether we are dealng with obstacle connected to lower banking system development and effectivity or to corruption and clientelistic environment. Lastly, we include the variable **In Crisis** which marks countries that have been through systemic or at least borderline crisis in years 2007-2011, which is also the same time period as our firm-level data. We

deliberately add two variables which proxy for the incidence and partially the impact of crisis (In Crisis and GDP Growth) to isolate the allocation process itself, given the conditions, and filter effects through stabilization of the banking system.

Table 3.3: Summary statistics of firm-specific variables

Variable	Mean	Std. Dev.	Median	Min	Max
Obstacle	1.70	1.37	-	0	4
Sales	92	12 800	0.015	0	2 700 000
Size	1.73	0.77	-	1	3
Government	1.53	12.46	15.00	0	100
Domestic	8.75	26.76	89.08	0	100
Foreign	87.56	31.44	9.03	0	100
Experience	17.35	11.66	17.86	0	231
Exports	6.92	21.09	6.95	0	100

Source: Enterprise Survey (The World Bank, 2013)

Notes: The sample includes 49,183 firms from 85 countries surveyed between 2008 and 2011. Sales are in billions of USD, Experience is in months.

Our anticipations about the effects of regulatory variables in vector **X** are mixed. Models that we use to determine the effects of regulatory approach on access to finance aim to answer two widely discussed theories (Beck et al., 2006). The first one, supervisory power view as proposed for example by Chortareas, Girardone & Ventouri, (2012) and Pasiouras, Tanna & Zopounidis, (2009) relates to a topic we have already tackled – whether we see public servants as maximizing overall (public interest view) or personal (private interest view) utility – and focuses on the outcomes of policies increasing independence and power of regulatory agencies. Although the mentioned authors expect the impact to be positive, in our model, assuming the private monitoring view, we anticipate that increasing **Official** supervisory **Power** and **Independence** would lead to its abuse and channeling credit to few friendly enterprises, neglecting the majority and thus increasing the difficulty to obtain credit.

The second one endorsed among others by research of Barth et al., (2004, 2006), Beck et al., (2006) and Cihak & Demirguc-Kunt, (2012), is the private empowerment theory. It proposes that private entities operating on the markets have means to evaluate the risks and this ability should be fostered by disclosure of accurate and up-to-date information. The two theories need not be mutually exclusive and to the contrary, are often present together (Levine, 2004), as in Basel II accord where they form two out of three pillars on which banking stability dwells. We expect information disclosure through **Private Monitoring**, especially if backed by functioning institutions, to prevent inefficient credit allocation and thus be negatively correlated with our dependent variable.

3.4 Results: Access to Credit

The basic regressions (regressions 1 to 4) did not reveal any robustly significant results, but after improving the model specification we do present some results. As for the supervisory power theory, even after applying multiple specifications with interactions, our regressions do not provide any proof of it. In column 5 the development level of the country (GDP Per Capita) is taken into consideration and in columns 6 and 7 we include Government Effectiveness and Regulatory Quality indicators which, if insufficient, could impede the enforcement of imposed rules and their quality, counterweighing the possible effects of regulation. Neither did allowing for non-linear relationship provide any significant results, therefore we cannot state any support for the supervisory power (second pillar of Basel II Accord) view in case of credit availability.

Table 3.4: Supervision, regulation and credit availability

	(1)	(2)	(3)	(4)
Export	-0.0469	-0.0188	-0.00520	-0.0242
	(0.455)	(0.778)	(0.934)	(0.713)
Experience	-0.00616**	-0.00457*	-0.00513**	-0.00518*
	(0.023)	(0.088)	(0.039)	(0.052)
Foreign	-0.00832***	-0.00911***	-0.00798***	-0.00846***
	(0.000)	(0.000)	(0.000)	(0.000)
Domestic	-0.00405***	-0.00417**	-0.00323*	-0.00372**
	(0.007)	(0.017)	(0.054)	(0.039)
Size	-0.222***	-0.206***	-0.216***	-0.185***
	(0.000)	(0.000)	(0.000)	(0.000)
Sales	-1.31e-09	-1.30e-09	-1.42e-09	-1.38e-09
	(0.266)	(0.264)	(0.277)	(0.260)
GDP Growth	0.0286	0.0342	0.0349	0.0302
	(0.303)	(0.192)	(0.161)	(0.296)
In Crisis	-0.00482	0.0384	0.100	0.0371
	(0.976)	(0.821)	(0.636)	(0.836)
Private Mon.	-0.0596			-0.0664
	(0.204)			(0.177)
Official Power		-0.0400		-0.00915
		(0.465)		(0.873)
Independence			-0.150*	-0.112
			(0.061)	(0.152)
Obs.	40,681	40,820	43,263	38,858
Pseudo R2	0.009	0.008	0.01	0.009

Notes: P-values are in parentheses. The model was estimated using ordered logistic regression with robust clustered standard errors at country level. Constants were included in the model but are not reported. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, *, respectively.

