Measures to tame credit growth: are they effective?

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Abstract

This paper focuses on policy measures taken to curb the private sector credit growth in the period 2003-2008. Our analysis is based on an original survey performed on eleven central banks in Central and Eastern Europe (CEE). The findings reveal high intensity of policy intervention: altogether 82 measures were taken in CEE in the period. We apply difference-in-differences method to selected countries to find out whether the measures applied were effective in slowing down the credit growth. Deriving from country experiences, the paper argues that in order to eliminate adverse impacts, policy measures should include combination of monetary and prudential tools with special emphasis on domestic environment and role of foreign banks in the CEE region.

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Keywords: Credit growth, monetary policy, macroprudential policy, Central and Eastern Europe.

1 Introduction

Until the eve of global financial crisis, majority of the economies of Central and Eastern European countries (CEE) witnesses an unprecedented credit boom. With the impact of the crisis, the boom was suddenly discontinued and turned into a credit crunch. This paper tracks the period from credit growth to credit crunch (2003-2008) with a special focus on policy measures taken to alleviate the adverse effects of the credit growth.

Credit growth is an inherently beneficial process. Its revivals are seen as sings of healthy banking system and confidence in the economy. On the other hand, excessive credit growth increases imbalances and can contribute to amplifying vulnerabilities of the financial system.

The objective of this paper is to analyse the policy responses to the credit developments. In particular, it aims to answer a set of questions: What instruments were used the most? How effective were they? What were the implementation challenges? How did agents circumvent the measures? The main contribution of this paper is that the evaluation is performed upon the results of a survey that was conducted on eleven central banks in CEE. Having the survey return ratio of 100%, the analysis builds on a unique dataset of policy responses for given period. We record 82 policy interventions taken over six years in only eleven CEE countries. This is not only a rich experience for the region but also an ample pool of lessons for design of monetary, prudential, supervisory or administrative measures elsewhere.

The paper is structured as follows: Chapter 2 introduces some stylized facts. Chapter 3 focuses the menu of policy measures policymakers may apply to counter the credit boom. Chapter 4 presents results of the survey conducted among central banks in CEE. Chapter 5 assesses selected country experiences by applying event studies that track the application of the tools. Chapter 6 concludes.

2 Stylized facts and literature review

Private credit to GDP levels were above the pace of the euro area, albeit the absolute levels remained relatively low. In 2003-2007 credit to private sector rose significantly faster than in case of the euro area. The credit dynamics in the region reached the highest pace in mid-2006 (Figure 1). Considering the absolute values, credit in CEE was still below the levels of Western Europe: euro area private credit persistently amounted to more than 100% of GDP. Figure 2 illustrates relatively low levels of the private credit to GDP in CEE. We observe clear differences in credit development among Central (CEE-5), Baltic (BE-3) and South-Eastern (SE-3) European economies. Hence the region shall be treated as a rather heterogeneous.

