A STUDY ASSESSING IMPACTS OF NEW REGULATORY PROPOSALS ON CYCLICALITY OF CAPITAL REQUIREMENTS: CASE OF CZECH REPUBLIC

By

Michal Bartůsek

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF PUBLIC POLICY

2012

A STUDY ASSESSING IMPACTS OF NEW REGULATORY PROPOSALS ON CYCLICALITY OF CAPITAL REQUIREMENTS: CASE OF CZECH REPUBLIC

By

Michal Bartůsek

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF PUBLIC POLICY

2012

Professor Joonkyung KIM

A STUDY ASSESSING IMPACTS OF NEW REGULATORY PROPOSALS ON CYCLICALITY OF CAPITAL REQUIREMENTS: CASE OF CZECH REPUBLIC

By

Michal Bartůsek

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF PUBLIC POLICY

Committee in charge:

Professor Joonkyung KIM, Supervisor

Professor Youngki LEE

Professor Joongho HAN

Approval as of December, 2012

ABSTRACT

A STUDY ASSESSING IMPACTS OF NEW REGULATORY PROPOSALS ON CYCLICALITY OF CAPITAL REQUIREMENTS: CASE OF CZECH REPUBLIC

By

Michal Bartůsek

This work focuses on new regulatory proposals, primarily Basel III accords and analyzes its ability to create a buffer for recurrent credit bubbles. Research by Lis, Pagés and Saurina [2000] has illustrated the cyclicality of loan growth and GDP growth for Spain. These economists argued that the current financial system created credit bubbles, which the current banking regulation Basel II supported due to its cyclicality. In this paper, following their research, we examine the ability of new regulatory proposals such as Basel III, statistical provisions and change in the approach to the probability of default, to cope with recurrent credit bubbles. According to our critical assessment, Basel III may not be able to create sufficient capital buffer for exceptional credit bubbles such as the current one. This buffer suggested by Basel III has several drawbacks which may decrease its functionality. Statistical provision is not an appropriate measure, because it could weaken the fair and true view of financial statements principle. Change in approach to probability of default seems to be rational and effective. The only issue may relate to its recovery mechanisms. It doesn't support economic growth in time of economic recession. The author's proposal of new countercyclical buffer, which would be based on credit-to-GDP ratio and GDP growth to loan growth gap is introduced at the end of this work. Although this measure may have negative impact on GDP growth, it may create an appropriate buffer to systematic credit risk.

TABLE OF CONTENTS

LIST OF TABLES ii
LIST OF FIGURES iii
INTRODUCTION 1
1. Banking business 3
1.1. Description and specification of banking business 3
1.2. Risks in banking business 5
1.2.1. Credit risk 6
2. Credit bubbles 10
2.1. Determinants of credit bubbles 10
3. Banking regulation 12
3.1. Banking regulation principles 12
3.2. Basel II regulation 13
3.2.1. Minimum capital requirements 13
3.2.2. Probability of default (PD) 16
4. Regulatory proposals 18
4.1. Basel III - comparison to Basel II 18
4.1.1. Strengthening the global capital framework 19
4.1.2. New global liquidity standards and leverage ratio 26
4.2. Statistical provision 29
5. Critical assessment of new regulatory proposals 31
5.1. Basel III 31
5.2. Probability of default 39
5.3. Statistical provision 40
CONCLUSION 42
APPENDICES 45
BIBLIOGRAPHY 51

LIST OF TABLES

Table 1 Loan-loss provision – CNB classification 7
Table 2: Regulatory capital 20
Table 3: Individual bank minimum capital conservation standards (Numbers are illustrative and do not represent a proposed calibration level) 21
Table 4: Extra regulatory capital 31
Table 5: Analysis of coefficient 37

LIST OF FIGURES

Figure 1: Structure of financial institutions 5
Figure 2: Loans to GDP, credit failure and capital adequacy 8
Figure 3: Default on credit compared to real GDP growth.....11
Figure 4: Credit gaps in the Czech Republic with alternative 25
Figure 5: Regulatory capital to risk-weighted assets in Czech Republic.....32
Figure 6: Capital adequacy to total RWA.....33
Figure 7: Countercyclical buffer charges.....38

INTRODUCTION

The current financial crisis has become the largest financial crisis since the Great Depression in 1929 and it has triggered an extensive discussion about causes of a recurring financial crisis and related bank regulation. There is a large spectrum of causes such as excessive on- and off-balance sheet leverage, erosion of the level and quality of the capital base, insufficient liquidity buffer[1], interconnection of systematic institutions and their complex transactions, credit and asset price bubbles etc. One of the main causes undoubtedly is systematic credit bubbles. Despite the continuing current financial crisis and its spillover into real economy, leading to another round of financial crisis, many economists already discuss regulatory proposals which should be implemented after the end of this crisis.

Credit bubbles have large mostly negative impact on society. Credit bubbles strengthen the economic cycle. People, due to positive future prospect and asset prices increase, take out new loans to invest or consume. Those new loans leverage significantly the whole economy. In the period of economic downturn, the deleveraging spiral plunges the economy to even deeper recession. Deep recession brings a higher rate of unemployment which is interconnected with higher level of suicides[2] and higher number of homeless people. The lives of many inhabitants are threatened or totally ruined by such a rapid increase in unemployment and wage cuts, since they have to keep repaying their consumer or mortgage loans. Unemployed people are also significantly unhappier than the employed based on research done by Ohtake [2012]. Another research by Tversky and Kahnemann [1991] shows that people react more sensitively to losses than to gains. Based on this notion, credit bubbles harm society and therefore, there should be created a special buffer for credit bubbles in order to eliminate their impact.

Research done by Saurina, Lis, Pagés [2000] has proven cyclicality of loans and GDP for Spain. Following their research, the goal of this work is to discuss and assess current and new regulatory proposals related to credit bubbles.

In the first step we present expected and unexpected credit risk and current regulatory approach to those risks. Further, we introduce briefly Basel II, Basel III and statistical provision of regulation in order to lay the foundations of further assessment of new regulation. Countercyclical buffer and conservation buffer are discussed in deep, because those two

[1] Banks doesn't take into account increasing maturity mismatch.
[2] Rate of suicides in Greece doubled during current financial crisis.[Kirschbaum (Reuters),2012]

measures directly target credit bubbles. Basel II should make regulatory capital charges on rising unexpected risk during economic boom and vice versa. As Lis, Pagés, Saurina [2000] as well as other economists show, Basel II doesn't create buffer for unsystematic credit risk, because it is not countercyclical. This is why; the new Basel III and its countercyclical and conservation buffer are introduced. So new regulatory measures will be critically discussed and their strengths and weaknesses will be identified. At the end of the paper I propose a different approach to the countercyclical buffer as the most important countercyclical measure in Basel III accords.

1. The banking business

1.1. Description and specification of the banking business

Banking has completely changed its form and functions throughout its history moving from storing valuables to intermediation of funds. However, nowadays there are also other services provided by banks such as liquidity insurance [Bryant, 1980; Diamond and Dybvig, 1983], reduction of participation costs [Allen and Santomero, 1997] and facilitation of risk transfer [Allen and Santomero, 1997]. The list of services is constantly expanding due to the remarkable development in financial services. Those new services are for instance derivatives, letters of credit and guarantees. Thus the banking business has become much more complicated than ever before. Globalization and internationalization of financial services created more competitive and internationally interconnected markets and brought new challenges for financial institution in areas of operational risk, new instruments and handling more complicated rating models. Financial intermediary sector has grown substantially in past years and debt to GDP increased from 167% in 1980 to 314% in 2011 [Cecchetti, Mohanty, Zampolli]. This incredible growth brought new issues such as systematic importance of some institutions. Those institutions have become too big to fail which require bailouts in times of financial troubles. Bank bailouts burden state budgets and give a sufficient justification for tighter regulation of financial institutions. Despite costs associated with the crisis, economists argue that a well-developed financial system contributes to economic growth. They believe that the efficient allocation of capital increases economic growth [Levine, 1997].

The banking business is special in comparison with the production or other service businesses. The most important are presumably the two following differences. Compared to other businesses, banks are highly leveraged (trade primarily with client's deposits)[3] and in most cases conclude long-term contracts[4] by using primarily short term financing. According to economic theory banking is much more exposed to principal agent problem, adverse selection problem and imperfect or asymmetric information [Scholtens and Wensveen, 2003].

[3] Default risk - In most of businesses, company produce its product with its own funds and final product sell to client. There are similar businesses such as developers, house construction companies, which builds its houses with client's money and default risk plays important role. Due to this fact clients are vulnerable to any kind of bad news about its financial institution.

[4] Banking institutions finance in many cases long term project with high level of uncertainty (mortgages, investment loans). As a source of funding are used short term deposits. This trend creates maturity mismatch and increase in liquidity risk.

There are two types of informational asymmetry; informational asymmetry between bank/borrower and between bank/lender. The former relates to the selection of borrowers to which the bank will provide a loan. The bank is highly motivated to attract borrowers with the lowest probability of default or in other words with high creditworthiness. Problematic areas of bank/borrower relation are first screening of borrower prior to providing a loan and his monitoring throughout the repayment period. First screening is executed by credit risk managers and lawyers who select a client based on several criteria. Those are the client's financial situation and cash flow prospect, creditworthiness (checking register of debtors), legal issues related to client and pledges on client's tangible and intangible assets. The borrower looking for the best interest rates is incentivized to hide negative shortcomings of his business or increase the value of available collateral in order to receive better interest rates. Moreover, there appears to be also an adverse selection issue. By increasing the interest rate the bank attracts mostly borrowers with high-risk projects and worse creditworthiness, who are willing to pay this interest and who cannot receive credit elsewhere[5]. This is a similar problem to the one presented in insurance business by Siegelman [2004].

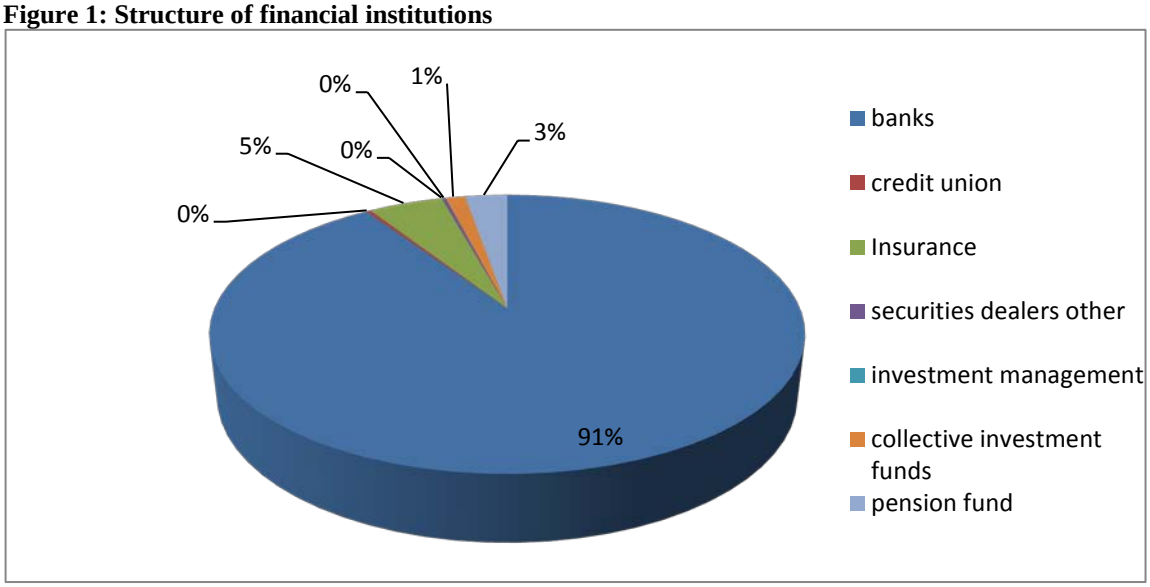
The issue of imperfect or asymmetric information causing bank runs appears to be central for the bank/lender relationship. The significance of this issue is documented by many economists who analyze and come with solution to bank runs and their prevention [Diamond and Dybvig, 1983]. Banks are trading with client's money, while individual depositor costs to control bank??? are too high. Depositors then rely on deposit insurance provided by the Deposit insurance fund. Deposits compensation is paid to 100% of the deposit amount and the maximum compensation amount is EUR 100,000 per client per bank. The Deposit insurance fund in the Czech Republic administers only CZK 21.8 billion. Up to now the fund has paid out depositors in 16 cases totaling CZK 25.5 billion. In case of medium or large bank default, the deposit insurance fund would not likely be able to meet its obligations.

All this specific bank issues make banks to be highly exposed to various risks. Because of the various risks in the banking business, managing and trading risks is thought to be the most important activity. It makes a key difference between successful and unsuccessful bank institutions.

[5] Borrowers with low creditworthiness borrow funds in smaller institutions, for instance in saving unions (Saving unions have to accept borrowers with lower creditworthiness, because they can hardly compete to bigger banks by interest rate due to lower savings related to economy of scale.

This thesis focuses on the banking business and credit bubbles, because the banking business plays the most important role in the Czech financial market. Banks in the Czech Republic hold 91 % of all assets in the Czech financial sector.