Table 3.5: Supervision, regulation and credit availability: Interaction terms

	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Export	0.0065	0.0244	0.0205	-0.0191	0.0125	-0.0181	-0.0113
	(0.915)	(0.689)	(0.675)	(0.771)	(0.829)	(0.744)	(0.850)
Experience	-0.0037	-0.0028	-0.0029	-0.0046*	-0.0036	-0.0048*	-0.0046*
	(0.131)	(0.270)	(0.209)	(0.075)	(0.153)	(0.054)	(0.068)
Foreign	-0.0096***	-0.0091***	-0.0092***	-0.0091***	-0.0091***	-0.0082***	-0.0089***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Domestic	-0.0045***	-0.0041**	-0.0041**	-0.0041**	-0.0047**	-0.0043***	-0.0046***
	(0.008)	(0.038)	(0.030)	(0.015)	(0.015)	(0.006)	(0.005)
Size	-0.205***	-0.208***	-0.208***	-0.206***	-0.217***	-0.228***	-0.219***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	-1.24e-09	-1.04e-09	-1.02e-09	-1.30e-09	-1.58e-09	-1.17e-09	-1.22e-09
	(0.284)	(0.331)	(0.339)	(0.261)	(0.277)	(0.306)	(0.294)
GDP Growth	0.0159	0.0151	0.0066	0.0343	0.0105	0.0264	0.00027
	(0.643)	(0.557)	(0.761)	(0.193)	(0.641)	(0.313)	(0.994)
In Crisis	0.0960	0.009	0.0102	0.0415	-0.0700	0.0949	0.0919
	(0.523)	(0.945)	(0.931)	(0.788)	(0.602)	(0.524)	(0.471)
Official Power	-0.0478	-0.0525	-0.0461	-0.00506			
	(0.568)	(0.331)	(0.413)	(0.991)			
Private Mon.					-0.0831*	-0.136**	-0.0491
					(0.075)	(0.041)	(0.452)
GDP Per Capita	-3.06e-05						8.32e-07
	(0.780)						(0.990)
Official Power* GDP Per Capita	5.18e-08						
	(0.996)						
Private Mon.* GDP Per Capita							-5.64e-06
							(0.506)
Gov. Effectiveness		-0.547					
		(0.498)					
Official Power* Gov. Effectiveness		0.0153					
		(0.842)					
Reg. Quality			-0.280				
			(0.670)				
Official Power* Reg. Quality			-0.0109				
			(0.861)				
(Official Power)^2				-0.00169			
				(0.943)			
Voice and Acc.					0.511		
					(0.258)		
Private Mon.* Voice and Acc.					-0.103*		
					(0.076)		
Rule of Law						0.917	
						(0.152)	
Private Mon.* Rule of Law						-0.144*	
						(0.086)	
Obs.	40,820	40,820	40,820	40,820	40,681	40,681	40,681
Pseudo R^2	0.009	0.01	0.01	0.008	0.01	0.01	0.01

Notes: P-values are in parentheses. The model was estimated using ordered logistic regression with robust clustered standard errors at country level. Constants were included in the model but are not reported. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, *, respectively.

For the third pillar, our data provide somewhat more of an insight. The basic theories state that private monitoring is beneficial in general, that is, however, a rather simplistic view which is more of a theoretical value and we could not confirm it. Our interest lies with those branches of the theory that take into account different specific influences which can interfere with the effect by both enhancing and mitigating it.

And indeed our data do confirm some of them; private monitoring is not significant if included as the only regulatory variable, nor when other regulatory variables are present. If we, however, allow for institutional indices, we get a significant result. Specifically we have tested models with variables Rule of Law and Voice and Accountability to take into consideration possible ways of influencing the banking sector by private entities. If such channels of influence are closed, no matter how sophisticatedly private sector assesses risks, it is difficult to actually change anything. Also these variables can reflect the fact, whether the information disclosure rules are actually followed. If the institutions are in place, firms can effectively prevent (or call for the punishment of) behavior such as funneling credit to allied corporations.

Specifically, we found a negative effect of private monitoring on the difficulty of obtaining credit. For regression 10 the effect is significant on the 5% level and further enhanced by interaction term with Rule of Law (significant on the 10% level). Similarly we found a significant negative effect which is fostered by interaction term after including Voice and Accountability measure in regression 9. These results are also robust against changes in specification (adding or removing different control variables) and using a different model (ordered probabilistic model with clustered standard errors). The same effect as the two aforementioned variables, however, did not have the variable GDP per capita used as a proxy for country development. This regression did not yield any significant result in regression 11.

3.5 The Model: Bank Profits

To determine the effect of banking regulation and supervision on bank profits, we utilize the Bankscope database (Bureau van Dijk, 2013)[5] and construct a pooled cross-sectional dataset, following the lead of Beltratti and Stulz (2012). The dependent variable of our choice is Return on Average Equity (ROAE) which quantifies the owner's return on their investment and is one of the most commonly used proxies for profit measurement (Amor-Tapia, Tascón & Fanluj, 2010; Greene & Segal, 2004; Sufian & Habibullah, 2009). We will again use the average value over years 2008 and 2009 to decrease the influence of single extreme observations and capture the years of the crisis (Hoynes, Miller & Schaller, 2012). To be consistent (although the variables chosen and estimates will be different), our multivariate model will be:

$$ROAE\_avg_{i,j} = \alpha + \beta X_i + \gamma Y_{i,j} + \delta Z_i + u_{i,j},$$

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[5] We use an updated version 270.2 from January 2013.

where α, β, γ and δ are estimated parameters, u is the error term and **X** is the vector of regulatory variables. **Y** is the vector of firm-level control variables chosen from the bankscope database and consists of **Equity** to total assets, the primary tool to mitigate shocks, and also a measure of bank's capital health potentially decreasing its funding costs and possibly increasing profitability; size as measured by logarithm of total **Assets** which are thought to decrease the cost of information gathering and processing (Pasiouras & Kosmidou, 2007); **Net Loans** to total assets and **Deposits** to total assets from year 2007 as suggested by Beltratti & Stulz, (2012). In some specifications we also use **Net Interest Margin** and **Overhead Costs** to proxy for competitiveness of the market. In vector **Z** we include **In Crisis** and average **GDP Growth** over years 2008 – 2009, along with average **Consumer Price Index (CPI**; measured in percentage change) over the same period to control for growth and decline and the severity of crisis as manifested in different elements of economy.