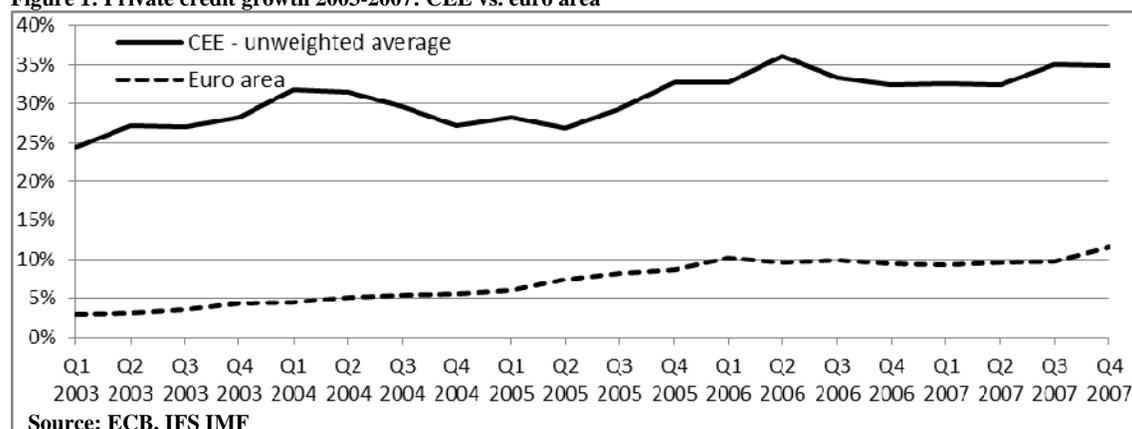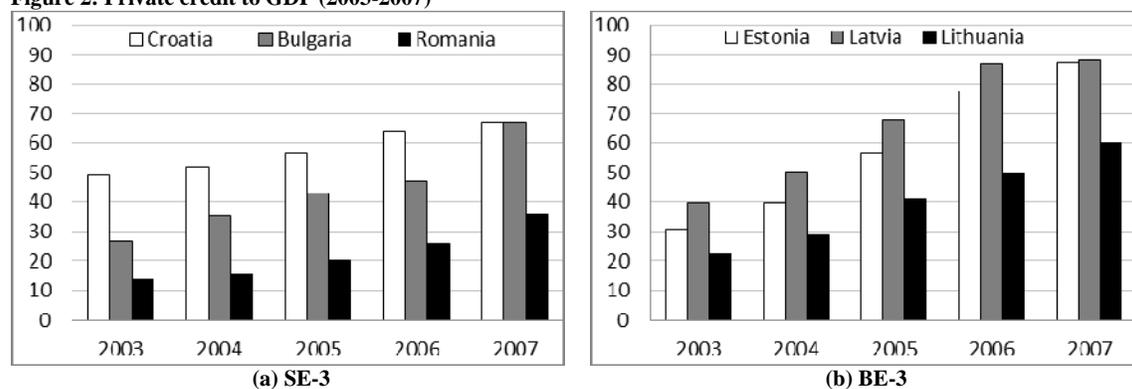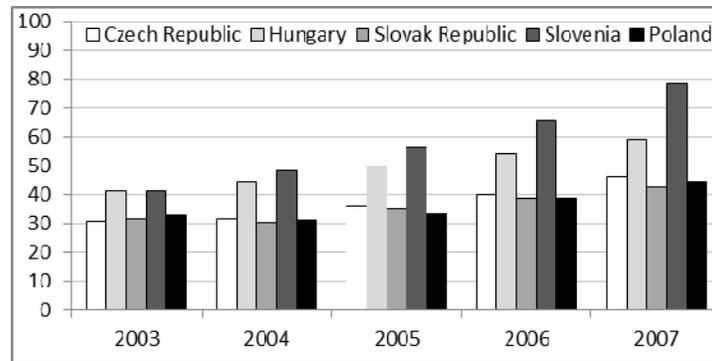**Figure 1: Private credit growth 2003-2007: CEE vs. euro area**

Source: ECB, IFS IMF

**Figure 2: Private credit to GDP (2003-2007)**

(a) SE-3

(b) BE-3

(c) CEE-5

In most countries, foreign currency denominated loans were a very significant component of the credit growth. Even though the amount of FX loans varies substantially, the phenomenon is quite widespread. As of mid-2007 it appeared 7 out of 11 CEE economies. The exceptions are the Czech Republic and Poland. Cases of Slovakia and Slovenia should be treated separately as both countries underwent the euro adoption. In case of Slovakia, however, FX loans had not contributed significantly to the total loans (20%). Right before the currency conversion, the share of FX loans in Slovenia was 65% (predominantly in euro).