Figure 1: Structure of financial institutions



Source: own made graph, data from CNB website

Czech Banks as well as their clients are very conservative in their strategy and approach to new products. This is the main reason for the high portion of loans in the balance sheets of Czech banks. This makes bank highly exposed to economic cycle and credit bubbles. For more details, see the consolidated balance sheet of the Czech banking sector in Appendix D.

1.2. Risks in the banking business

In this chapter we will briefly discuss the basic issue of regulation, which is regulation of risk taking behavior. On the one hand, regulators want a bank to be prudent and risk averse. This behavior would contribute to its stability. However, at the same time regulators don't want to harm the banking business. Banks and regulators then solve the question how prudent risk management should be. Risks accompany any kind of human activity. There are hundreds of risks in our life. Those are mostly risks of damage to our health or property. In ordinary life people deal with those risks by using insurance, lowering the probability of occurrence or eliminating occurred damages.

On the financial markets the risks are financial. Financial institutions deal with these risks as ordinary people do. As in life in finance, ignoring risks can also be fatal. On the other hand, any endeavor to fully eliminate all risks is either too expensive or just impossible. However, there is an important difference between risks in life and in finance. There is a difference in

the carrier of risk and the risk taker. In the case of human life we are risk takers and at the same time also carriers of risks[6]. On the other hand, in the case of finance, financial companies take risks, but the real carriers of risks are depositors and investors. In the case of our life, we risk our life. Financial institutions risk mostly depositor's money. Those funds are insured up to a limit, causing moral hazard as a result of monitoring ignorance of depositors [Hooks and Robinson, 2002]. Hooks and Robinson studied the impact of deposit insurance in Texas on risk taking behavior of banks. Based on the result of regression analysis they concluded that the part of the moral hazard implicated by deposit insurance can explain only a part of risk taking behavior. Their results may be affected by rational ignorance of depositors. Generally, depositors would most likely not monitor banks anyway, as they are not provided with sufficient information, knowledge and incentive to incur costs that are too high.

Financial risk is defined as a potential loss of a subject. There are expected and unexpected losses. The expected loss is defined as an already existing loss. On the other hand, the unexpected loss represents potential loss.

There are five groups of financial risks. Those are credit, market, liquidity, operational and business risks. However, the main objective of this thesis is to assess the ability of new regulatory proposals to create sufficient capital buffer on unexpected credit risk. Therefore credit risk will be further introduced in the next section.

1.2.1. Credit risk

In general credit risk is a risk of counterparty failure. Counterparty failure means that the partner is not able to meet their signed contract and thus they cause a loss to their creditor. These partner's liabilities can originate from credit, business or investment activities. As described above there are expected and unexpected losses. This split is very important due to the fact that the bank institution creates loan-loss provisions on existing losses[7]. Unexpected losses should be taken into account fully in capital requirements [Jílek, 2000]. Loan loss provisions are created based on loan classification. Loan classification depends on the number of days overdue or economic results of the borrower. For the classification see the table below.

[6] There are exceptions – for instance bus drivers (in this case bus driver is responsible not just for himself but also for other passengers.

[7] Those loan-loss provisions are cyclical to GDP and unemployment. causing credit bubbles

Table 1 Loan-loss provision – CNB classification

	Overdue	Amount of provisions
Standard	max. 30 days	0%
Watched	31-90 days	1%-19.99%
Non-standard	91-180 days	20-49.99%
Doubtfull	181-360 days	50-99.99%
Loss loan	361 - and more days	100%

Source: CNB webpage www.cnb.cz

Calculation of loan loss provisions for watched loans

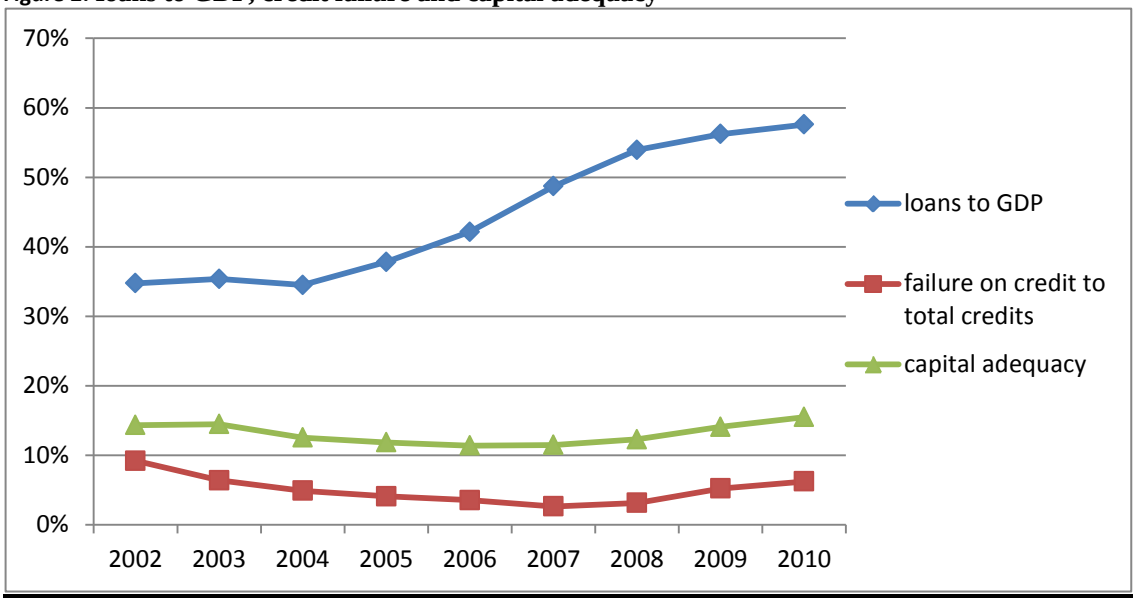
$$Provisions = (principal + interest - acceptable\ value\ of\ collateral) * coefficient$$

Calculation of provisions for Non-standard loans, Doubtful loans and Loss loans

$$Provisions = [(principal - acceptable\ value\ of\ collateral) * coefficient] + interest$$

Unexpected losses can occur from unexpected events such as economic downturn. Personally, I consider economic downturn as an expected event, because it always occurs in determinable time horizon. However, in the sense of accounting principles, economic downturn does not come regularly or in the same extent, thus banks should not be making reserves for this event. In the graph below we can see that there was significant credit expansion in the Czech Republic in the last 8 years. It means an increase in unexpected credit risk. As was already discussed above, this risk should be taken into account by capital adequacy. However, there was no increase in the average capital adequacy of Czech banks during the economic boom from 2000-2007. This means that capital adequacy does not really take into account increase in unexpected credit risk. Increase in "failure on credit to total credits" is used to illustrate the worsening economic situation due to the onset of the current financial crisis. In conclusion, we can say that capital adequacy relates to default on credit increase. In my opinion, capital adequacy does not fulfill its role. Instead of creating a buffer for unexpected losses, capital buffer on credit risk is cyclical to GDP. Increase in GDP decreases the buffer and vice versa.

Figure 2: Loans to GDP, credit failure and capital adequacy



Source: data from CNB database own calculation,Database casovych rad ARAD

As already mentioned, the financial sector grows tremendously compared to real economy due to an increase in on- and off-balance sheet leverage. This graph illustrates the amount of loans to GDP in the Czech Republic. It illustrates a massive loan expansion which can be either interpreted as a development of the financial market in the Czech Republic or as a creation of a small credit bubble or a kind of combination of both mentioned. The biggest issue for all regulators is to distinguish between stable growth of the financial market and asset or a credit bubble. Even in the case that central bankers would be sure that there is a credit bubble on the market, it would be very unpopular to try to burst it by increasing an interest rate. It would have a negative impact on economic growth and unemployment. Despite this, there are economists who think that the central bank should burst the assets or credit bubbles [Patel, 2009]. Patel argues that the low interest rates of central banks lead to bubbles, hence these interest rates encourage taking an excessive debt to buy assets as demonstrated during the housing bubble in the United States. By not bursting an asset bubble, the central bank creates a precedent of continuous asset price growth. This encourages market participants to bet on asset price growth development by buying new assets on credits, which leads to continuous leveraging of economy and creation of a credit bubble. Possibility of bursting a bubble if market value overwhelms an intrinsic value could lead market participants to cautious behavior and prevent excessive risk taking as experienced in the U.S.

As I have already mentioned, bursting the bubble could plunge the economy into recession and cause significant damages which would be assigned to the central bank's decision. Some

central banks would even have to break their main commitments by bursting a bubble. For instance FED has a dual objective of employment and stable prices. Bursting a credit bubble would decrease the employment rate and the central bank would fall short of its goals.

Figure 2 also illustrates an increase in counterparty risk in the Czech Republic. Counterparty risk is a risk that a party to a contract fails to fully discharge the terms of contract. It emerges when a counterparty is not able to fulfill its obligation in time or in whole extent, due to which the bank is exposed to financial loss. Default on credits rate has increased between the years 2007-2010 by 3.3 percentage points and more than doubled. Default on credit is related to worsening CNB classification of portfolio which leads to increasing loan-loss provisions. This development is caused by the start of the financial crisis, which brought an increase in companies and households bankruptcies.

2. Credit bubbles

In order to assess Basel III ability to cope with credit bubbles, i firstly we have to set determinants of credit bubbles. This part of the thesis is focused on credit bubbles and its determinants as a systematic cause of the current financial crisis [Lis, Pagés, Saurina, 2000]. Although, there are also other determinants and factors influencing credit growth, GDP is assumed to be one of the most significant.

2.1. Determinants of credit bubbles

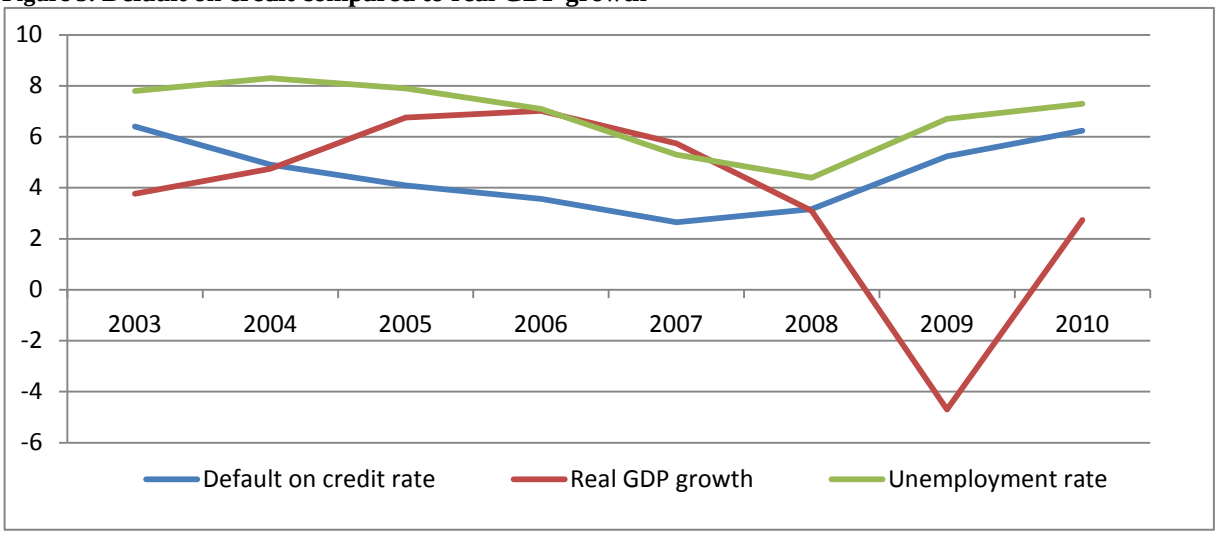
According to Lis, Pagés, Saurina [2000] credit bubbles are driven by extensive credit growth. This credit growth has many causes. Probably the most important is cyclicality of credit growth and default on credit to GDP growth. However, there are also other factors influencing credit growth such as rules for remuneration management, credit agencies rating etc.

Based on the study from Lis, Pagés, Saurina [2000] working for the Central bank of Spain, not only is that loan growth cyclical to GDP growth, loan growth is even faster than GDP growth in time of economic boom and underperforming during an economic recession. Lis, Pagés, Saurina [2000] tested this hypothesis for Spain. As described in their paper, it can be explained by supply and demand factors. Bank loans do not finance only consumption and business investments, but also financial acquisitions, which are not part of GDP, but show strong cyclical patterns. The other factors are according to Lis, Pagés, Saurina [2000] also interest rate and relative prices. Relative prices of loans affect the demand for loans; since loans are deflated by the growth of CPI.

The most important factor is bank lending policy. Bank lending depends heavily on economic growth as already discussed. In time of economic growth, probability of default decreases which has impact on expected as well as on unexpected risk. The graph below illustrates development of default on credit rate[8]. The amount of credit decreased during the boom from 6.4 % in 2003 to 2.6 % in 2007. This has had two consequences on expected as well as on unexpected risk. Expected risk is covered by loan provisions which are calculated as presented in section 1.2.1. Due to decrease in default on credit rate, banks had to create lower amount of loan provisions, which leads to higher profit and decrease in the price of lending.