Table 3.6: Summary statistics of bank-specific variables

Variable	Mean	Std. Dev.	Median	Min	Max	Obs.
ROAE_avg	1.78	10.93	2.76	-101.85	113.05	596
Equity to Assets	7.01	4.10	6.22	0.10	40.52	642
Loans To Assets	0.58	0.18	0.60	0.10	0.99	640
Deposits To Assets	0.70	0.18	0.73	0.20	1.00	642
Assets (bil. USD)	231	431	68	25	2 964	598

Notes: The sample was obtained from Bankscope (Bureau van Dijk, 2013) and contains 642 banks from 48 countries with loans to assets ratio higher than 10%, deposits to assets ratio higher than 20% and total assets larger than $25 billions as of 2007. Assets are in billions of USD, Experience is in months.

The theory often provides us with mixed signals, but our expectations are that stronger **Private Monitoring** should impose pressure for excessive risk-taking and thus foster the resilience of the system, increasing profits in crisis. **Independence** should help the supervisory agency resist political pressure copying the election cycle. This pressure is forcing the agency to not regulate the booming economy, ignoring potential risk build-up. Although we will assume the private interest view again, we expect **Official** supervisory **Power** to have positive impact, too. If the regulators were working for the good of the society, the reasoning would be trivial (given our assumptions). But even in the situation of regulatory capture the banks have the incentives to secure this prominent position and not to undergo any risky ventures that would threaten it, therefore the impact of the crisis is weaker. Also, the clientelistic relationships work on stable uncompetitive grounds which may not be affected by the crisis that much. Following the major body of literature we also expect positive impact of **Capital Requirements** on bank profits by decreasing the system volatility (Gersbach & Rochet, 2012b) and strengthening the incentives for

owners and managers to take on less risk (Gale, 2010). Lastly, we see restricting the ownership structures (**Conglomerate Restrictions**) and non-lending activities (**Activity Restrictions**) as a way of protecting the basic banking industry functions and expect that although limiting different sources of exposure could decrease the crisis impact, the loss suffered by inability to diversify the "ownership and activity portfolio" is higher and thus we expect that restrictions will have negative impact on bank profits.

3.6 Results: Bank Profits

There are three main findings we can infer from our data on the effect of regulation on bank profitability. Firstly, contrary to our hypothesis, there is a robustly negative relationship between Official supervisory power and returns on average equity (regressions 15 and 18; significant at 10% and 5% level, respectively). We believe that this may be caused by two factors. Either the regulations, as set before crisis (mostly by Basel II (BCBS, 2006)), were so far removed from reality that their strong enforcement was a burden for the sector, or the regulators have acted to minimize the damage inflicted to economy at the expense of banks whose profits were cut down from non-standard high levels (Breton & Cõté, 2006). The banks have been often blamed for their strong contribution to the crisis by evading the capital requirements (Acharya & Richardson, 2009). As for the explanation, we incline towards the second alternative, believing that all in all the effect of regulation is positive. The regulations were certainly not perfect before the crisis and in some cases created the environment for shadow banking (Kashyap, Berner & Goodhart, 2011), but such corrective bahavior could present danger and foster procyclicality if used as an arbitrary discretionary measure not included in the regulatory framework.

Secondly, we have identified a relationship between private monitoring and profits. Contrary to our expectations and findings of authors who have discovered a positive relationship of private monitoring on banking industry health (Barth et al., 2004, 2006, 2012), the private empowerment theory is not supported and the relationship is negative as presented in columns 17 and 18 at significance levels 5% and 1%. For this phenomenon we offer two explanations. High private monitoring levels could lead to a more competitive market environment where banks operate 'on the edge' and have to take higher risks to make profits. This theory, however, is disproved in regression number 23 by adding NIM and Overhead costs to proxy for market competition though effectiveness, where the negative effect remains significant. Again, the second and preferred alternative is punitive action for misbehavior of the banks which were seen as major contributors to the origin and expansion of the crisis.