Figure 3: Foreign currency loans (% of total loans to the private sector)
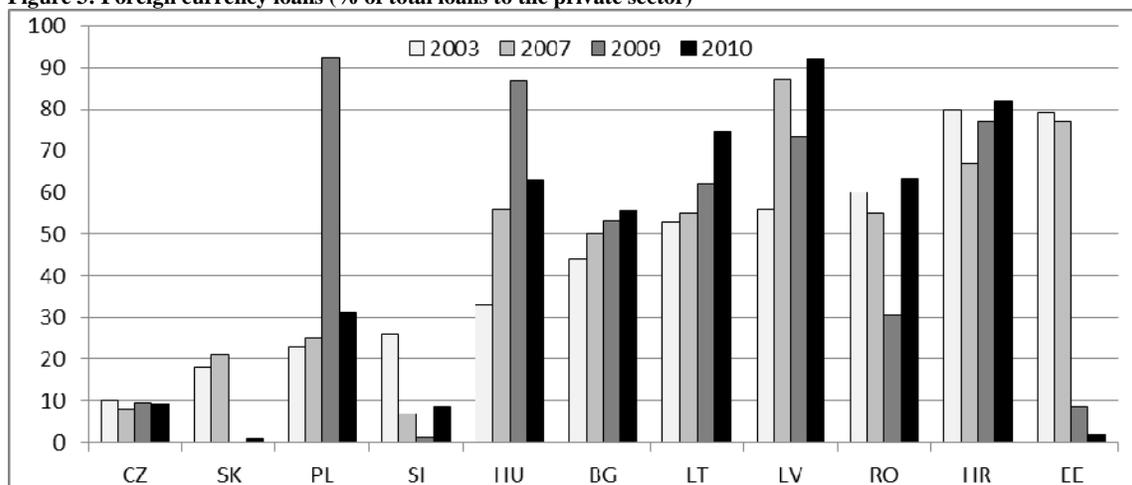
Cross-border (direct) lending channel was very relevant in a number of countries. Direct lending poses substantial limit on effectiveness of domestic policy measures to dampen the credit dynamics. Table 1 illustrates the development of foreign claims in CEE. Total foreign claims consist of cross-border claims and local claims on foreign affiliates' in all currencies. This is an important distinction that allows us to see that besides activities of local subsidiaries, many countries also faced direct foreign borrowing. Cross-border credit was profound mainly in BE-3 and SE-3 and Hungary while rest of the CEE-5 economies shows higher portion of the claims of foreign affiliates. The cross-border channel can represent serious troubles to domestic policymakers as they are unable to control the credit development and domestic agents are obtaining credit directly from abroad.

Table 1: Foreign claims (in USD bn, end of the period)

	Country	Total foreign claims			Cross-border claims			Local claims		
		2005	2008	2010	2005	2008	2010	2005	2008	2010
CEE-5	Czech Republic	85.1	164	182.7	26.9	49.6	42.3	58.2	114.4	140.4
	Slovakia	33.9	72.6	64.7	7.8	21.4	14	26.1	51.2	50.7
	Slovenia	14.9	41.8	35.5	11.8	23.9	17.9	3.2	17.9	17.6
	Hungary	72.5	136.3	116.8	36.1	66.1	57.2	36.4	70.1	59.6
	Poland	103.5	239.5	293.1	32.4	63.7	82.7	71.1	175.8	210.4
SE-3	Bulgaria	9.4	31.7	34.4	3.5	11.9	12.1	6	19.8	22.3
	Croatia	38	89.6	73.4	16.7	41	29	21.3	48.6	44.4
	Romania	25.8	107.5	106.6	11.8	42.2	38.8	14	65.3	67.8
BE-3	Estonia	16.5	28.9	20.6	11	15.1	8.4	5.5	13.9	12.1
	Latvia	9.9	30.4	24.1	5.1	8.4	7.3	4.7	22	16.8
	Lithuania	11.1	26.9	24.4	8.8	13.8	14.8	2.3	13.1	9.6

Source: BIS

After the financial turmoil in the last quarter of 2008, the credit growth suddenly turned into a credit crunch. Yet the downturn reflected also country and region specific factors. The slowdown in credit growth occurred in line with the global downturn. The crunch was especially strong in the economies where credit growth was funded by the capital inflows. Foreign mother banks, which were confronted with liquidity and capital shortages, came under severe liquidity pressure and saw themselves forced to stop new lending or even deleverage (Bakker & Gulde 2010). Country and region specific factors also contributed to the slowdown: extending domestic and regional imbalances, followed by a collapse of domestic demand and correction in the housing market in a few countries (Zumer et al. 2009). Given the excessive FX denominated borrowing, credit developments were adversely affected by the exchange rate depreciation (where applicable by the exchange rate framework and existence of FX lending phenomenon).

Listed stylized facts illustrate the most significant aspects of the credit boom in CEE. Published literature firstly aimed to analyse the issue of excessiveness in credit growth. The most popular approach to address the excessiveness was to derive the long-term equilibrium level of credit with respect to macroeconomic fundamentals (Boissay et al., 2007; Brzoza-Brzezina, 2005; Egert et al. 2006 – later revised at Backe et al., 2007 and Zumer et al., 2009). Majority of the studies identified a few CEE economies with excessive credit development that could adversely affect financial stability.

Second, the most thorough palette of policy responses to address the credit boom was introduced by Hilbers et. al (2005). The study also serves as a reference guide for this paper. Hilbers et al. (2005) looked at the wider group of countries in Eastern Europe. On the other hand, due to the year of publishing the research period was limited only to the mid-2005 thus it does not cover the main period of interventions analysed at this paper.