[8] Amount of loans classified as non-standard, doubtful and loss to total amount of loans

Figure 3: Default on credit compared to real GDP growth[9]



Source: data from CNB database - own calculation,Database casovych rad ARAD and CSU

On the other hand, decrease in default on credit rate also affects unexpected risk. Basel II calculates charges on credit risk by standard or IRB approach as discussed in 2.2.1. Probability of default is either based on credit rating agency or on internal estimation. However, in both cases probability of default depends strongly on macroeconomic conditions.

As it can be implied, expected as well as unexpected risk and its loan loss provisions and capital charges are depending on economic growth, which affects the probability of default. This is the source of problem, because capital charges on unexpected risk should create capital reserves for systematic risk such as credit bubbles. Probability of credit bubbles is increasing with length of economic growth and so capital charges should increase during this time. This is not the picture of reality, because as already explained, probability of default is decreasing during economic growth and so are the capital charges. This makes Basel II to be procyclical.

[9] Credit default is defined as loans which are more than 90 days overdue with payments. (Non-standard, Doubtful and Loss loan)

3. Banking regulation

3.1. Banking regulation principles

In this chapter the current banking regulation will be closely introduced. Focus will be directed on Basel II accords as a regulation which should create a buffer for unexpected events such as credit bubbles.

The banking sector as it was illustrated in previous chapters is a special area of business, which is full of various risks and where appears to be significant informational asymmetry which leads to moral hazard issues. In reaction to this spectrum of issues, national and later international regulation has been established. Basel regulation is the first international regulation of the banking business. Before Basel regulation, there were significant discrepancy between regulation of East-Asia and UK. East-Asia banks didn't have to make any regulatory capital as is the case of the UK. Neither was there any international institution which would coordinate regulation of domestic and international banks. After the entry of international banks to individual countries, question of its regulation arose. The question of equal conditions appears to be relevant in light of fair competition. This demand brought a Basel regulation and its Basel I accord which came into force in 1988, published and implemented by Basel Committee working closely with the Bank for International Settlements BIS. Basel committee has been established in 1974 and it consisted of central bank governors of G10. The first meeting was in 1975 and meetings are 3-4 times per year. Except for governors, the Basel committee consists of 25 working groups. Those groups meet on a regular basis. Basel regulation brought unification of capital adequacy rules and minimal capital requirements were set at 8 %.[10] Basel I was focused exclusively on credit risks.

In 1992 the Basel committee has introduced principles of international supervision [PANEK, 2005, pp.16]

- International banking group is supervised by home country on consolidated basis, it relates to all its transactions around the world
- Branch opening needs to be confirmed by home as well as host country
- Institution of supervision at home country has a right to information about international banking operations, which relate to its sphere of responsibility

[10] In other words, bank has to cover 8 % of its provided loans by own capital.

- Supervisor of host country can impose a regulation on the foreign branch if it is not satisfied with supervision of home regulator.

Basel I rules were extended in 1996 in a reaction to financial inventions. New capital requirements on market risks were added to Basel I and as well as capital requirements to operational risks. First version of Basel II was introduced in 1998. It was followed by several changes and final version was presented in July 2006. Basel II was accompanied by QIS (Quantitative Impact studies) [Bürgerová, 2007]. Nowadays, Basel Committee is preparing the third document, called Basel III accords.

3.2. Basel II regulation

Basel II brought a new way to calculate capital adequacy by adding operational risks. Market risk was already added to the calculation in 1996 [Penza and Bansal,2000]. Basel II is focused on three areas. Those are minimum capital requirements, supervision process and market discipline. Banks are required to follow these three pillars.

3.2.1. Minimum capital requirements

As it was discussed before, banks are highly leveraged depending highly on deposits. Together with a wide range of risks, banks are highly exposed to the possibility of bankruptcy. Since stability of too big to fail institutions is in public interest and state budgets have been used in many cases for bank bailouts, regulators have decided to set a minimum level of capital to cover potential asset losses (risk weighted assets). This capital should serve as a buffer against high losses of these institutions. These capital requirements are prescribed by Basel accords. In the reaction to Basel II pro-cyclicality of capital charges, according to Kashyap and Stein [2004], capital charges should be related to the state of the business cycle. Based on empirical work of Repullo and Suarez [2009], banks hold a higher capital buffer in boom than during recession, but as they point out, this buffer is insufficient to prevent significant contraction in the market.

Capital adequacy is calculated as follows:

$$capital\ adequacy = \frac{capital}{RWA_{credit} + (MRC_{Market} * 12.5) + (ORC_{Opr.} * 12.5)} * 0.08$$

RWA_{credit} = capital requirements for credit risks

MRC_{Market}*12.5 = capital requirements for market risks

$ORC_{Opr.}$*12.5 = capital requirements for operational risks

Capital is calculated as

$$Capital = Tier1 + Tier2 - deductibles + Tier3$$

Where

- Tier 1 – Core capital
- Tier 2 – Additional capital
- Tier 3 – Capital for market risk

Tier 1	Equity capital issued & fully paid common stock Non-cumulative, non redeemable preferred stock Disclosed reserves Excludes goodwill
Tier 2	Undisclosed reserves Assets revaluation reserves General provisions or loan loss reserves (only in Tier 2) Hybrid debt capital instruments (cumulative preffered stock) Subordinated term debt
Tier 3	Short-term subordinated debt Maturity at least 2 years With covenant limiting payment it impairs bank's capital requirement

Part of capital is not:

Profit/Losses arising on revaluation of bank liabilities at fair value in connection with changes in bank credit risk (past and present)

Gains and losses on hedging derivatives in cash flow hedges

There are available several approaches for calculation of capital requirements on credit, market and operational risks, as in §74 of CNB[11] decree 123/2007.

Capital requirements for credit risk are calculated either by the standardized approach or IRB approach (Internal Rating Based Approach)[12]. Due to possible choice, capital requirements are not fully comparable across the banking sector or countries. The standardized approach sets credit risk weights based on the type of debtor[13] and credit rating[14]. Rating is assigned by rating agencies registered by central banks. On the other hand, IRB approaches which are developed by individual banks measure credit risks more accurately.

The IRB approach is based on a formula of four risk components according to the Basel committee on banking supervision:

$$RWA = 12.5 * EAD * K$$

EAD – Exposure at default (Adjusted exposure)

Where K is function of

$$K = LGD * PD * f(M)$$

LGD - Loss given default (1-Recovery rate)

PD – Probability of default (expected default frequency)

M – Maturity of exposure

There are two types of IRB approaches. Those are Foundation IRB and Advanced IRB approach. In the Foundation IRB approach the bank gets to develop its own internal estimate of probability of default and the supervisor provides the other three components. The Advanced IRB approach can be used by an individual bank in case that bank is able to demonstrate that the criteria it uses are plausible or intuitive and that they are supported by evidence.

Standard as well as IRB approaches for credit risk measurement are strongly pro-cyclical. The Standard approach is based on credit rating agencies. However, credit rating decisions are reactive and credit rating changes are correlated with actual default experience instead of predicting future development [Partnoy, 1999]. IRB approach due to calculation of

[11] Czech National Bank

[12] The internal rating based approach

[13] Sovereign, Bank 1, Bank 2, Retail, Residential and Corporate. Bank 1 and Bank 2 are exposures to banks. Bank 2 option is selected if it is lend to headquarter of the bank.

[14] Credit rating is provided by credit rating agencies.

probability of default is also reactive and is not able to predict a coming burst of the bubble. It is based on past data to predict future probability of default.

Personally, I consider this as a weak part of financial regulation since capital requirements on credit risk should reflect charges on unexpected losses, but as described above it mostly makes charges on expected losses. Both approaches are cyclical as described above. No model can ever determine time of credit bubble burst, but in a period of economic growth, it is very probable that the credit bubble to some extent is on the market and its burst is just a question of time. Credit growth overwhelms GDP growth during a boom. Based on this, we can conclude that all financial institutions should create capital reserves in boom periods for extraordinary cases such as credit bubble burst.

3.2.2. Probability of default (PD)

Probability of default (PD) is very important variable in the model above. PD is the probability that a debtor will not be able to handle obligations during the repayment period. Since one bank is holding a huge number of obligations to various debtors, it is necessary to calculate the PD of the portfolio. The PD of the portfolio at particular time is calculated as the average of grade PDs weighted by the number of counterparties in each grade.

Many papers deal with the issue of correct probability of default calculation, because the current system is very pro-cyclical and it is causing deepening of economic cycles as it was mentioned above. The method used in Basel II uses current probability of default while setting minimum capital requirements. This approach works very well in times of economic boom, because the very good outlook of economy promises very low probability of default and thus a lower need of capital requirements. This lower need of capital requirements boosts economy even more, since banks are allowed to lower the level of capital and lend even more. In the time of economic downturn, which inevitably comes, banks have higher banking losses due to higher level of defaults and they are pushed due to higher probability of default hold higher minimum capital requirements. Wrong judgment about future economic growth may then very easily bring the bank into financial trouble. The solution to this cyclicality could be using probability of default estimated for bank's portfolios in downturn conditions [CEBS,2009] or to use noncyclical probability of default in IRB requirements through specific application of scalar that converts the outputs of bank's underlying PD models into through-the-cycle estimates [UK FSA,2009].

According to my view there could be theoretically created counter-cyclical adjustments for probability of default especially for industries which are very sensitive to economic cycles. This counter–cyclical adjustment could link to GDP growth or asset prices growth which in most cases is the best indicator of a bubble. Bubbles in asset markets are usually followed by strong economic contraction. There is also an alternative, which could be any kind of mixture between mentioned approaches and which would eliminate drawbacks of both variants.

4. Regulatory proposals

The previous chapter discussed Basel II regulation and the consequences of new regulation. Following that, this chapter will introduce Basel III regulation, which was created to cope with the shortcomings of Basel II as well as with credit bubbles. However, there is no consensus among economists about regulatory proposals which should be applied. Apart from Basel III, it is necessary to take a look at complementary proposals such as introduction of statistical provision [Lis, Pagés, Saurina, 2000]. This proposal has been selected as one of the most important and promising regulatory reforms which could have fundamental impact on credit bubble recurrence if implemented. However, there are also other regulatory reform proposals that may have indirect impact on credit expansion such MIFID (Market in Financial Investment Directive) II, regulation of credit rating agencies, bank remuneration reform, mark to funding approach, new accounting standards, regulation of OTC derivatives, stress tests. Those regulatory reforms will not be discussed due to their limited and hardly predictable impact on credit bubbles.

4.1. Basel III - comparison to Basel II[15]

Basel III accords are the third regulation in line. The Basel Committee on Banking Supervision (BCBS) published these new rules on 16 December 2010. Basel III accords were created as an answer to the financial crisis which emerged in 2008. They try to strengthen the global capital framework and introduce new global liquidity and leverage standards. Basel III is part of the Committee's comprehensive reform package together with other measures focused on improvement of risk management, governance, transparency and disclosures. The objective of this new regulatory framework is to create a resilient banking sector and strengthen its ability to absorb future shocks and their spillover to the real economy. In reaction to these introduced measures, other institutions such as the European Commission, Financial Stability Board (FSB), Committee of European Banking Supervisors (CEBS) and Institute of International Finance (IIF) prepared specific legislative measures, interpretation of requirements and impact analysis.

Basel III brings several new measures which are focusing on mitigation of weaknesses of Basel II framework and strengthening the stability of the banking sector.

[15] The source for whole chapter is official document of BIS: Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems

There are two main areas of changes:

4.1.1 Strengthening the global capital framework

4.1.2 Introducing the global liquidity standards and leverage ratio: Liquidity Coverage ratio, Net Stable Funding ratio, Leverage ratio

4.1.1. Strengthening the global capital framework

This part of regulation targets the problems related to quality and quantity of capital base.

"The crisis demonstrated that credit losses and writedowns come out of retained earnings, which is part of banks' tangible common equity base. It also revealed the inconsistency in the definition of capital across jurisdictions and the lack of disclosure that would have enabled the market to fully assess and compare the quality of capital between institutions."

[Basel III, 2010]

- **Minimal capital requirements**

Basel III is strongly focused on strengthening capital requirements. There are several issues which are very challenging regulators abilities.

Those issues are: how to set a) Elements of capital, b) Limits and minima, c) Probability of default (PD)

a. Elements of capital

Regarding this issue, several changes have been made between Basel II and Basel III accords. Regulatory capital should be newly consisting of the following elements:

i. Tier 1 Capital (going-concern capital) consists of:

a) Common Equity Tier 1 – common shares and retained earnings.
b) Additional Tier 1 - instruments which are subordinated and have fully discretionary non-cumulative dividends or coupons and have neither a maturity date nor an incentive to redeem. Innovative hybrid instruments[16] which redeem through step up clauses, currently limited up to 15% of Tier 1, will be phased out.