Table 3.7: Supervision, regulation and bank profitability

	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Equity	0.0919	0.0644	0.0205	0.137	-0.0245	0.137	0.137
	(0.733)	(0.808)	(0.938)	(0.607)	(0.928)	(0.672)	(0.657)
Net Loans	4.323	4.038	3.860	3.510	3.491	5.872	3.339
	(0.489)	(0.518)	(0.536)	(0.577)	(0.595)	(0.311)	(0.606)
Deposits	-3.747	-3.124	-4.161	-2.756	-4.637	-1.841	-1.945
	(0.621)	(0.688)	(0.591)	(0.721)	(0.537)	(0.798)	(0.778)
Assets	-2.515***	-2.538***	-2.508**	-2.528***	-2.523**	-2.158**	-2.497**
	(0.009)	(0.009)	(0.011)	(0.009)	(0.010)	(0.018)	(0.013)
In Crisis	-3.003**	-2.766**	-2.698*	-2.752**	-2.742**	-2.097*	-4.184***
	(0.027)	(0.035)	(0.066)	(0.033)	(0.050)	(0.096)	(0.001)
GDP Growth	1.290***	1.303***	1.159***	1.358***	1.302***	1.363***	2.268***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
CPI	53.48	55.28	64.86	39.00	56.29	51.76	-43.60
	(0.274)	(0.241)	(0.191)	(0.416)	(0.267)	(0.407)	(0.481)
Activity rest.	-0.561						-0.185
	(0.334)						(0.791)
Conglomerate rest.		-1.066					-2.229
		(0.313)					(0.141)
Capital stringency			0.229				1.168**
			(0.671)				(0.010)
Official Power				-1.017*			-0.869**
				(0.079)			(0.031)
Independence					1.086		2.874***
					(0.315)		(0.009)
Private Mon.						-1.564**	-1.764***
						(0.033)	(0.006)
Constant	39.13**	40.99**	34.19**	45.32**	35.68**	41.95***	67.44***
	(0.016)	(0.011)	(0.041)	(0.010)	(0.033)	(0.009)	(0.000)
Obs.	569	569	569	567	569	558	558
Adjusted R^2	0.079	0.079	0.078	0.082	0.079	0.079	0.084

Notes: P-values are in parentheses. The model was estimated using ordinary least squares regression with robust clustered standard errors at country level. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, *, respectively.

Thirdly, our data suggest that independence of supervisors has a significantly positive influence on returns on average equity. Therefore the data confirm the theory that giving the official supervisory agency more power does produce better outcomes (column 18), if measured by bank profitability during the crisis. We believe that independence makes supervisors resistant to both political pressures and regulatory capture. If independence were missing, they could be swayed by myopic political cycles or persuaded (even threatened) by banks to not perform their job as well as they could (Etzioni, 2009). This finding stresses the importance of addressing also "the rules, the constraints within which political agents act," (Buchanan, 1987) and brings the institutional environment problem one step higher. Further insight is gained by including some governance quality indicators in regressions 19, 20 and 21 that reveal that this positive effect is further enhanced by Voice and Accountability and Regulatory Quality variables.

Table 3.8: Supervision, regulation and bank profitability: Interaction terms

	(19)	(20)	(21)	(22)	(23)
Equity	0.103	-0.00732	-0.0492	0.103	-0.193
	(0.654)	(0.974)	(0.847)	(0.717)	(0.507)
Net Loans	2.195	2.912	3.116	2.965	5.184
	(0.746)	(0.667)	(0.642)	(0.655)	(0.363)
Deposits	-4.372	-6.118	-6.323	-2.914	-4.024
	(0.560)	(0.404)	(0.383)	(0.700)	(0.585)
Assets	-2.642***	-2.740***	-2.634**	-2.559**	-4.428**
	(0.008)	(0.007)	(0.010)	(0.010)	(0.015)
In Crisis	-3.161**	-3.626***	-2.934**	-2.577*	-2.011*
	(0.016)	(0.004)	(0.034)	(0.051)	(0.096)
GDP Growth	0.918**	1.177***	1.132***	1.466***	1.357***
	(0.027)	(0.000)	(0.002)	(0.001)	(0.001)
CPI	126.9***	105.7***	70.84*	31.18	19.85
	(0.003)	(0.006)	(0.096)	(0.546)	(0.767)
Independence	-3.305***	-2.635	-0.655	5.398	
	(0.001)	(0.107)	(0.631)	(0.280)	
Voice and Acc.	-1.484				
	(0.361)				
Independence* Voice and Acc.	4.133***				
	(0.000)				
Reg. Quality		-0.594			
		(0.745)			
Independence* Reg. Quality		3.230**			
		(0.014)			
Rule of Law			-1.706		
			(0.264)		
Independence* Rule of Law			1.702		
			(0.153)		
Official Power				-0.261	
				(0.742)	
Independence* Official Power				-0.490	
				(0.375)	
Private Mon.					-1.914**
					(0.013)
Net Interest Margin					1.367***
					(0.002)
Overhead Costs					5.35e-07**
					(0.031)
Constant	36.78**	39.47**	39.93**	38.18*	71.13***
	(0.028)	(0.020)	(0.019)	(0.063)	(0.006)
Obs.	569	569	569	567	556
Adjusted R^2	0.085	0.082	0.078	0.080	0.096

Notes: P-values are in parentheses. The model was estimated using ordinary least squares regression with robust clustered standard errors at country level. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, *, respectively.

Some authors have also suggested the influence of capital requirements which should protect the whole economy from negative externalities, increase system stability (Demirguc-Kunt et al., 2003; Slovik & Cournède, 2011). This mechanism, however, does not manifest itself on our data, even if controlled for supervisory power and independence which may be crucial for the enforcement. Other authors have stressed the importance of allowing banks to engage in broad range of activities for bank development (Barth et al., 2006), but we could not find any link to bank profitability in this case either.

4 Evaluation of Current Global Course in Regulation

In our regressions we have discovered numerous effects, among them four that have been robust to specification changes and thus we are fairly confident presenting these findings. Out of three regulatory variables tested in the first model, only private monitoring combined with certain governance quality indices was significant, in line with the private empowerment theory which states that it enhances the banking performance and its effect can be further improved by good quality institutions. This approach also corresponds with findings of other authors, e. g. Barth et al. (2004, 2006, 2008). The second part of our research revealed three findings. Firstly, increasing private monitoring intensity corresponds with significantly lower return on avergae equity during the crisis. Similar adverse effect on profits was estimated for the official supervisory power, presenting disproving evidence of the study of Ahrend et al. (2011) who discovered that strongly regulated countries have evaded the crisis damage better. Thirdly, we found a positive effect of supervisory agency independence on bank profits and thus we present empirical grounds for Masciandaro et al. (2011) who stress the importance of proper conduct and independence of supervision.