Third, the question of effectiveness of the specific policy measures was often approached on a country basis, namely by Kraft & Jankov (2005) for Croatia, Popa (2007) for Romania or as a part of the financial stability reports by NPL (2007) for Poland or Latvijas Banka (2007) in case of Latvia.

The financial crisis highlighted the debate about the role of macroprudential policy, its tools, implementation challenges and efficiency.[2] Since CEE provides a rich pool of experience from the credit boom period, policy measures applied in the region were subject to the further analysis. Dell'Ariccia et al. (2012) explores the past credit booms in a large sample of economies. As far as the CEE experience is concerned, they find little evidence that macroprudential measures had a lasting impact on the boom itself (Dell'Ariccia et al., 2012). On the other hand the measures could be successful in affecting specific goals (such as currency positions) or building buffers for the downturn.

Lim et al. (2011) provide the study of effectiveness of macroprudential policies from 49 countries CEE included. The authors apply three different approaches to assess the effectiveness: (i) case study involving small groups of countries, (ii) simple approach examining performance of the variables before and after the intervention and (iii) panel regression analysis to assess the effectiveness of measures on various variables. The findings identify the conditions under which the measures can be successfully implemented as well as potential challenges.

3   Measures: theory

Prior to the credit crunch, the global view favoured the benign neglect rather than a more proactive policy stance. Justifications were twofold. First, It is a demanding task to clearly identify excessive credit expansion that is not in line with macroeconomic fundamentals. Second, any measure entails costs and distortions. And yet, not all credit booms are followed by financial crisis or poor macroeconomic performance. Duenwald et al. (2007) estimate the likelihood of a banking crisis following a lending boom to be 20%. Based on IMF (2004), 70% of credit booms coincide with either investment or consumption boom in emerging market. As a result, introduction of policy measures is a challenging task, its ex-ante valuation indeed.

Even upon deciding to act, the task is not about to become any easier as more questions emerge. What policy tools do policymakers actually have at their disposal? How strong are they? What are the limitations? Crowe et al. (2011) stress there is "no silver bullet" among the policy options. Each policy introduces costs and distortions and its effectiveness is limited by loopholes and implementation problems. Broad reaching measures (e.g., monetary policy rates) are more difficult to circumvent, and hence potentially more effective, but will typically involve greater cost. On the other hand, more targeted measures (e.g., specific macroprudential measures) may limit costs but will be challenged by loopholes, jeopardizing efficiency (Crowe et al. 2011).

Needless to say, one must also account for the interactions across the range of the tools, their complementariness as well as potential conflicts. At last, every economy is unique in its distinctive characteristics and institutions that significantly influence feasibilities of each measure and possible trade-offs.

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[2] The strongest initiative has been generated by the IMF Board asking for four strands of work (i) identifying indicators of systemic risk, (ii) reviewing country experiences on the use and effectiveness of macroprudential policy, (iii) assessing the effectiveness of different institutional setups for macroprudential policy and (iv) assessing the multilateral aspects of macroprudential policy (IMF, 2011).

Table 2 summarizes a wide menu of policy options to counter the credit growth ranging from macroeconomic measures to soft measures such as promotion of better understanding of risk.

3.1 Macroeconomic policy measures

Within the group of macroeconomic policy measures we will look more closely at the monetary tools, namely interest rates and reserve requirements. There is of course a wide palette of other measures including those fiscal and exchange rate character (see Table 2).

Rise in key policy rates makes borrowing more expensive and reduces demand for loans. Interest rate increases pose however many concerns. As interest rates affect entire economy, they shall be used only to address macroeconomic overheating pressures. Therefore, they are rarely used to address the credit boom as such. Furthermore, interest rate tightening may pose other concerns.

a. Transition problem: Many economies witnessed increasing competition but still relatively ample profit margins for financial institutions. Banks were willing to absorb higher funding costs (associated often with conventional monetary policy measures) without affecting the lending costs.
b. Exchange rate framework: Countries experiencing the most pronounced credit boom were constraint by currency peg to euro (Baltic countries, Bulgaria).
c. Foreign ownership of banks allowed banks to obtain financing from parent banks. Lending standards were in line with home conditions (relevant mainly for Baltic countries).
d. FX borrowing, as one of the most risky drivers of credit boom, would not only remain unaffected but in case of significant interest rate differentials would be even spurred by the domestic rate tightening.
e. Already high capital inflows would under rising interest rates increase even further while credit growth response was uncertain (fear in Croatia given the past experience of Serbia).
f. Low initial level of household debt was often the case. Experience of Latvia in 2003-05 showed that even though interest rates were implemented the financial deepening persisted.