[16] Instruments, which are having cosine characteristics of shares and fixed interest products. Investors were in the case of bankruptcies settled up before shareholders but after bondholders.

ii. **Tier 2 Capital (gone-concern capital)** - It introduces a harmonization of instruments. The upper and lower sub-categories of Tier 2 capital are going to be eliminated. Instead, there will be one set of "entry criteria"[17]. [Oertel,2011]

iii. **Tier 3 Capital** - in Basel II regulation Tier 3 capital was used to cover market risks. Tier 3 capital is now eliminated in Basel III regulation.

b. Limits and minima

In this section, Basel III introduces significant changes. Under new Basel III capital requirements, banks will need higher level of capital and better quality capital to risk weighted assets. Bankers are concerned about their future profitability. Generally equity capital is more expensive than debt capital, though bankers will have to achieve higher returns. On the other hand, politicians are concerned about impact on economic growth.
Basel III requires a higher level of good quality capital as illustrated in the table below.

Table 2: Regulatory capital

	Common Equity Tier 1	Additional Tier 1	Minimum Tier 1 capital	Tier 2 capital	Total regulatory capital
Basel II	2%	2%	4%	4%	8%
Basel III	4.5%	1.5%	6%	2%	8%

Source: Basel III: A global regulatory framework for more resilient banks and banking systems

$$Minimum\ Tier\ 1\ capital = Common\ Equity\ Tier\ 1 + Additional\ Tier\ 1$$

$$Total\ regulatory\ capital = Minimum\ Tier\ 1\ capital + Tier\ 2\ capital$$

Table 2 above presents capital requirements as a percentage of risk-weighted assets. Highlighted fields are obligatory minimal capital as a percentage of risk-weighted assets. As we can conclude, there is high pressure to increase Common Equity Tier 1 capital, representing the most stable and the most subordinated claim in liquidation of the bank. For

[17] For entry criteria see APPENDIX F

banks the situation will be even more difficult, because the regulatory adjustments as presented in Basel III will be in most of cases deducted from common tier equity, instead of currently used Tier 1 or combination Tier 1 and Tier 2 capital. This will increase the cost of adapting Basel III regulatory framework.

- **Capital conservation buffer**

Additionally to 8% of minimum capital requirement will be added a capital conservation buffer[18] in good times. This will bring total common equity Tier 1 capital requirements to 7%. On the other hand, in time of financial distress, bank can draw on the buffer, however under condition to keep limit in earnings distribution as required by Basel III (bonuses and dividends). This buffer should help to cover losses coming from system-wide risk.

As the following table illustrates, the proposed conservation buffer works on the principle of discrete bands. Based on the level of conservation buffer, bank will be allowed to distribute dividends, share buybacks and discretionary bonus payments. Those ranges are provisional and Bank for International Settlement plans to calibrate them.

Table 3: Individual bank minimum capital conservation standards (Numbers are illustrative and do not represent a proposed calibration level)

Capital conservation range is established above the minimum requirement	
Amount by which a bank's capital exceeds the minimum requirement in terms of a percentage of the size of the conservation range	Minimum Capital Conservation Ratios (expressed as a percentage of earnings)
[< 25%]	[100%]
[25% - 50%]	[80%]
[50% - 75%]	[60%]
[75% - 100%]	[40%]
[> 100%]	[0%]

Source: Countercyclical capital buffer proposal, Basel Committee on Banking Supervision, July 2010

A bank will have a choice to increase or decrease conservation buffer as necessary. However in time when the conservation buffer doesn't reach 2.5 % to total risk weighted assets, a bank will be limited in the level of profit distribution. For example: in case that the bank conservation buffer is 1.6 % of total risk weighted assets, this particular bank will be allowed to distribute 60 % of their profit.

[18] build of Common Equity Tier 1

- **Countercyclical buffer**

This buffer serves to enhance cyclicality of credits to GDP growth. This buffer should vary between 0 and 2.5% to total risk weighted assets. As written by Basel Committee, it will apply to each bank reflecting geographical composition of its portfolio of credit exposures. Countercyclical buffer will consist of Common Equity Tier 1 or other fully absorbing capital or it will be subject to the restrictions on distributions. Basel Committee set a usage of countercyclical buffer like this.

"For each jurisdiction, when the variable breached certain pre-defined thresholds this would give rise to a benchmark buffer requirement. This could then be used by national jurisdictions to expand the size of the capital conservation buffer." [Repullo and Saurina, 2011]

National regulators would have the responsibility to decide about implementation. They will be in charge of monitoring indicators which may signal a build-up of system wide risk.[19] The main signal is credit-to-GDP ratio. Therefore, if credit-to-GDP ratio exceeds its long term trend, by significant amount, bank regulators should use their own judgment and principles as stated in "Guidance for national operating the countercyclical capital buffer" to decide about countercyclical buffer implementation. Guidance consists of 5 principles such as follows[20]

- Objectives – the only objective of this buffer is to protect the banking system against potential future losses.
- Common reference guide – the credit/GDP guide is the main reference place
- Risk of misleading signals – use professional judgment (possibility to use also the other indicators such as various asset prices, funding spreads and CDS spreads, credit condition surveys, real GDP growth and data on the non-financial entities to meet their debt obligations on a timely basis.)
- Prompt release – fast response to stress may reduce the risk of the supply of credit
- Other macroprudential tools – also alternative tools may be used such as loans to value limits, income gearing limits, sectoral capital buffers.

[19] Association for Financial Markets in Europe: *Briefing note: Counter-cyclical Capital Buffer [June,2011]*
[20] Basel Committee on Banking Supervision*: Guidance for national authorities operating the countercyclical capital buffer*, [December 2010]

Decision about a countercyclical buffer should be performed quarterly or on a more frequent basis. This is based on the argument that most of the macroeconomic and financial information is released quarterly.

Credit to GDP parameter has shown to be the best ratio to indicate increase in systematic risk. Other parameters as presented in principle 3: "Risk of misleading signals"[21] are not fully reliable in all cases.

Calculation of credit to GDP[22]

This is done in three steps.

1. Calculation of aggregate private sector credit-to-GDP ratio
2. Calculation of credit-to-GDP gap
3. Transform the credit-to-GDP gap into the guide buffer add-on

1. Calculation of aggregate private sector credit-to-GDP ratio

$$\mathrm{RATIO}_t = \frac{\mathrm{CREDIT}_t}{\mathrm{GDP}_t} * 100\%$$

GDPt is domestic GDP

CREDITt is total credits to the private, non-financial sector.

2. Calculation of credit-to-GDP gap

$$\mathrm{GAP}_t = \mathrm{RATIO}_t - \mathrm{TREND}_t.$$

"TREND is a simple way of approximating something that can be seen as a sustainable average of ratio of credit-to-GDP based on the historical experience of the given economy. While a simple moving average or a linear time trend could be used to establish the trend, the Hodrick-Prescott filter is used in this regime as it has the advantage that it tends to give higher weights to more recent observations. This is useful as such a feature is likely to be able to deal more effectively with structural breaks. The Hodrick-Prescott filter is a standard mathematical tool used in macroeconomics to establish the trend of a variable over time. It is implemented in any statistical package such as EViews, but it is also available as an add-in

[21] BASEL COMMITTEE ON BANKING SUPERVISION. Guidance for national authorities operating the countercyclical capital buffer [December, 2010]

[22] Basel Committee on Banking Supervision*: Guidance for national authorities operating the countercyclical capital buffer*, December 2010

in Excel. For the purposes of this regime a one sided Hodrick-Prescott filter with a high smoothing parameter is used to establish the trend (TRENDt). Only information available at each point in time is used for the construction. The smoothing parameter, generally referred to as lambda in the technical literature, is set to 400,000 to capture the long-term trend in the behaviour of the credit/GDP ratio in each jurisdiction." [Basel Committee on Banking Supervision, December 2010]

3. Transform the credit-to-GDP gap into the guide buffer add-on

Credit-to-GDP gap is going to be transformed to a countercyclical buffer in case it exceeds a certain threshold.

There are two thresholds. The minimum threshold is called L and maximum threshold is called H. L is set at 2 and H is set at 10.

Setting L=2 means that when:

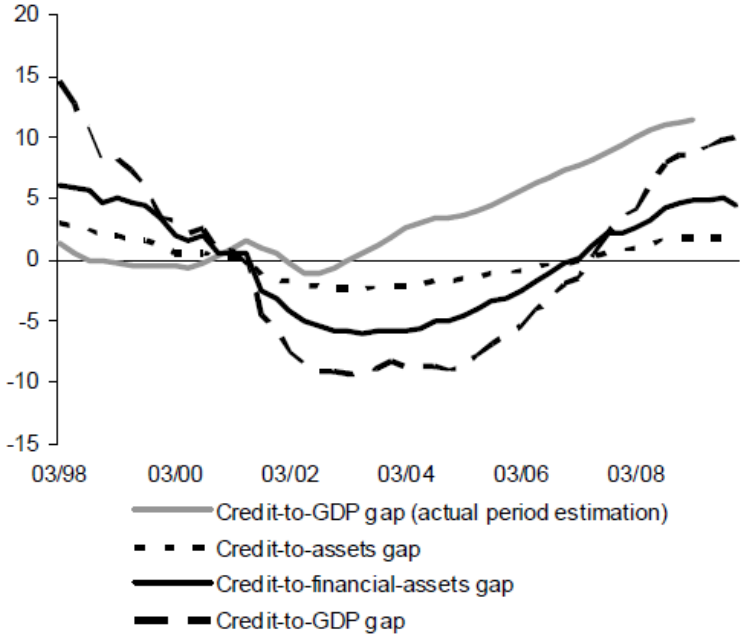
- ((CREDITt / GDPt) X 100%) – (TRENDt) <2%, the buffer add-on is zero

Setting H=10 means that when:

- ((CREDITt / GDPt) X 100%) – (TRENDt) >10%, the buffer add-on is at its maximum

In case that credit-to-GDP gap will be between those two thresholds, countercyclical buffer will vary linearly between 0% and 2.5%.

Figure 4: Credit gaps in the Czech Republic with alternative denominators



Source: [Seidler, 2012]

Figure 2 illustrates development of Credit to GDP gap for the Czech Republic from 1998 to 2008. Credit to GDP gap (actual period estimation) line is the gap as proposed by Basel III. It illustrates that the Czech Republic would reach excessive credit growth as early as 2004. In 2008, the total Credit-to-GDP gap reached 10 percentage points. This implicates that banks would have to create a credit buffer amounting to 2.5 percent of risk weighted assets. If the financial crisis wouldn't hit Czech economy, this trend of growing credit to GDP gap would continue, however Basel III would not be creating any additional buffer for this new systematic wide risk, because it already reached its maximum.

The purpose of the countercyclical buffer is not elimination of economic cycles or assets prices. It should just create a capital buffer against potential future losses. It would be applied to all banks with the credit exposure in particular country, whether or not a particular bank contributed to the credit boom. After the announcement of the countercyclical buffer, a bank should have at least 12 month for capital buffer adoption.

- **Requirements for systematically important financial institutions (SIFI) (focusing on "too big to fail" issue)**

As it could be observed during the current financial crisis, the biggest financial institutions were taking advantage of their market position and became heavily leveraged. Economists such as Goldstein and Veron [2011] as well as many others argue that there are SIFI which

benefit from their position on the market. Other market participants consider those institutions as low risk institutions, because those institutions are offered bailout in case of financial distress wherefore they don't disappear from the market. Therefore, institutions target SIFI institutions with risky investments and don't require risk premiums related to their default. Those banks have to be bailed out, because due to interconnectedness of financial institutions, "domino" effect could occur. It is arguable what would be the proper solution to solve this moral hazard. Measures concerning this issue are currently discussed and the results are expected to be announced in the near future. There is a proposal which introduces new capital surcharges for SIFI and introducing contingent capital or the so called "bail-in-able" debt. Federal regulators in US have adopted a plan to increase a contribution of "Too big to fail" institutions to Deposit insurance fund [Dash, 2011].[23] To sum it up, there are two different approaches. European regulation focuses on slowing growth of financial institution, on the other hand, US regulation requires participation of big institutions in incurred losses from bank bankruptcies.

4.1.2. New global liquidity standards and leverage ratio

In order to take into account liquidity risks connected with investments and credit exposures, the Basel Committee introduced harmonized global liquidity standards. Those standards will establish minimum requirements and try to mitigate competing in risk taking practices.

Banking is a type of business, in which there is an enormous maturity mismatch of assets and liabilities compared to other businesses as already discussed in chapter 2. Their assets have long maturities due to the long-term character of investments while liabilities have a short-term character as they do mostly consist of deposits. This maturity time inconsistency makes banks very vulnerable to liquidity troubles. Those liquidity troubles can spill over in cases of market turbulence to solvency troubles, while banks need to sell their assets with haircuts. The behavior of the banking institution is affected by the upward sloping character of interest curve. This means that these institutions make profits from a spread between long-term interest rate on assets and short-term interest rate on liabilities. To increase the spread, most banks do not hesitate to keep high level of maturity mismatches, because it allows them

[23] It is planned that 110 biggest US bank would cover 80% of the amount paid to Deposit insurance fund.

to make high profits. After the beginning of the financial crisis 2008-2010, many regulators realized the problems of this paradigm.
This behavior gives a fundament for new liquidity regulation as introduced by the Basel Committee.