One of the specifics arising from the research is a deep interconnectedness of different policies and the quality of the legal system and functionality of democratic mechanisms. In some of the cases we have presented, the positive effect is entirely dependent on these mechanisms and sometimes our models predict that the absence could even lead to reversing the effect and causing harm. Today, this is a major threat for less developed countries as the Basel accords are issued as global recommendations. Although not binding for the countries, the markets may tend to use them as clear benchmarks, pressing for their adoption and disregarding the possibility of broader negative consequences (Barth et al., 2006). This issue is further complicated by the fact that some countries may not readily have the means or capacity to adopt them (The World Bank, 2012a), which even more increases the costs of policy that by itself would bring no benefits and could be even harmful.

As we have mentioned, Basel III fails to distinguish between markets with diametrically different levels of development and produces some threats for the banking system health. As for the content side of the accord, our results do not

present any significant justification for the strong focus on liquidity and capital requirements (to regard such a broad range of rules and regulations, however, is a very simplistic view and this matter deserves much more detailed examination). On the other hand, nor did we find any negative effects, as opposed to some authors who argue that capital requirements can be harmful (Allen, Chan, Milne & Thomas, 2012). Basel III, however, further expands on the second (official supervisory power and independence) and third pillar (private monitoring), which is in line with the findings we present under the circumstances that this expansion is not only granting the agency more power but also takes into consideration possible procyclicality and imperfection of human judgement. After the crisis many more recommendations have emerged and the field is not only represented by BCBS, we shall therefore also note that our research supports the effort of the FSB to improve supervisory quality and independence.

Keeping in mind that we have only tested influence on two specific indicators, we shall not draw any definitive conclusions. It is, however, important to analyze many different aspects of the economy and this is one of them.

5 Conclusion

In this paper we contribute to a body of literature investigating the effects of regulatory approaches and compare our results with the latest development of global regulatory recommendations. In particular, we examine how access to finance as perceived by firms during four years from the beginning of the crisis and bank return on average equity over years 2008 and 2009 were affected. It is not the aim of this paper to reveal the causes of the crisis; rather we try to identify the factors that improve banking system performance during these turbulent times.

Firstly, we discovered that official supervisory power and private monitoring are negatively associated with bank profits, which we attribute to regulatory overreaction and effort to compensate for the fact that banking sector has often been blamed for the crisis. Should this theory prove right, we need to be very cautious. Such overreactive punitive behavior based on hindsight should be minimized, if they are aimed at *ex-post* compensating for imperfect regulatory framework, rather than disciplining illegal behavior, as they could induce procyclicality.

Secondly, we confirm the positive influence of private monitoring on lending advanced by Barth et al. (2006), which we attribute to improved integrity and possibly also efficiency of banking industry. Thirdly, our results show that independence of the supervisor is significantly associated with higher levels of profitability. This indicates that independence helps supervisors resist political pressure which short-sightedly tempts them to enjoy the full benefits of growth without preparation for future slow-down.

These two positive relationships were, however, conditioned and boosted by better governance environment. This phenomenon, although widely overlooked by Basel III, is one of the few that do not spur any controversy and its contribution to the well-functioning of the economy has been proven time and again. The inability to effectively differentiate between countries could constitute a serious weakness of Basel III and bring crucial rigidity into regulation of a dynamically evolving industry. All in all, while Basel III and the recommendations by the FSB are broadly in line with our results elaborating on market discipline and supervisory quality and independence, we did not find any systematic evidence for the massive expansion of capital requirements and strengthening of the supervisory agency. Therefore we cannot confirm our hypothesis neither in the way that the regulations we have

examined have a significant impact, nor that their effects are well represented by the latest recommendations issued by the FSB and the BCBS. Further research on this topic should focus on resolving the contradictory claims and creating a meta-analysis of the topic by assembling all the constituent papers and drawing more general conclusions that could be applicable in praxis.

Bibliography

Ahrend, R., Arnold, J. M., & Murtin, F. (2011). Have more strictly regulated banking systems fared better during the recent financial crisis? *Applied Economics Letters*, *18*(5), 399–403.

Acharya, V. V., & Richardson, M. (2009). Causes of the financial crisis. *Critical Review*, *21*(2-3), 195–210.

Allen, B., Chan, K. K., Milne, A., & Thomas, S. (2012). Basel III: Is the cure worse than the disease? *International Review of Financial Analysis*, *25*, 159–166.

Amor-Tapia, B., Tascón, M. T., & Fanjul, J. L. (2010). Country Creditor Rights, Information Sharing, and Commercial Banks' Profitability. *Czech Journal of Economics and Finance*, *60*(4), 336–355.

Barth, J. R., Caprio, G., & Levine, R. (2001). *The Regulation and Supervision of Banks around the World* (Policy Research Working Paper No. 2588). The World Bank.

Barth, J. R., Caprio, G., & Levine, R. (2004). Bank regulation and supervision: what works best? *Journal of Financial Intermediation*, *13*(2), 205–248.

Barth, J. R., Caprio, G., & Levine, R. (2006). *Rethinking Bank Regulation: Till Angels Govern*. New York, NY: Cambridge University Press.