Changes in the reserve requirements (RR) are a strong instrument widely used in CEE during the transition period. Enoch & Otker-Robe (2007) stress that an increase in RR can be essential in one-off sterilization of excess liquidity or in accommodation of structural changes in demand for reserves. Besides changes in the required level, measures often include also reserve requirements differentiated by the currency, type of deposit or broadening the reserve base. However, RR changes have many limitations as they hinder financial intermediation (i.e. RR are perceived as a tax on financial intermediation as they do not generate interest paid). Possible negative outcomes are lower financial deepening, moving of the banks off shore or in case of subsidiaries higher borrowing form parents, banks accepting more risky projects, discrimination of banks vis-a-vis non-banks.

Fiscal policy approach credit boom from two main perspectives: fiscal tightening connected to real estate booms (transaction taxes and property taxes) and avoiding fiscal/quasifiscal incentives that may encourage certain type of lending (such as specifically explicit subsidies or guarantees for housing loans).

Exchange rate policy measures address the foreign exchange risk of the credit growth. The risk is associated with significant FX-denominated borrowing abroad and tendency to borrow from abroad. Furthermore, Hilbers et al. (2005) argue the main problem is misperception of FX risks by economic agents. In particular, it is a combination of two factors: seemingly predictable exchange rates and high interest rates differentials that are not consistent with exchange rate regime. As a result it may create misperception of low exchange rate risk and encourage FX-denominated borrowing.

3.2 Macroprudential and Supervisory Measures

Macroprudential and supervisory measures are primarily concerned with strengthening the banking sector rather than dampening the credit boom. Nonetheless, Crowe et al. (2011) admit that when policy succeeded in slowing down a boom and avoiding systemic crisis in a credit crunch, it almost always involved some prudential measures.

Justification of the measures is yet subject to the nature of risk associated with the credit growth. Prudential and supervisory measures are suitable when eliminating inconsistencies or distortions in the market (e.g., excessive loan concentration or unhedged FX positions). Otherwise, prudential tools and supervision should be designed so that they support macroeconomic policies, i.e., they should be part of a comprehensive package of measures rather than a separated tool. Hilbers et al. (2005) emphasize that there are limits to what prudential policies can do in the absence of prudent fiscal policies, or if monetary fiscal regimes persistently create incentives that encourage credit growth. As a result prudential measures are typically employed along with monetary or direct instruments.

Successful implementation of macroprudential and supervisory measures stands upon a wide range of requirements. In detail, these are adequate enforcement capacity of regulatory authorities, cross-border supervisory cooperation (furthermore in case of foreign-owned banks, adequate scrutiny from supervisors in Western European home countries) and coordination between supervisors of bank and non-bank financial institutions. Unless a common dialog and cooperated measures are achieved, single attempts to cure the excessive credit growths may not only prove unsuccessful, but also create new loopholes in the system and introduce further obstacles. Put differently, it is impossible to design a stable and resilient domestic financial system independent of a global network.

Unlike monetary policy, macroprudential measures have narrower and more targeted goals which results in reduced costs. Their primary objective is to strengthen the banking system not to limit the credit boom. Therefore even if they fail to stop the boom, they may still help to cope with the crunch. On the other hand, few caveats are in order. First, as these instruments are narrower, it is easier to circumvent them and encourage regulatory arbitrage and risk-shifting. Second, macroprudential framework is still in infancy, thus there is a call for more research to be done in this area. Specific measures also entail strong and weak points that are to be addressed as we discuss them in detail in next chapters.

3.3 Administrative and other measures

To get a full picture of possible policy options, we also need to approach two extremes: the measures of the first and the last resort. The first is promotion of better understanding of risks, the latter are administrative measures.

Promotion of better understanding of risks is a keystone in improving credit culture in the economy. For illustration those are disclosure of information, consultative meetings with banks, establishing credit bureaus and registries. Although, such tools are rather soft techniques, they play crucial role in strengthening market discipline and capacity to cope with credit booms.

On the side of the spectrum are administrative measures. Administrative (direct) measures are explicitly aimed to limit the source of funding, for instance controls on capital inflows, reserve requirements on bank borrowing from abroad, differentiated reserve requirements on domestic and foreign currency. Direct tools are strong inhibitors of credit growth. Even though they often entail huge costs and distortions, their effect is mostly only of a temporary character. Administrative

measures are to be applied only as a last resort policy. Yet, these tools did also occur in CEE region over the researched period.