There were created two ratios to cover two main complementary objectives:
Liquidity Coverage Ratio – ensuring bank survival of acute stress scenario lasting for one month;
Net Stable Funding Ratio – for a time horizon of one year. Part of this measure is the creation of sustainable maturity structure of assets and liabilities.

- **Liquidity Coverage ratio** [Powell and Kingsley, 2011]

This LCR measure forces banks to hold high liquid assets in a quantity which would allow meeting its potential cash outflows over a 30 day stressed period.

Below is a list of assumptions in a stress scenario for which an institution needs to have a sufficient unencumbered, high-quality liquid assets.

- A significant downgrade of the institution's public credit rating;
- a partial loss of deposits;
- a loss of unsecured wholesale funding;
- a significant increase in secured funding haircuts; and
- increases in derivative collateral calls and substantial calls on contractual and non-contractual off-balance sheet exposures, including committed credit and liquidity facilities.

The complete tree for calculation stock of high quality liquid assets and Net cash outflows over a 30 – day time period can be found on [Deloitte website].

$$\frac{Stock\ of\ high\ quality\ liquid\ assets}{Net\ cash\ outflows\ over\ a\ 30-day\ time\ period} \geq 100\%$$

- **Net Stable Funding ratio**

There is a requirement from the NSFR to keep a minimum amount of stable sources of funding depending on the liquidity profile of the assets and off-balance sheet commitments in a horizon longer than one year.

$$\frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} > 100\%$$

There is no finalized shape of those measures, because the Basel Committee agreed to postpone adopting the standards to 2015 and 2018. Impact of those measures will be assessed during an observation period.

- **Leverage ratio**

The last, but not least important measure is leverage ratio which is focused on dealing with the build-up of excessive on- and off-balance sheet leverage in the banking system. Some banks presented their strong risk based capital ratios while they build up excessive leverage. The main goal of this ratio is to minimize deleveraging process as well as reinforce the risk-based capital adequacy requirements. The committee will test a minimum Tier 1 leverage ratio of 3% during the parallel run period. All off-balance sheet positions[24] will have 100% credit conversion factor (CCF), not as in BASEL II ranging from 0% to 100%. Off-balance sheet positions which are unconditionally cancelable will have 10 % CCF. This regulation prohibits the use of collateral, guarantees, credit derivatives and all other forms of credit risk mitigation to reduce on-balance sheet exposures.

$$Equity + Reserves\ - Intangible\ assets = Tier\ 1\ capital$$
$$Total\ assets - Intangible\ assets = Adjusted\ assets$$
$$Tier\ 1\ capital/Adjusted\ assets\ = Leverage\ ratio$$
$$Leverage\ ratio > 3\%$$

Note: Intangible assets include goodwill, software expenses, and deferred tax assets.

[24] commitments to lend (including liquidity facilities), direct credit substitutions, acceptances, standby letters of credit and trade letters of credit

4.2. Statistical provision

The current system of loan loss provision creates provisions on expected losses. It is in line with accounting principles. Statistical provision is discussed by Lis, Pagés, Saurina [2000].

This approach provokes a discussion if it should be accounted for credit losses which could relate to credit bubbles, so if it should take into account also unexpected losses.

This approach is also different to countercyclical buffer, because it focuses on creating loan-loss provisions which are booked directly to P/L. On the other hand, the countercyclical buffer increases capital requirements to credit risk[25]. This provision is an extra component to ordinary loan-loss provisions which was already discussed in chapter 1.

Banco de Espana implemented this provision in 2000 in order to cope with decrease in credit risk on Spanish banks balance sheet. Except Spain, this measure is also implemented in Peru, Columbia and Uruguay. Statistical loan loss provision is used in only those 4 countries. According to [Saurina, July 2009], Spain had the lowest ratio of loan loss provisions to total loans among OECD countries in 1999. Also correlation between GDP growth and provision ratio was exceptionally high, reaching 0.97 for period 1991-1999. Decrease in credit risk led to extensive credit growth. This measure intended to make banks more conservative.

Specific loan-loss provisions and its calculation vary among countries and so compare to Spanish approach there would have to be some changes before application of statistical provision in other countries. However, this provision could be applicable in its basic principal anywhere. Its principal is based on comparison of latent risk and specific provision.

Coefficients for standard approach in Spain see below [Lis, Pagés, Saurina 2000]:

1. without risk (0%): those risks involving the public sector;
2. low risk (0.1%): mortgages with outstanding risk below 80% of the property value as well as risks with firms whose long-term debts are rated at least A;
3. medium-low risk (0.4%): financial leases and other collateralised risks (different from the former in point 2);
4. medium risk (0.6%): risks not mentioned in other points;
5. medium-high risk (1%): personal credits to finance purchases of durable consumer goods;

[25] Discussed in section about Basel III

6. high risk (1.5%): credit card balances, current account overdrafts and credit account excesses

These coefficients are multiplied by the exposure to calculate latent risk measure

$$L_r = s * L$$

Where s – average coefficient

L- total amount of loans

$$\text{Annual provision: StP} = \text{Lr} - \text{SP}$$

Where SP – Specific provision

$$\text{SF} = \text{e} * \text{M}$$

Where: M - stands for problem loans and

e - parameter

$$\text{Annual provision: SP} = \text{e} * \text{M}$$

If SP < Lr (low problem loans) => StP > 0 (building up of the statistical fund)

If SP> Lr (high problem loans) => StP < 0 (depletion of the statistical fund)

Balance of the statistical fund: StF = StPt + StFt-1, with a limit: $0 \leq StF \leq 3 * \text{Lr}$

Annual total provision consisted of general, specific provision and statistical provision.

5. Critical assessment of new regulatory proposals

In the previous chapters Basel II and new regulatory proposals, mainly Basel III were introduced. In this chapter possible impacts of Basel III on capital buffer to systematic risks are identified and discussed.

5.1. Basel III

Basel III introduces several changes. Although impacts of changes are difficult to measure, the author assesses those measures and points out strong and weak parts of regulation. The following table illustrates a summary of the main regulatory changes introduced in Basel III.

Table 4: Extra regulatory capital

	Basel II			Basel III		
	Common Equity	Tier 1 Capital	Total Capital	Common Equity	Tier 1 Capital	Total Capital
Minimum requirements	2%	4%	8%	4.5%	6%	8%
Additional capital conservation buffer	Not applicable			2.5%		
Additional countercyclical buffer	Not applicable			0-2.5%		
Leverage ratio	Not applicable			May be added to the other risk-weighted requirements		
Additional requirements for systemically important financial institutions	Not applicable			May be added to the other risk-weighted requirements		

Source: Basel III: A global regulatory framework for more resilient banks and banking systems [Basel III, 2010]

There are worries of politicians and central bankers about impacts of the new implemented measures. This is the reason why those measures are going to be implemented gradually and impacts are going to be closely monitored.

1) Increase in quality of regulatory capital

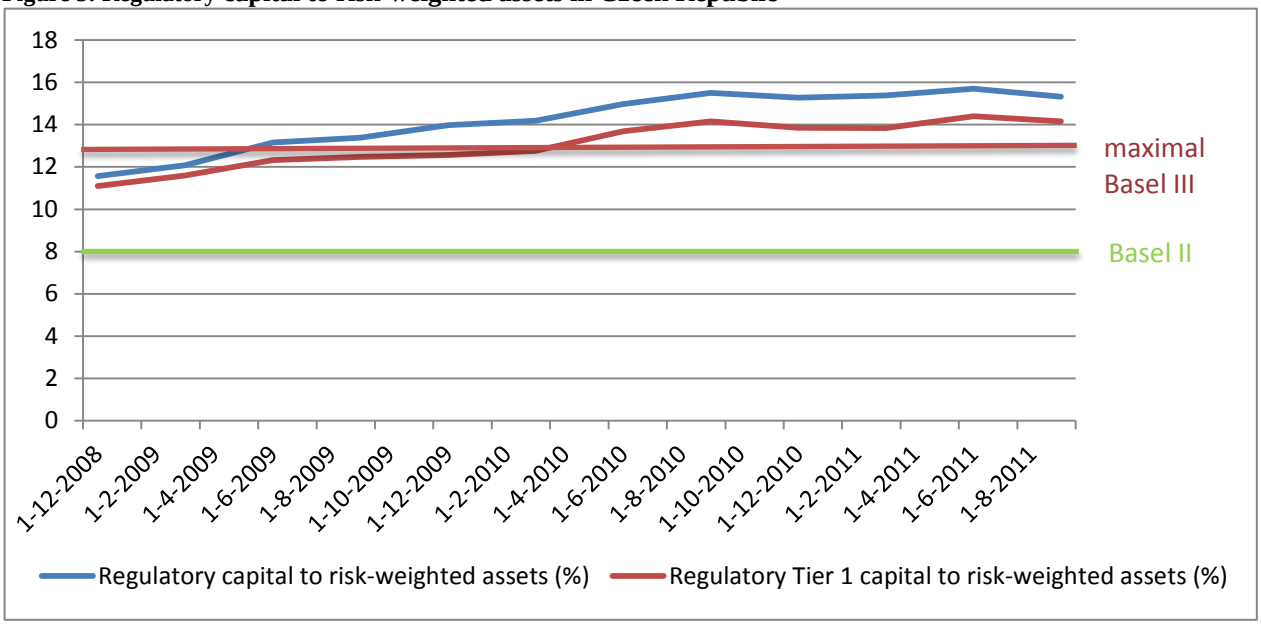
This measure targets strengthening the quality of capital which would have positive impact on bank stability in case of credit crunch. However, this measure does not target to cope with credit expansion. It could slightly increase the price of loans which could reduce credit expansion. Czech banks already hold on average sufficient amount of good quality capital as presented on Figure 7, so for most of them no extra charges required.

2) Increase in regulatory capital

Increase in the level of regulatory capital will not directly influence credit bubbles. Banks will hold higher level of capital to cover eventual losses, but it doesn't motivate banks to limit credit expansion. It makes credits slightly more expensive, but Czech banks already keep a sufficient capital buffer, so there can't be expected any significant impact on credit expansion in the Czech Republic.

On the graph below we can see development of regulatory capital in the Czech banking sector. Czech banks hold very high and good quality capital. Despite the maximal increase of regulatory capital as possible in Basel III, Czech banks on average would not have to increase their capital.

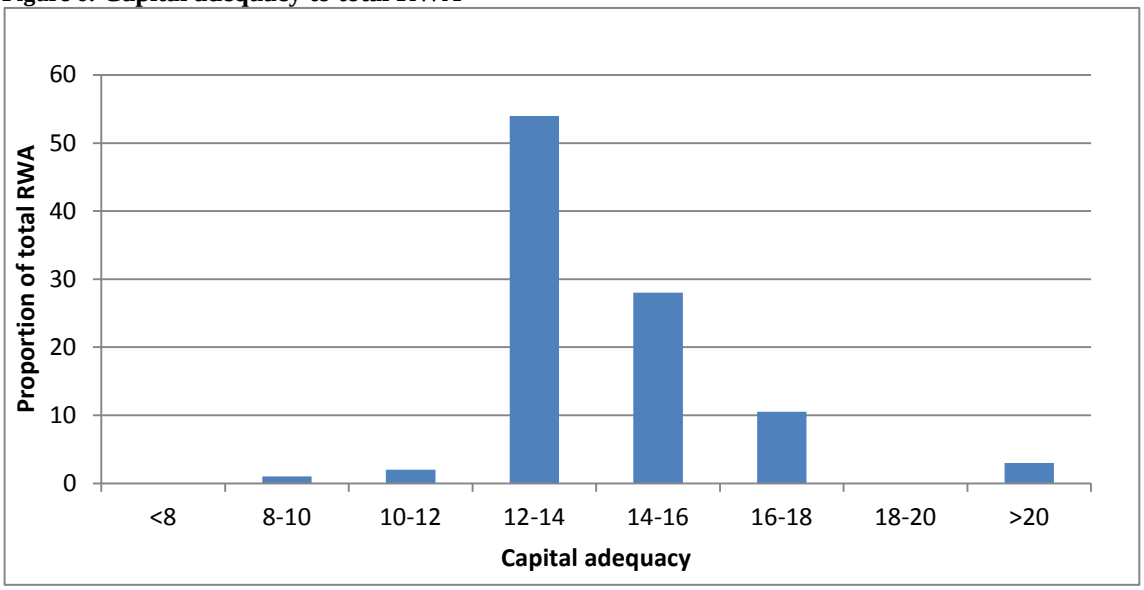
Figure 5: Regulatory capital to risk-weighted assets in Czech Republic



Source: data from CNB website- Základní ukazatele o bankovním sektoru, Author's own graph

There are banks which would need extra capital as can be seen at Figure 6 below. However, due to their proportion of total RWA, those banks are very small and insignificant.