Barth, J. R., Caprio, G., & Levine, R. (2008). Bank Regulations are Changing: For Better or Worse? *Comparative Economic Studies*, *50*(4), 537–563.

Barth, J. R., Caprio, G., & Levine, R. (2012). *The evolution and impact of bank regulations* (Policy Research Working Paper No. 6288). The World Bank.

Barth, J. R., Caprio, G., & Levine, R. (2013). *Bank Regulation and Supervision in 180 Countries from 1999 to 2011* (NBER Working Paper No. 18733). National Bureau of Economic Research.

Barth, J. R., Lin, C., Ma, Y., Seade, J., & Song, F. M. (2010). *Do bank regulation, supervision and monitoring enhance or impede bank efficiency?*

Battiston, S., Puliga, M., Kaushik, R., Asca, P., & Caldarelli, G. (2012). DebtRank: Too central to fail? Financial networks, the FED and systemic risk. *Scientific Reports*, *2*.

BCBS. (2011). Basel III: A global regulatory framework for more resilient banks and banking systems. Bank for International Settlements. Basel.

BCBS. (2013). *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*. Bank for International Settlements. Basel.

Beck, T., Demirguc-Kunt, A., & Levine, R. (2006). Bank supervision and corruption in lending. *Journal of Monetary Economics*, *53*, 2131–2163.

Beltratti, A., & Stulz, R. M. (2012). The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics*, *105*(1), 1–17.

Berger, A. N., Herring, R. J., & Szeg, G. P. (1995). The role of capital in financial institutions. *Journal of Banking & Finance*, *19*(3-4), 393–430.

BIS. (2011). *Global systemically important banks: assessment methodology and the additional loss absorbency requirement*. Bank for International Settlements. Basel.

Blum, J. (1999). Do capital adequacy requirements reduce risks in banking? *Journal of Banking & Finance*, *23*, 755–771.

Breton, G., & Cõté, L. (2006). Profit and the legitimacy of the Canadian banking industry. *Accounting, Auditing and Accountability Journal*, *19*(4), 512–539.

Buchanan, J. M. (1987). The Constitution of Economic Policy. *American Economic Review*, *77*(3), 243–250.

Bureau van Dijk. (2013). Bankscope.

Cihak, M., & Demirguc-Kunt, A. (2012). *Bank regulation and supervision around the world: a crisis update* (Policy Research Working Paper No. 6286). The World Bank.

Cirasino, M., & Garcia, J. A. (2008). *Measuring Payment System Development* (Financial Infrastructure Series). The World Bank.

Crockett, A. (2011). *What financial system for the 21st century?* Basel.

Demirgüç-Kunt, A., & Detragiache, E. (2002). Does deposit insurance increase banking system stability? An empirical investigation. *Journal of Monetary Economics*, *49*, 1373–1406.

Demirguc-Kunt, A., Laeven, L., & Levine, R. (2003). *Regulations, market structure, institutions, and the cost of financial intermediation* (NBER Working Paper No. 9890). National Bureau of Economic Research.

Dewatripont, M., & Tirole, J. (1993). *The Prudential Regulation of Banks*. Cambridge: Cambridge University Press.

Dinc, I. (2005). Politicians and banks: Political influences on government-owned banks in emerging markets. *Journal of Financial Economics*, *77*(2), 453–479.

Elliott, M., Golub, B., & Jackson, M. (2013). Financial networks and contagion.

Etzioni, A. (2009). The Capture Theory of Regulations - Revisited. *Society*, *46*(4), 319–323.

Fahlenbrach, R., & Stulz, R. M. (2011). Bank CEO incentives and the credit crisis. *Journal of Financial Economics*, *99*(1), 11–26.

Fernández, A. I., & González, F. (2005). How accounting and auditing systems can counteract risk-shifting of safety-nets in banking: Some international evidence. *Journal of Financial Stability*, *1*(4), 466–500.

FSB. (2009a). *Improving Financial Regulation*. Basel.

FSB. (2009b). *Principles for Sound Compensation Practices*. Basel.

FSB. (2010a). *Principles for Reducing Reliance on CRA Ratings*. Basel.

FSB. (2010b). *Intensity and Effectiveness of SIFI Supervision*. Basel.

FSB. (2012). *Update of group of global systemically important banks (G-SIBs)*. Basel.

Gale, D. (2010). Capital regulation and risk sharing. *International Journal of Central Banking*, *6*(4), 187–204.

Gersbach, H., & Rochet, J.-C. (2012a). *Aggregate Investment Externalities and Macroprudential Regulation* (Swiss Finance Institute Research Paper No. 12-03). Swiss Finance Institute.

Gersbach, H., & Rochet, J.-C. (2012b). *Capital Regulation and Credit Fluctuations* (CEPR Discussion Paper No. DP9077). Centre for Economic Policy Research.

Gerschenkron, A. (1962). *Economic Backwardness in Historical Perspective*. Cambridge, MA: Harvard University Press.

Gorton, G., & Winton, A. (2000). *Liquidity Provision, Bank Capital, and the Macroeconomy*.

Greene, W., & Segal, D. (2004). Profitability and efficiency in the US life insurance industry. *Journal of Productivity Analysis*, (21), 229–247.

Groenwegen, J., Spithooven, A., & Van den Berg, A. (2010). *Institutional Economics: An Introduction*. New York, NY: Palgrave Macmillan.