Table 2: Menu of policy responses

Macroeconomic Policy Measures	Fiscal Measures	▪ Fiscal tightening ▪ Avoiding fiscal/quasi-fiscal incentives that may encourage certain lending
	Monetary Measures	▪ Interest rate tightening ▪ Reserve requirements ▪ Liquid asset requirements ▪ Sterilization operations
	Exchange Rate Policy	▪ Increase exchange rate flexibility ▪ In general maintain a consistent mix of monetary and exchange rate policy

Prudential Measures	▪ Higher/differentiated capital requirements ▪ Tighter/differentiated loan classification provisioning ▪ Tighter eligibility criteria for certain loans ▪ Dynamic provisioning ▪ Tighter collateral rules ▪ Rules on credit concentration ▪ Tightening net open FX position limits ▪ Maturity mismatch regulations, and guidance to avoid excessive reliance on short-term borrowing

Supervisory/ Monitoring Measures	▪ Increasing disclosure requirements for banks on risk management and internal control policies and practices ▪ Closer onsite/offsite inspection/surveillance of potentially problem banks or those with aggressive lending ▪ Periodic stress testing ▪ Periodic monitoring/ survey of banks' and customers exposure ▪ Increasing supervisory coordination of banks and nonbank financial institutions ▪ Improved dialogue between domestic and home supervisors of foreign banks

Market Development Measures	▪ Encouraging development of hedging instruments ▪ Developing asset management instruments to deal with distressed assets ▪ Developing securities markets to reduce dependence on bank credit and improve diversification of banks' credit risks ▪ Improving credit culture (establishment of credit bureaus, credit registry, stronger legal system, creditor rights, etc.) ▪ Improving banks' and corporations' accounting standards

Administrative Measures	▪ Overall or bank-by-bank credit limits ▪ Marginal reserve requirements based on credit growth ▪ Controls on capital flows: e.g., ▪ Control on foreign borrowing by banks and/or bank customers ▪ Diff. reserve requirements on domestic and foreign currency ▪ Taxes on financial intermediation ▪ Import restrictions

Promotion of Better Understanding of Risks	▪ Strengthening banks' ability to monitor, assess, manage risks ▪ Public risk awareness campaigns, press statements, etc. ▪ Discussions / meetings with banks ("moral suasion") to warn or persuade banks to slow down credit extension

4 Survey results

The core data were collected via direct survey across the central banks in the CEE region. Central authorities were asked to provide information regarding the measures used over the period 2003-2008 to control the credit growth. The survey consisted of three main parts: a) monetary policy measures, b) prudential and supervisory measures, and c) administrative and other administrative measures.

Our survey was conducted in form of a simple questionnaire where central banks were to identify whether or not they undertook any of the listed instruments in period 2003-2008. If affirmative, they were to specify the date (month and year) when such steps were taken. Importantly, we managed to receive responses from all eleven central banks (return ratio = 100%).[3]

Table 3: Survey results - List of policy measures

Measures	CZE	SVK	LTU	LVA	EST	HUN	POL	ROU	BUL	CRO	SLO
Monetary measures											
Interest rate response				X			X	X			
Reserve requirements				X	X			X		X	
Changes in the required level				X	X			X		X	
Differentiated by currency								X			
Differentiated by type of deposit				X							
Broaden the reserve base				X				X			
Prudential and Supervisory measures											
Capital requirements or higher risk weights			X	X	X	X	X	X		X	
Liquid asset requirements		X					X			X	
Tighter asset classification rules								X			
Tighter provisioning rules				X				X			
Tighter eligibility criteria for certain loans				X		X		X			
Limit on LTV				X				X			
Limit on LTI / payment to income								X			
Tighter rules on valuation criteria											X
Measures targeted on FX borrowing			X	X			X	X		X	
Targeting unhedged borrowers				X			X	X		X	
Tighter net open position limits			X	X							
Soft measures: non-binding guidelines for banks		X	X	X	X	X	X			X	X
Tighter supervision				X		X		X			
Administrative and other measures											
Capital controls			X								
Credit ceilings								X		X	
Change in taxes on real estate transactions				X							

Table 3 illustrates the overall list of measures used within the region. As can be inferred the CEE experience is very rich; every measure asked was implemented at least in one of the countries. Altogether we observed 82 policy interventions over the period. Yet, the country experiences varied significantly. Most of the countries that were identified to exhibit the rapid credit booms resorted to more active policy involvement. On the other hand, the heterogeneity of the responses across

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[3] Bank of Slovenia provided us only with the Yes/No answers to the tools without stating the dates of implementation. Given the fact that Slovenia does not fall into the category of countries that used such policy measures extensively, the response is of valuable significance nonetheless.

the CEE region provide us with a unique possibility to compare the countries that made more effort to act against the adverse developments with the other in the region via difference-in-differences estimations.