Figure 6: Capital adequacy to total RWA



Source: data from CNB website, Základní ukazatele o bankovním sektoru

3) Conservation buffer

This measure creates a capital buffer for stress scenarios. The concept of this measure is very logical and has a very elegant form. It will press banks to keep conservation buffer which they may anytime release, if credit losses appear. However, it doesn't influence the size of the credit bubble and so it will not have a massive protective impact. It has positive impacts on stability of banking sector; however its total impact is hard to measure. The only threat could be a moral hazard related to excessive risk taking, because banks will have an extra buffer which they can release anytime.

4) Countercyclical buffer

This is the only measure which targets directly credit bubbles and mitigation of their impacts on banks. As discussed, it should create a buffer which would protect banks in time of economic downturn and deleveraging. It stands on credit to GDP gap (Gap between short term development and long term trend) as the main indicator of credit bubbles. As discussed, long term trend is calculated by using Hodrick-Prescott filter. This measure should be further tested, because there are several threats, which could emerge. The author sees the main issue in implementation. Countercyclical buffer is not mandatory, but it depends on the regulators' professional judgment. Rising countercyclical buffer would increase the price of loans and could undermine economic growth. It should reconsider independence of central banks in individual countries as well as targets of central banks (FED targets are price stability as well

as GDP growth). This measure is also limited to an extent of up to 2.5% in case that credit-to-GDP gap reaches 10%. However, economic cycles vary in their intensity and so this buffer could appear to be insufficient in case of a severe financial crisis such as the current one. This opinion can be supported by recalculated countercyclical buffer by [Seidler,2012] on the Figure 4. This Figure illustrates that the Czech Republic would reach upper limit of countercyclical buffer in 2007. However, Credit to GDP gap continued to increase in 2008 and it would most likely continue to grow, if the financial crisis would not emerge. This increase in credit to GDP gap would cause increase in systematic wide risk, but countercyclical buffer already reached its maximum level in 2007. Countercyclical buffer as presented, doesn't take into account the length of economic cycle and the size of system wide risk is related to it. This can be seen as the weak side of this regulation.

Further, there are issues related to countercyclical buffer calculation. The main indicator for countercyclical buffer usage is credit-to-GDP gap. As it was described on the page 23, credit-to-GDP gap is the difference between the particular credit to GDP ratio and its trend. This is based on the assumption that there exists a long-term equilibrium to which all economies converge. However, as historical data show credit growth exceeds GDP growth in all countries which raises the question if credit-to-GDP ratio converge to some point or will raise to infinite. As assumed, increase of this ratio increases the systematic risk due to two reasons. Firstly, the banking sector is becoming more important in particular in economy, increasing the number of banks, which become "too big to fail". Secondly, this rise in ratio can hide a credit bubble.

However, there are also other issues related to calculation of countercyclical buffer. First relates to usage of Hodrick-Prescott (HP) filter, as discussed in paper from [Siedler,2012]. Hodrick Prescott filter is significantly dependable on the length of the chosen time series[26]. The other factor according to Seidler [2012] is that the calculation is very sensitive to smoothing parameter lambda. The last issue is related to "end-point bias". This makes Trend to be highly affected by the most current data. This can highly affect results and calculated buffer. He argues that it could be better to use out-of-sample technique. This would be based on estimation for advanced EU countries. Those countries are used to calculate the equilibrium credit levels of the CEE countries.

[26] There are very short time series for Czech Republic.

New Countercyclical buffer proposal[27]

Personally, I venture to suggest changes to countercyclical buffer. As Lis, Pagés, Saurina [2000] showed in their work for Spain, there is a strong relationship between loan growth and GDP growth. Loan growth is faster than GDP growth during boom and vice versa. It can be assumed that any loan growth faster than GDP growth increase system wide risk to some extent. Therefore, based on the authors' opinion, countercyclical buffer calculation should reflect relationship between loan and GDP growth. Calculation of the countercyclical buffer would be based on a simple three-step calculation.

1. Calculation of excessive loan growth:

$$Excessive\ loan\ growth = loan\ growth - GDP\ growth$$

Where:

Loan growth – percentage loan growth of particular bank

GDP growth – nominal GDP growth

2. Calculation of Coefficient

$$Coefficient = Loan\ to\ GDP\ ratio * 0.1$$

Where:

Coefficient – would be defined as Loan to GDP ratio * 0.1

This constant was set based on the reasonability of Coefficient analysis. Coefficient should be calibrated further based on the bank stress test in different periods of economic cycle and it should be analyzed ability of introduced capital buffer to cover system wide risk. The author considers estimation of system wide risk as a very complicated issue, which requires a significant dataset not publicly available.

3. Calculation of countercyclical buffer:

$$Countercyclical\ buffer = excessive\ loan\ growth * coefficient$$

[27] Author's idea

Charges increase would be depending on excessive loan growth and loan to GDP ratio development. It could be further analyzed and discussed if the constant is set appropriately.

Credit bubble burst is unexpected risk, because its probability and impact is hardly if at all possible to measure. However, based on experiences of the current financial crisis it could become clearer if those charges would be sufficient.

I do not have any data about unexpected credit risk for individual years. Furthermore, my analysis is focused on reasonability of its impact and scope.

Table 5: Analysis of coefficient

	CGEXP	GDP	Excessive loan growth	Coefficient	Regulatory capital change	Counter cyclical buffer	Impact on GDP
1996	7,95	4,54	3,41	0,053	0,180	0,180	0,036
1997	26,04	-0,85	26,89	0,053	1,427	1,607	0,321
1998	-0,17	-0,24	0,07	0,049	0,003	1,610	0,322
1999	-4	1,68	-5,68	0,044	-0,249	1,361	0,272
2000	-2,31	4,19	-6,5	0,036	-0,232	1,129	0,226
2001	-10,31	3,1	-13,41	0,038	-0,505	0,624	0,125
2002	-5,28	2,15	-7,43	0,035	-0,258	0,366	0,073
2003	6,54	3,77	2,77	0,037	0,103	0,469	0,094
2004	6,26	4,74	1,52	0,037	0,056	0,525	0,105
2005	16,66	6,75	9,91	0,038	0,373	0,898	0,180
2006	19,89	7,02	12,87	0,042	0,547	1,445	0,289
2007	26,25	5,74	20,51	0,049	1,009	2,454	0,491
2008	16,35	3,1	13,25	0,053	0,703	3,157	0,631
2009	1,27	-4,7	5,97	0,055	0,327	3,484	0,697
2010	3,46	2,74	0,72	0,056	0,040	3,524	0,705
Total	108,6	43,73	64,87		3,524		4,566

Source: columns CGEXP and GDP recalculated from CNB and CSU data, other columns own calculation based on first two columns.

Column CGEXP represents credit growth and column GDP represents GDP growth. Based on those data Excessive loan growth (CGEXP-GDP) was calculated. In the second step change of countercyclical buffer (Regulatory capital change) was calculated[28]. The column Cumulative regulatory capital illustrates what would be the countercyclical buffer for individual years.

Macroeconomic Assessment group [Vinals (IMF), 2010, pp.38] estimated that 1 percentage point increase in the required ratio of capital relative to risk-weighted assets (TCE/RWA) would cause reduction in real GDP by less than 0.2%.

On the other hand, the second IMF group focusing on long-term economic impact [Vinals (IMF), 2010, pp.38] estimated that 1 percentage point in capital adequacy requirements would reduce real GDP only by about 0.1%.

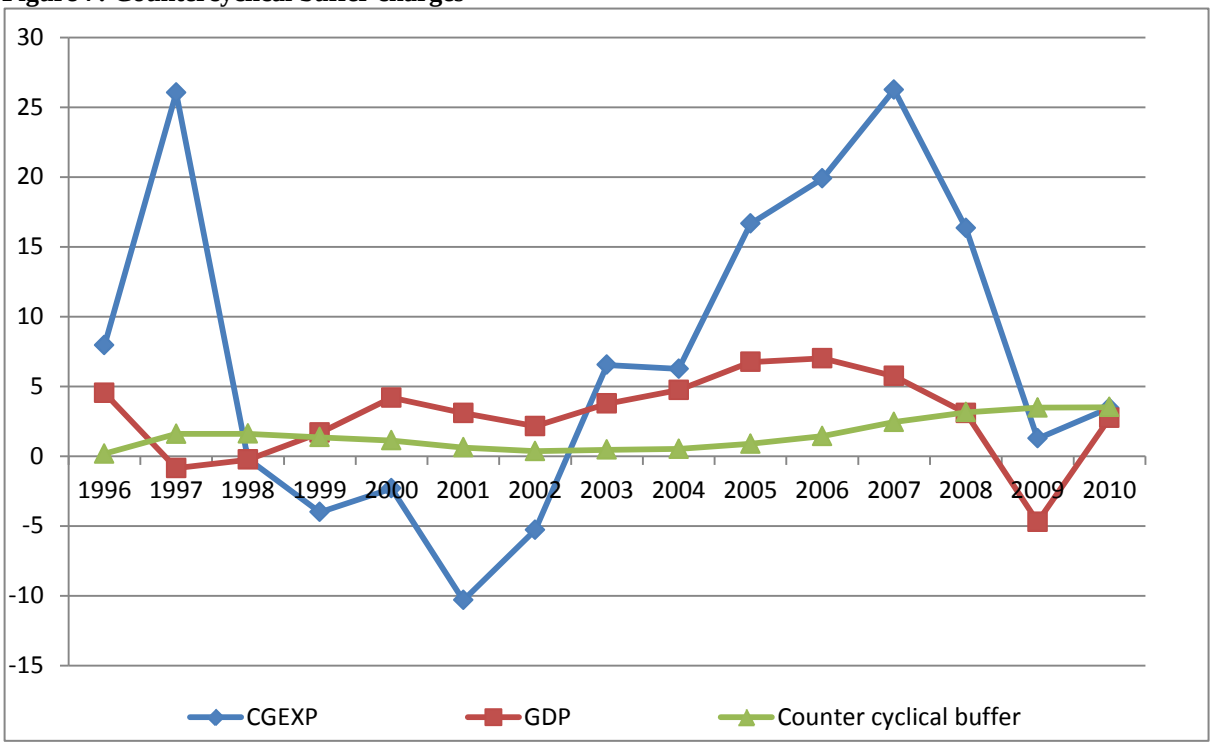
[28] Excessive credit growth*coefficient

Based on these studies I have calculated expected impact of changes in regulatory capital on GDP. Due to prudency I have chosen higher impact (1 percentage point increase in regulatory capital would cause decrease by 0.2 percentage points of real GDP growth) estimated by the first working group. Based on this model regulatory capital would increase by 3.5 percentage points in last 14 years, the cumulative impact on real GDP growth would be 4.5 percentage points. The impact seems to be not significant and for the Czech Republic would be even lower due to high average regulatory capital held by banks.

There would be a positive impact on cyclicality, because banks would be obliged to keep a higher level of regulatory capital to risk-weighted assets.

On the graph below it is visible that although a financial crisis emerged in 2008, the countercyclical buffer didn't decrease. It is due to a delay in which GDP growth affects loan growth.

Figure 7: Countercyclical buffer charges



Source: own production, based on data from CNB and CSU

In the graph above the countercyclical buffer development is well visible. Its increase is in line with credit expansion and related credit risk. In long-term development loan growth overwhelms GDP growth and so this measure would constantly tend to raise capital requirements. However, this means that the whole economy is leveraging which based on the author's judgment increase systematic credit risk. There are significant differences between developments of financial services. Low developed financial markets would suffer by a high

level of regulatory requirements, although their loan to GDP ratio and to it related systematic risk would be lower than in high developed financial markets. I consider countries with high loan to GDP leverage more risky than vice versa, so those countries should create higher capital requirements to systematic credit risks. This is solved by using Loan to GDP ratio during coefficient calculation.

5) Requirements for systematically important institutions (too big to fail issue)

This measure could have a slight effect on leveraging of financial institutions and limit their credit expansion since it would cost them additional regulatory capital. U.S. plans to implement an extra premium to Deposit insurance fund for such institutions. Neither of the measures would be most likely a sufficient motive to reduce credit bubbles.

6) Liquidity coverage ratio and Net stable funding ratio

These measures are focused on mitigation of liquidity risk as discussed before. In case of insufficient liquidity buffer, banks would have to limit their credit expansion. However, until a bank is in liquidity distress, liquidity is not usually a limiting factor for loan expansion, because funds may be easily borrowed from depositors or on interbank market. It implies that this will not have any significant impact on credit bubbles.

7) Leverage ratio

This measure targets to include off-balance sheet position to risk considerations. It is much more prudent than Basel II and so it will have deleveraging tendency. Impact of this measure will be closely monitored by BIS. It could to some extent limit off-balance sheet credit exposure, however the impact of this measure is difficult to predict. It doesn't limit on-balance sheet exposure which is considered as credit expansion creating credit bubbles in this work.

5.2.Probability of default

As discussed in the chapter about Basel II, probability of default is the probability that the debtor will not be able to pay back their debt. Probability of default is highly procyclical, causing Basel II to be procyclical. As it was already discussed, probability of default varies based on business cycle. Committee of European Banking Supervisors (CEBS) proposed a change in probability of default (PD) estimation. PD would be estimated for a bank's portfolios in downturn conditions. This is a similar proposal to the proposal of UK Financial

Services Authority (FSA) which comes up with through-the-cycle-estimates. This measure limits credit expansion by making loans more expensive. Increase in probability of default would increase the risk weighted assets which would require more of additional capital to hold against them. This measure is however just in the sphere of consideration and not introduced in Basel III accords. On the other hand, this is the other way which may reach the same goal as the author's countercyclical buffer proposal.