Haber, S., Noel, M., & Razo, A. (2003). *The Politics of Property Rights: Political Instability, Credible Commitments, and Economic Growth in Mexico, 1876-1929. Perspectives on Politics*. Cambridge: Cambridge University Press.

Hansen, P. (2001). Bank Regulation in Denmark from 1880 to World War Two: Public Interests and Private Interests. *Business History*, *43*(1), 43–68.

Hellwig, M. (2010). *Capital Regulation after the Crisis: Business as Usual?* (Working Paper Series of the Max Planck Institute for Research on Collective Goods No. 2010_31). Max Planck Institute for Research on Collective Goods.

Herring, R. J. (2004). How Can the Invisible Hand Strengthen Prudential Supervision? and How Can Prudential Supervision Strengthen the Invisible Hand? In C. Borio, W. C. Hunter, G. G. Kaufman, & K. Tsatsaronis (Eds.), *Market Discipline Across Countries* (pp. 363–379). Cambridge, MA: MIT Press Ltd.

Hoynes, H., Miller, D. L., & Schaller, J. (2012). Who Suffers During Recessions? *Journal of Economic Perspectives*, *26*(3), 27–48.

Chortareas, G. E., Girardone, C., & Ventouri, A. (2012). Bank supervision, regulation, and efficiency: Evidence from the European Union. *Journal of Financial Stability*, *8*(4), 292–302.

Institute of International Finance. (2010). The Net Cumulative Economic Impact of Banking Sector Regulation : Some New Perspectives.

Kane, E. J. (2000). The dialectical role of information and disinformation in regulation-induced banking crises. *Pacific-Basin Finance Journal*, *8*(3-4), 285–308.

Kashyap, A. K., Berner, R., & Goodhart, C. a E. (2011). The Macroprudential Toolkit. *IMF Economic Review*, *59*(2), 145–161.

Kashyap, A., Stein, J., & Hanson, S. (2010). An Analysis of the Impact of "Substantially Heightened" Capital Requirements on Large Financial Institutions. *manuscript, Harvard University*.

Kroszner, R. S., & Strahan, P. E. (1999). What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions. *The Quarterly Journal of Economics*, *144*(4), 1437–1467.

La Porta, R., Lopez-de-Silanez, F., & Schleifer, A. (2002). Government ownership of banks. *The Journal of finance*, *LVII*(1).

Laeven, L. (2011). Banking crises: A review. *Annual Review of Financial Economics*, *3*, 17–40.

Laeven, L., & Valencia, F. V. (2012). *Systemic Banking Crises Database: An Update* (IMF Working Papers No. 12/163). International Monetary Fund.

Levine, R. (2004). *The Microeconomic Effects of Different Approaches to Bank Supervision* (SCID Working Paper No. 237). Stanford, CA.

Masciandaro, D., Pansini, R. V., & Quintyn, M. (2011). *The Economic Crisis : Did Financial Supervision Matter?* (Working Paper No. 11/261). International Monetary Fund.

Nelson, P. J. (2001). Transparency Mechanisms at the Multilateral Development Banks. *World Development*, *29*(11), 1835–1847.

Pasiouras, F., & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, *21*(2), 222–237.

Pasiouras, F., Tanna, S., & Zopounidis, C. (2009). The impact of banking regulations on banks' cost and profit efficiency: Cross-country evidence. *International Review of Financial Analysis*, *18*(5), 294–302.

Peria, M., Schmukler, S. L., & Soledad, M. (2001). Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises. *The Journal of Finance*, *56*(3), 1029–1051.

Shleifer, A., & Vishny, R. (1989). Management entrenchment: The case of manager-specific investments. *Journal of financial economics*, *25*(1), 123–139.

Slovik, P., & Cournède, B. (2011). *Macroeconomic Impact of Basel III* (OECD Economics Department Working Papers No. 844). Organization for Economic Cooperation and Development.

Sufian, F., & Habibullah, M. S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *Journal of Business Economics and Management*, *10*(3), 207–217.

Temin, P. (2002). Financial Intermediation in the Early Roman Empire. *The Journal of Economic History*, 64(3), 705-733.

The World Bank. (2007). Banking Regulation and Supervision Survey.

The World Bank. (2011). World Governance Indicators.

The World Bank. (2012a). *Global Financial Development Report 2013: Rethinking the Role of the State in Finance*. Washington, DC.

The World Bank. (2012b). World Development Indicators.

The World Bank. (2013). Enterprise Survey.

Turner, A. (2009). *The Turner Review: A regulatory response to the global banking crisis*. London.

Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small business economics*, *13*(1), 27–55.

Wren-lewis, S. (2010). Macroeconomic policy in light of the credit crunch: The return of counter-cyclical fiscal policy? *Oxford Review of Economic Policy*, *26*(1), 71–86.

Appendix: Construction of Regulatory Indices

Appendix table 1

Variable name	Quantification	World Bank Survey IV questions
Overall activity restrictivness	4.1 + 4.2 + 4.3; Unrestricted = 1, Permitted = 2, Restricted = 3, Prohibited = 4	4.1 What are the conditions under which banks can engage in securities activities?
		4.2 What are the conditions under which banks can engage in insurance activities?
		4.3 What are the conditions under which banks can engage in real estate activities?
Financial conglomerate restrictivness	4.4 + 2.3 + 2.5; Unrestricted = 1, Permitted = 2, Restricted = 3, Prohibited = 4	4.4 Can banks own voting shares in nonfinancial firms?
		2.3 Can nonfinancial firms own shares in commercial banks?
		2.5 Can nonbank financial firms (e.g., insurance companies, finance companies, etc.) own any voting shares in commercial banks?
Capital stringency	3.2 + 3.3 + 3.3.1 + 3.5 + 3.9.1 + 3.9.2 + 3.9.3 + (3.7 if < 0.75); Yes = 1, No = 0	3.2 Does the minimum ratio vary as a function of an individual bank's credit risk?
		3.3 Does the minimum ratio vary as a function of market risk?
		3.3.1 Does the minimum ratio vary as a function of operational risk?
		3.5 Is subordinated debt allowable as part of regulatory capital?
		3.9 Before minimum capital adequacy is determined, which of the following are deducted from the book value of capital?
		3.9.1 Market value of loan losses not realized in accounting books?