Exchange rate regime mattered both in scale and scope of responses. The fears about excessiveness of the credit growth came predominantly from fixed exchange rate regimes, to be more specific from countries operating under formal currency boards (Bulgaria, Estonia or Lithuania), quasi-currency boards (Latvia, Croatia[4]). Additionally, having their hands tied in case of interest rates or exchange rate tools, the countries introduced a rich record of various prudential and supervisory activities. Most of the measures were moreover specifically targeted to the key issues of the credit developments, namely FX-denominated private borrowing often in form of housing loans.

The overall assessment is however mixed. Among the most important reasons for underperformance is the insufficient scrutiny of foreign parent banks. The main problem was rooted in lack of enforcement capacity and weak cross-border supervisory cooperation. This argument was permanently stressed in the literature prior (Hilbers et al. 2005) or after the financial meltdown (Bakker & Gulde 2010). The lack of supervisory coordination contributed to creation of loopholes such as shift from FX-lending of local subsidiaries directly to foreign mothers, or shift to less regulated and supervised non-bank financial institutions (notably leasing companies) that conducted quasi-bank activities and fell outside the regulatory horizon. On the top of that, selected countries experienced also faced persistent issues with domestic yet systematically important banks (Hungarian OTP Bank or Latvian Parex).

Figure 4: Number of policy measures over time in CEE (quarterly data)
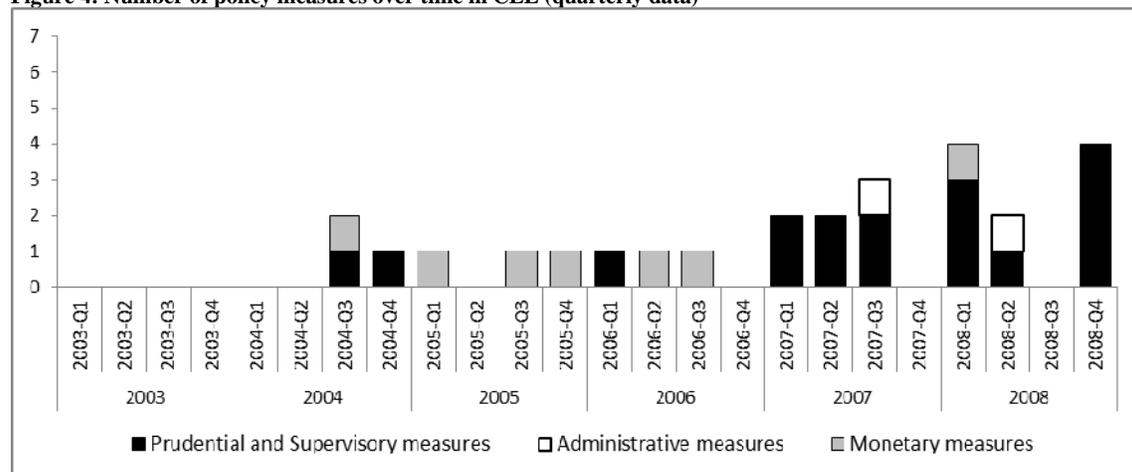
Policy measures were mostly reactive rather than proactive or counter-cyclical. There has been a controversy regarding the type and timing of policy responses. Taking the fiscal stance, Bakker & Gulde (2010) emphasized that with the benefit of hindsight, public expenditure growth should have been more restrained during the boom years. If the surge in revenues had been used to build up increasing fiscal surpluses, fiscal policy would not have further fueled overheating (Bakker & Gulde, 2010). Based on the survey results, only Latvia undertook changes in taxation to discourage

[4] The *de iure* and *de facto* regimes in Croatia differ markedly. National Bank of Croatia implements the exchange rate regime of managed floating *de iure*. In the light of highly euroized financial system Croatia operates under de facto quasi-currency board allowing for exchange rate volatility to discourage one-way gambles and speculation and at the same time encourage FX hedging.

lending practices (the change in taxation was aimed at real estate transaction). Notwithstanding Martin et al. (2009) argued even in the specific case of Latvia, the post-financial turmoil implementation of the fiscal measures stimulating the economy proved to be a very complicated task since the government has not accumulated any reserves in good times.