5.3. Statistical provision

Statistical provision is solves cyclicality of loans and GDP from a different perspective than Basel III. It does it despite the PL account. It is the third way on how to dissolve cyclicality of loan growth to GDP growth. Introduction to statistical provision as well as increase in regulatory capital would increase costs of loans for banking institutions, decreasing their profitability. The question is which would be more suitable to be applied. As it was discussed in the first chapter there are expected and unexpected risks. There are two reasons why it is more appropriate to use regulatory capital instead of loan-loss provisions. Firstly, despite credit bubbles recurrence, this risk is considered to be unexpected, because it is not possible to set probability of its occurrence. Accounting should present true and fair information about an accounting unit (in this case financial institution). This would not be applied if statistical provision is going to be implemented, because statistical provision would be based on making loan-loss provisions on credit bubbles and could cause earnings management. Due to missing probability of occurrence and size of bubble, these provisions would be probably very inaccurate and it could disrupt fair and true view of financial statements. Accounting profit could be significantly distorted which would significantly affect explanatory power of accounting.

On the other hand, this measure was tried in Spain. It didn't significantly decrease loan-loss provision cyclicality to GDP growth, but it helped to create an extra buffer for a coming financial crisis since 2008. According to PWC [April, 2012], Spanish banks had the highest provision to non-performing loans ratio among Western European countries in 2006, which is very helpful during financial crisis. On the other hand, there are some critics from PWC and other accountancies. They criticize unclear approach to booking and reversing a loss, potential changes in credit risk are not recognized on a timely basis, expected loss is not reflected in effective interest rate [PWC, April 2012]. Analysis of possible impacts on Czech banks, if this provision is implemented is not provided since necessary data for calculation

are not available. Statistical provision is an interesting concept, which helps to banks to create reserves for unexpected risk. The main disadvantage of this measure is its distortion of accounting principle. Therefore, the author would propose to stay with a countercyclical capital buffer.

CONCLUSION

The aim of this work was to assess the ability of Basel III accords to create a buffer to systematic risk implied by recurrent credit bubbles. New regulatory measures were critically discussed.

Defining the exact impact of those measures is very complicated if possible. The primary focus of the analysis was if those new measures are countercyclical or not and how significant an impact they may have. Significant measures for analysis have appeared to be mainly conservation and countercyclical buffer as part of Basel III. However, relevant to discussion is also statistical provision.

Conservation buffer is an elegant measure, because it helps to create and dissolve capital as needed. Banks will be allowed to use this buffer according to their judgment when they will experience credit losses. There appears to be only an issue related to moral hazard. Banks may count on this extra buffer and it may enter more risky projects and create higher systematic credit risk.

The second measure, a countercyclical buffer is prepared in detail. There appear to be several issues. The first issue may be seen in independency of regulators. Countercyclical buffer will affect economic growth and so some regulators may feel reluctant to use it, in order to protect economic growth. This measure would be more effective if it would be mandatory for all countries and not depending. Differences in regulator approaches wouldn't hurt competitiveness of the banking sector, because also foreign banks with exposures in a particular country would be affected. However, competitiveness of domestic exporting companies could be weakened. Banks providing loans to domestic companies would have to keep an extra capital buffer to those risk weighted assets (loans). Equity capital is more expensive than debt capital; therefore banks would have to increase interest rate to achieve required profitability. Borrowing costs for domestic companies would be higher than for foreign competitors which would create unfair competition environment. The second issue may be seen in the buffer extent. Its maximum reach 2.5 % of risk weighted assets. It should be tested if this would be enough in time of deep systematic crisis such as the current one. The third issue is related to its calculation. The Hodrick-Prescott filter is used. Results could be significantly affected by length of time series, by parameter lambda and end-point bias. The last issue which the author sees in the calculation of the countercyclical buffer is a dependence on Loan-to-GDP trend. This trend is constantly growing based on historical data.

The author assumes that excessive leverage of economy based on high level of Loan-to-GDP increases a systematic risk and therefore, a special buffer should be created to those risks.

The third measure discussed is statistical provision. This measure could significantly eliminated true and fair view of accounting and so its implementation should be very deeply analyzed.

In the last part of this work we introduce a new measure, which is focused on different approach which could be used while considering a countercyclical buffer. It is a proposal which should be further critically discussed and analyzed. It would be countercyclical and it would create a capital buffer in time when credit growth exceeds GDP growth, what implies increase in system-wide risk. While this measure will reduce loan expansion; it will have a negative impact on GDP growth. Any effective measure focused on creating a sufficient buffer or credit bubble mitigation will always have a negative impact on GDP growth.

At the end, the work has also critically examined another proposal. One such proposal comes from Committee of European Banking Supervisors (CEBS). CEBS proposes to estimate probability of default as for downturn conditions. This measure seems to be relevant. If implemented, it would have similar impacts as my proposal of a countercyclical buffer. However, regulatory capital requirements wouldn't decrease in time of economic downturn as in my proposal. It wouldn't help to economic recovery since probability of default wouldn't change during the cycle. There would have to be an additional clause related to capital buffer resolution in time of credit losses.

APPENDICES

APPENDICES

APPENDIX A

Overview of bank assets to GDP for Eurozone countries + Czech Republic

	Number of Credit Institutions	Total Assets (€ billion)	as % of National GDP	Average Asset Size (€ billion per bank)	Share of Euro-16 Total Assets	Nominal GDP (€ billion)	Share of Euro-16 GDP
Austria	803	1071,9	380%	1,335	3,40%	281,9	3,00%
Belgium	105	1276,3	370%	12,155	4,00%	344,7	3,70%
Cyprus	163	118,1	685%	0,725	0,40%	17,2	0,20%
Finland	357	396,2	215%	1,11	1,20%	184,2	2,00%
France	728	7710,6	395%	10,591	24,20%	1950,1	21,10%
Germany	1989	7892,7	316%	3,968	24,70%	2495,8	27,00%
Greece	66	464,5	194%	7,038	1,50%	239,1	2,60%
Ireland	501	1731,5	952%	3,456	5,40%	181,8	2,00%
Italy	818	3687,7	235%	4,508	11,60%	1567,9	16,90%
Luxembourg	153	1271,8	3232%	8,312	4,00%	39,3	0,40%
Malta	23	42,3	743%	1,839	0,10%	5,7	0,10%
Netherlands	302	2231,5	374%	7,389	7,00%	595,9	6,40%
Portugal	175	482,1	290%	2,755	1,50%	166,4	1,80%
Spain	362	3409,4	313%	9,418	10,70%	1088,5	11,80%
Slovakia	26	65,5	101%	2,519	0,20%	64,8	0,70%
Slovenia	25	49	132%	1,96	0,20%	37,1	0,40%
Euro Area	6596	31901,1	344%	4,836	100%	9260,4	100%
Czech republic[29]	37	150,1848	105%	4,059	0,5%	142,9	2%

Source: European Central Bank statistics

[29] Source: CNB and CSU, exchange rate for recalculation of banking assets and GDP was used 26,93CZK/Euro

APPENDIX B

Data for credit growth to GDP growth regression

year	CGEXP	GDP
1996	7.95	4.54
1997	26.04	-0.85
1998	-0.17	-0.24
1999	-4.00	1.68
2000	-2.31	4.19
2001	-10.31	3.10
2002	-5.28	2.15
2003	6.54	3.77
2004	6.26	4.74
2005	16.66	6.75
2006	19.89	7.02
2007	26.25	5.74
2008	16.35	3.10
2009	1.27	-4.70
2010	3.46	2.74

Source: CNB and CSU

APPENDIX C

Data for Default on credit rate to GDP growth and Unemployment rate regression

year	Default on credits rate	Real GDP growth	Unemployment rate
2003	6.4	3.8	7.8
2004	4.9	4.7	8.3
2005	4.1	6.8	7.9
2006	3.6	7.0	7.1
2007	2.6	5.7	5.3
2008	3.2	3.1	4.4
2009	5.2	-4.7	6.7
2010	6.2	2.7	7.3

Source: CNB and CSU

APPENDIX D

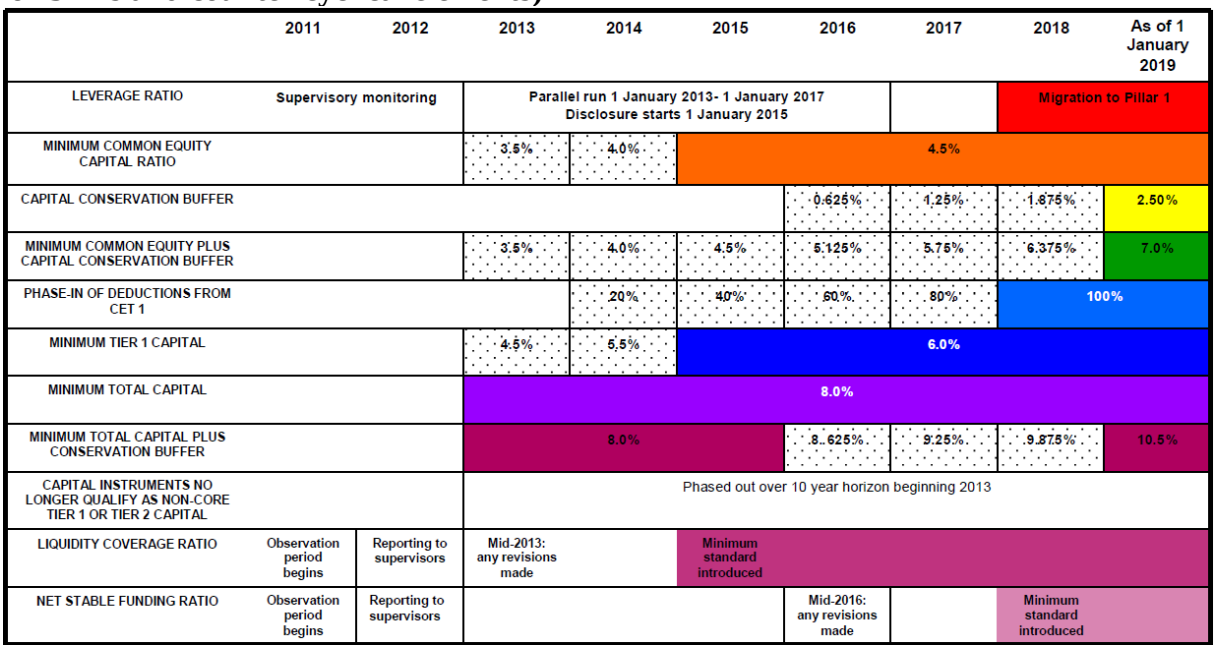
Balance sheet of Czech banking sector

Assets		Liabilities	
Cash and cash equivalents	40,308.10	**Total deposits and loans received**	3,449,143.20
Total deposits and loans	3,177,258.80	**Deposits and loans from central banks**	3,501.30
Deposits and loans with central bank	388,385.30	**Deposits and loans from other banks**	531,687.70
Deposits and loans with other banks	484,402.40	**Deposits and loans from customers**	2,913,954.20
Loans and other receivables with customers	2,304,471.10	**Issued non-marketable debt securities**	72,397.20
Non-traded debt securities	18,562.20	**Debentures and other debt securities**	307,653.50
Other debt securities	930,300.40	**Total capital and reserves**	504,380.00
Mutual fund shares of money market	0	**Out of which: Adjustments**	84,805.70
Other shares and equity investments held by banks	92,379.40	**Out of which: Total basic capital**	84,969.00
Fixed assets	113,051.90	**Out of which: Retain profit or loss**	-85.1
Other assets	239,315.40	**Out of which: Current year profit or loss**	53,299.40
Of which: Positive real value of derivatives	162,861.20	**Other liabilities**	277,602.40
		Out of which: Negative real value of derivatives	150,318.90
Total Assets	4,611,176.30	**Total Liabilities**	4,611,176.30

Source: CNB database ARAD

APPENDIX E

Phased implementation of the key Basel III components (excluding the possible buffers for SIFIs and counter-cyclical elements)



Source: [Oertel, 2011]

APPENDIX F

Criteria for inclusion in Tier 1 Additional Going Concern Capital.
The main criteria include:
>Subordinated to depositors, general creditors and subordinated debt (rather than having to be “the most subordinated claim”, as required of Common Equity which appears to allow Tier 1 Additional Going Concern Capital instruments to rank senior to common equity and pari passu with preference shares).
> No maturity date; no incentives to redeem or other “innovative” features.
> Callable at the initiative of the firm only after a minimum of five years subject to:
> prior supervisory approval;
> the firm not creating an expectation that the call will be exercised; and
> the firm not exercising a call unless the called instrument is replaced with capital of the same or better quality or the firm demonstrating that its capital position is well above the minimum capital requirements after the call is exercised.
> The firm must have full discretion to cancel distributions/payments. Such cancellation of distributions/payments must not impose restrictions on the firm except in relation to distributions to common stockholders (but see below regarding not hindering recapitalisation).
> Dividends/coupons must be paid out of distributable items.
> Instruments classified as liabilities must have principal loss absorption through either (i) conversion to common shares at an objective pre-specified trigger point or (ii) a write-down mechanism which allocates losses to the instrument at a pre-specified trigger point.
> The instrument cannot have any features that hinder recapitalisation.