Appendix table 1 (continued)

Variable name	Quantification	World Bank Survey IV questions
		3.9.2 Unrealized losses in securities portfolios?
		3.9.3 Unrealized foreign exchange losses?
		3.7 What fraction of revaluation gains is allowed as part of capital?
Official supervisory power	5.4 + 5.5 + 5.6 + 5.7 + 6.1 + 10.4 + 11.2 + 11.3.1 + 11.3.2 + 11.3.3 + (11.6 + 11.7 + 11.9.1); Yes = 1, No = 0; For questions 11.6, 11.7 and 11.9 (a) = 1, (c) and (d) = 0.5, (b) = 0	5.4 Do supervisors get a copy of the auditor's report?
		5.5 Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank?
		5.6 Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in illicit activities, fraud, or insider abuse?
		5.7 Can supervisors take legal action against external auditors for negligence?
		6.1 Can the supervisory authority force a bank to change its internal organizational structure?
		10.4 Are off-balance sheet items disclosed to supervisors?
		11.2 Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses?
		11.3 Can the supervisory agency suspend the directors' decision to distribute:
		11.3.1 Dividends?
		11.3.2 Bonuses?
		11.3.3 Management fees?

Appendix table 1 (continued)

Variable name	Quantification	World Bank Survey IV questions
		11.6 Who can legally declare---such that this declaration supersedes some of the rights of shareholders that a bank is insolvent: (Check all that apply)
		11.6.1 (a) Bank supervisor
		11.6.2 (b) Court
		11.6.3 (c) Deposit insurance agency
		11.6.4 (d) Bank restructuring or Asset Management Agency
		11.7 According to the Banking Law, who has authority to intervene that is, suspend some or all ownership rights a problem bank? (Check all that apply)
		11.7.1 (a) Bank supervisor
		11.7.2 (b) Court
		11.7.3 (c) Deposit insurance agency
		11.7.4 (d) Bank restructuring or Asset Management Agency
		11.9.1 Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency supersede shareholder rights
		11.9.1.1 (a) Bank supervisor
		11.9.1.2 (b) Court
		11.9.1.3 (c) Deposit insurance agency
		11.9.1.4 (d) Bank restructuring or Asset Management Agency
Private monitoring	$3.5 + 3.6 + 5.1 + 5.3 + 8.1 + 8.4 + 10.1 + [(10.1.1)*(-1) + 1] + 10.3 + 10.6 + 10.7.1 + 10.7.2 + 10.4.1 + 10.5 + 11.1.1$; Yes = 1, No = 0	3.5 Is subordinated debt allowable as part of regulatory capital?
		3.6 Is subordinated debt required as part of regulatory capital?
		5.1 Is an external audit a compulsory obligation for banks?
		5.3 Are auditors licensed or certified?

Appendix table 1 (continued)

Variable name	Quantification		World Bank Survey IV questions
		8.1	Is there an explicit deposit insurance protection system? If no, you may skip to question 8.2. If yes:
		8.4	Were insured depositors wholly compensated (to the extent of legal protection) the last time a bank failed?
		10.1	Does accrued, though unpaid, interest/principal enter the income statement while the loan is still performing?
		10.1.1	Does accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing?
		10.3	Are financial institutions required to produce consolidated accounts covering all bank and any nonk-bank financial subsidiaries (including affiliates of common holding companies)?
		10.6	Are bank directors legally liable if information disclosed is erroneous or misleading?
		10.7.1	How many of the top ten banks (in terms of total domestic assets) are rated by international credit rating agencies (e.g., Moody's, Standard and Poor)?
		10.7.2	How many of the top ten banks (in terms of total domestic assets) are rated by domestic credit rating agencies?
		10.4.1	Are off-balance sheet items disclosed to the public?
		10.5	Must banks disclose their risk management procedures to the public?
		11.1.1	Are bank regulators/supervisors required to make public formal enforcement actions, which include ceaseand desist orders and written agreements between a bank regulatory/supervisory body and a banking organization?

Appendix table 1 (continued)

Variable name	Quantification	World Bank Survey IV questions	
Independence of supervisors	(12.2 = 1 if the term is fixed and longer than 3 years) + 12.2.2 + [(12.10)*(-1) + 1]; For question 12.2 (c) = 1, (a) and (b) and (d) = 0	12.2	To whom are the supervisory bodies responsible or accountable? (a) the Prime Minister (b) the Finance Minister or other cabinet level official (c) a legislative body, such as Parliament or Congress (d) other
		12.2.2	Does the head of the supervisory agency (and other directors) have a fixed term? If yes, how long is the term?
		12.10	Can individual supervisory staff be held personally liable for damages to a bank caused by their actions or omissions committed in the good faith exercise of their duties?