Criteria for inclusion in Tier 2 Capital.
The main criteria include:
> Subordinated to depositors and general creditors.
> Minimum original maturity of at least five years, no incentives to redeem.

> Recognition in regulatory capital in the remaining five years before maturity will be amortised on a straight line basis.
> Callable at the initiative of the firm only after a minimum of five years subject to:
> prior supervisory approval;
> the firm not creating an expectation that the call will be exercised; and
> the firm not exercising a call unless the called instrument is replaced with capital of the same or better quality or the firm demonstrating that its capital position is well above the minimum capital requirements after the call is exercised.
> The investor must have no rights to accelerate the repayment of future scheduled payments (coupon or principal) except in liquidation.

Source: [Oertel, 2011]

BIBLIOGRAPHY

BIBLIOGRAPHY

ALLEN, Franklin and SANTOMERO, Anthony M. *The Theory of Financial Intermediation*. Journal of Banking and Finance. Vol. 11, 1997, pp. 1461-85.

ASSOCIATION FOR FINANCIAL MARKETS IN EUROPE. *Briefing note: Counter-cyclical Capital Buffer*. [online]. June 2011 [cit. 2012-09-23]. Available from: www.afme.eu/WorkArea/DownloadAsset.aspx?id=118

Basel III: *A Global Regulatory Framework for More Resilient Banks and Banking Systems*. Bank for International Settlements: Banking Committee on Banking Supervision [online]. 2010 [cit. 2012-05-15]. ISBN: 92-9131-859-0. Available from: http://www.bis.org/publ/bcbs189.pdf

BASEL COMMITTEE ON BANKING SUPERVISION. *The Internal Ratings-Based Approach*. [online].January 2011 [cit. 2012-06-04]. Available from: http://www.bis.org/publ/bcbsca05.pdf

BASEL COMMITTEE ON BANKING SUPERVISION. *Countercyclical capital buffer proposal*. [online]. July 2010 [cit. 2012-09-23]. ISBN 92-9197-833-7. Available from: http://www.bis.org/publ/bcbs172.pdf

BASEL COMMITTEE ON BANKING SUPERVISION. *Guidance for national authorities operating the countercyclical capital buffer*. [online]. December 2010 [cit. 2012-09-23]. ISBN 92-9197-865-5. Available from: http://www.bis.org/publ/bcbs187.pdf

BRYANT, John. *A Model of Reserves, Bank Runs, and Deposit Insurance*. *Journal of Banking and Finance*, Vol. 43, 1980, pp. 749-61.

BÜRGEROVÁ, Jiřina. *Role interního auditu při implementaci Basel II*. [online]. 2007 [cit. 2012-06-10]. Available from: http://nf.vse.cz/download/veda/workshops/

CECCHETTI, Stephen G, MOHANTY, M S and ZAMPOLLI, Fabrizio. *The real effects of debt*. [online]. September 2011 [cit. 2012-10-02]. Available from: https://docs.google.com/

ČESKÁ NÁRODNÍ BANKA. *Základní ukazatele o bankovním sektoru* [online]. 2012 [cit. 2012-07-28]. Available from: http://www.cnb.cz/cs/dohled_financni_trh/souhrnne_informace_fin_trhy/zakladni_ukazatele_fin_trhu/banky/index.html

ČESKÁ NÁRODNÍ BANKA. *Jak by zvládly české banky návrat recese do Evropy?* [online]. 2012 [cit. 2012-05-21]. Available from: http://www.cnb.cz/cs/faq/jak_jsou_na_tom_banky.html

ČESKÁ NÁRODNÍ BANKA. ARAD databáze [online]. [cit. 2012-05-01]. Available from: http://www.cnb.cz/cnb/STAT.ARADY_PKG.PARAMETRY_SESTAVY?p_sestuid=7317&p_strid=ABBAA&p_lang=CS

ČESKÝ STATISTICKÝ ÚŘAD. M000101c HDP výrobní metodou (ceny roku 2005) [online]. [cit. 2012-06-28]. Available from: http://apl.czso.cz/pll/rocenka/rocenkavyber.makroek_prod

Comittee of European Banking Supervisors (CEBS), *Position paper on a countercyclical capital buffer.* [online] 2009 [cit. 2012-04-15]. Available from: http://www.eba.europa.eu/getdoc/715bc0f9-7af9-47d9-98a8-778a4d20a880/CEBS-position-paper-on-a-countercyclical-capital-b.aspx, p.16

DASH, Eric. *Big Banks to Pay More to Insure Deposits* [online]. *The New York Times*, 2011 [cit. 2012-03-05]. Available from: http://www.nytimes.com/2011/02/08/business/08fdic.html?_r=2

DIAMOND, W. Douglas, and DYBVIG, Phillip H. *Bank Runs, Deposit Insurance and Liquidity*. *Journal of Political Economy,* Vol. 91, 1983, pp. 401-19.

FOND POJIŠTĚNÍ VKLADŮ. *Rok 2011 přinesl větší ochranu vkladů a nárůst počtu bank* [online]. 2012. [cit. 2012-03-10]. Available from: http://www.fpv.cz/cs/aktuality/rok-2011-prinesl-vetsi-ochranu-vkladu-a-narust-poctu-bank.html

GOLDSMITH, Raymond. W. *Financial Structure and Development* [online]. New Haven/London: Yale University Press, 1969. [cit. 2012-02-20] Available from: http://www.jstor.org/discover/10.2307/2230134?uid=3737856&uid=2129&uid=2&uid=70&uid=4&sid=21100948539583

GOLDSTEIN, Morris and VÉRON, Nicolas. *Too Big to Fail: The Transatlantic Debate*. Peterson Institute for International Economics [online]. 2011 [cit. 2012-03-28]. Available from: http://piie.com/publications/wp/wp11-2.pdf

Governors of the Federal Reserve System, *Reappraisal of the Federal Reserve Discount* Mechanism. Washington, D.C., 1972, Vol. 3, pp. 95-136.

HOLMSTROM, Bengt and TIROLE, Jean. *Financial Intermediation. Loanable Funds and the Real Sector*. Quarterly Journal of Economics, Vol. 112, August 1997, pp. 663-691.

HOOKS, Linda M., and ROBINSON, Kenneth J. 2002. *Deposit Insurance and Moral Hazard: Evidence from Texas Banking in the 1920s*. Journal of Economic History 62(3) (September): pp. 833-53

JÍLEK, Josef. *Finanční rizika*. Praha: Grada Publishing, spol. s.r.o., 2000. ISBN 80-7169-579-3, pp. 15-98

KASHYAP, A. and STEIN, J. *Cyclical Implications of Basel II Capital Standards*. Federal Reserve Bank of Chicago. *Economic Perspectives*, 1st Quarter 2004, pp. 18-31.

KIRSCHBAUM, Erik. *Suicides Have Greeks on Edge Before Election*. [online]. *Reuters 28.4.2012* [cit. 2012-02-15] Available from: http://www.reuters.com/article/2012/04/28/us-greece-election-suicide-idUSBRE83R08N20120428

LEVINE, Ross. Financial *Development and Economic Growth: Views and Agenda* [online]. *Journal of Economic Literature*, Vol. 35, 1997 [cit. 2012-05-07] p.668. Available from: http://www.jstor.org/stable/2729790

STRETTON, Catherine. *Liquidity Coverage Ratio*. DELOITTE. [online]. January 2011 [cit. 2012-08-14]. Available from: http://www.deloitte.com/assets/Dcom-SouthAfrica/Local%20Assets/Documents/5.%20Basel%20flyer%20-%20LCR.pdf

LIS, Santiago Fernández de, PAGÉS, Jorge Martínez and SAURINA, Jesús. *Credit Growth, Problem Loans And Credit Risk Provisioning in Spain* [online] Banco de España, 2000 [cit. 2012-04-10] Available from: http://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosTrabajo/00/Fic/dt0018e.pdf

OERTEL, Frank Peter. *Basel III: Capital Changes*[online] Linklaters 2011 [cit. 2012-02-15] Available from: http://frank-oertel-math.de/On_Basel_III_Feb_2011.pdf

OHTAKE, Fumio. *Unemployment and Happiness* [online] *Japan Labor Review*, Spring 2012, No. 2 [cit. 2012-02-01] Available from: http://www.jil.go.jp/english/JLR/documents/2012/JLR34_ohtake.pdf

PANEK, D. *Bankovní regulace a dohled*. Brno: Masarykova univerzita, 2005. str. 36. ISBN 80-210-3660-5

PARTNOY, Frank. *The Siskel and Ebert of Financial Markets: Two Thumbs Down for the Credit Rating Agencies* [online] *Washington University Law Quarterly*,1999, No. 3 [cit. 2012-02-27] Available from: http://www.publicassets.us/wp-content/uploads/2011/08/Two_Thumbs_Down_for_Credit_Rating_Agencies-Portnoy-1999.pdf

PATEL, Vandana Singhvi. *Central Banks and Asset Bubbles: A Perspective*. *Economic and Political Weekly*, Vol XLV, No 18, May 1-7, 2010

PENZA, Pietro and BANSAL, Vipul K. *Measuring Market Risk with Value at Risk* (Wiley Series in Financial Engineering, 2000).ISBN 0-471-39313-4, p.48 .

POWELL, Stephen and KINGSLEY, Ben. *The Basel III Liquidity Coverage Ratio: Implications for Corporate Borrowers.* [online] *Slaugther and May,* 2011 [cit. 2012-04-19] Available from: http://www.slaughterandmay.com/media/1682903/financing-briefing-the-basel-iii-liquidity-coverage-ratio-implications-for-corporate-borrowers.pdf

PRICE WATERHOUSE COOPERS. *Dynamic Provisioning*. [online]. April 2012 [cit. 2012-10-05]. Available at: http://www.um.edu.mt/__data/assets/pdf_file/0018/152073/Axisa_Fabio.pdf

REPULLO, R. and SUAREZ, J. *The Procyclical Effects of Basel II*. CEPR Discussion Paper No. 6862, 2009

REPULLO, Rafael a SAURINA, Jesús. *The Countercyclical Capital Buffer of Basel III.: A Critical Assessment* [online] 2011 [cit. 2012-05-14] Available from: ftp://ftp.cemfi.es/pdf/papers/repullo/Repullo-Saurina%20Final%20R.pdf

ROGOFF, Kenneth. World Economic Outlook. *Growth and Institutions* [online] IMF, April 2003 [cit. 2012-03-08]. ISSN 0251-6365. Available from: http://www.imf.org/external/pubs/ft/weo/2003/01/pdf/front.pdf

SAURINA, Jesús. *Dynamic Provisioning* [online]. July 2009[cit. 2012-10-05]. Crisis response, 7. Available from: http://rru.worldbank.org/documents/CrisisResponse/Note7.pdf

SCHOLTENS, Bert and WENSVEEN, Dick Van. *The Theory of Financial Intermediation*. [online] Vienna: SUERF, 2003. p. 7 , ISBN 3-902109-15-7. [cit. 2012-03-15] Available from: http://www.suerf.org/download/studies/study20031.pdf

SEIDLER, Jakub. *Credit Risk in the Macroprudential Framework: Three Essays*. July, 2012, Prague. Available from: ies.fsv.cuni.cz/default/file/download/id/20838. Dissertation. Charles University in Prague. Vedoucí práce prof. Ing. Oldřich Dědek, CSc.

SIEGELMAN, Peter. *Adverse Selection in Insurance Markets: An Exaggerated Threat*. [online] Fordham School of Law, Pub-Law Research Paper No. 27. July 31, 2003. [cit. 2012-05-06] Available at SSRN: http://ssrn.com/abstract=434604 or http://dx.doi.org/10.2139/ssrn.434604

TVERSKY, A.and KAHNEMAN, D. *Loss Aversion in Riskless Choice: A Reference-Dependent Model*. Quarterly Journal of Economics, Vol. 106, 1991, pp. 1039-1061

UK FSA's note *Variable Scalar Approaches to Estimating Through the cycle PDs* (February 2009) Available from: www.fsa.gov.uk/pubs/international/variable_scalars.pdf

VIÑALS, José. *Global Financial Stability Report—Executive Summary and Chapter I.* INTERNATIONAL MONETARY FUND: Monetary and Capital Markets Department [online] 2010 [cit. 2012-04-05].

Zátěžové testy EBA: *Banky potřebují 115 miliard eur kapitálu. Erste 743 milionů, přišel negativní výhled S&P*. [online] PATRIA ONLINE, 2011 [cit. 2012-07-12] Available from: http://www.patria.cz/zpravodajstvi/1966096/zatezove-testy-eba-banky-potrebuji-115-miliard-eur-kapitalu-erste-743-milionu-prisel-negativni-vyhled-s-p.html