Evaluation of prudential and monetary stance is more questionable. First of all, policymakers devoted much effort to design prudential and supervisory measures get in line with the Western European best practices and Basel II requirements. Second, the levels of capital buyers were even higher than the latter listed requirements and practices. The rationale behind a more prudent stance of particular economies once again stems from the nature of the region (its relative immaturity, riskiness and turbulent credit developments). Moreover, leaning against the wind during good times had at least partially positive effect (see evaluation of Recommendation S in Poland, or detailed assessment of selected Croatian measures performed by Galac, 2010).

Since the objective of this paper is to evaluate the effect on the credit developments prior to the crisis rather than their counter-cyclical character of the instruments, there are two main points to consider. First, the reactiveness character of central authorities stemmed from the wide range of circumvention practices used by the banks. A few country experiences report shift of activities to less well-regulated parts of the financial system as a response to more prudent measures. Consequently, some countries reacted by further measures to counter the newly emerged adverse issues (broadening of the base for reserve requirements or extending the supervision). Second, even when the countries attempted to pro-actively introduce changes to the potentially dangerous issues, the circumvention was not rare. As a result, when evaluating the successes of most measures, successes turn out to be short-lived or we need wider datasets (on not only bank credit but also account for non-bank data) to correctly assess the issue.

Figure 4 illustrates the time evolution of the measures used in entire CEE region. The reactiveness of the measures can also be supported by the frequency. In particular, unless facing serious issue, most policy responses were "late risers". The peak of policy activities was in second half of 2005 and first half of 2006. With respect to specific type of responses, we can observe that monetary measures were used among the first ones. Over time they mostly reached their limits and authorities turned into more specific prudential and supervisory tools.

Prudential and supervisory toolkit is particularly rich and over a wide range of relevant country lessons. As one can infer from Figure 4 the measures were popular until the end of the researched period, i.e., early stage of global financial crisis. This is also because the measures are not directly powerful for slowing down the credit boom but they are designed to foster the resiliency of the banking sector. From this perspective the best scenario would be to achieve a less pronounced credit growth as a welcome side-effect of more stable financial system. Few economies facing the most serious external imbalances also undertook more controversial direct measures (credit ceilings or capital controls). The overall amount of such measures does not strictly correspond to the data showed in Figure 4 as all the modifications and amendments to the existing measures taken in different periods are displayed.

For observed period Croatia witnessed two credit ceiling periods (from January 2003 until the end of the year, from November 2007 until 2009).[5] Next experiences occurred in Bulgaria (since March

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[5] The credit control was only eliminated in November 2009. The lifting of the tax was delayed due to fears that removing the tax would give banks room to depreciate the exchange rate.

2005 with further adjustments taken over 2005 and 2006) and Romania (September 2005). In mid-2008 Lithuania also resorted to capital controls.

Table 4: Popularity of the policy measures

Policy measures	Total usage	Number of countries
Monetary policy		
Interest rate response	8*	3
Reserve requirements	12 **	5
Prudential and Supervisory measures		
Capital requirements (higher/differentiated) or higher risk weights	12	8
Liquid asset requirements (introduction/tightening)	3	3
Tighter asset classification rules	3	2
Tighter provisioning rules	3	3
Tighter eligibility criteria for certain loans (via LTV, LTI etc.)	5	3
Tighter rules on valuation criteria	1	1
Measures targeted on FX borrowing	6	5
Soft measures – new non-binding guidelines for banks	13	9
Tighter supervision	7	4
Administrative and other measures		
Capital controls	1	1
Credit ceilings	7 ***	3
Change in taxes on real estate transactions	1	1

Notes
* Total number of interest rate responses can differ from the stated value. Three countries listed interest rates tightening as a policy measure tried yet majority of economies acknowledge they raised key policy rate to affect inflationary pressure, influencing credit growth as a by-product. ** Out of which 5x MRR in Croatia. *** Out of which 2x in Croatia and including changes and amendments of MRR in Bulgaria.

4.1 Soft measures

The survey results reveal soft measures were of the highest popularity. Nine out of eleven countries issued non-binding guidelines for the banks at least once over the years 2003-08. Moreover, many countries continued with moral suasion and soft measures targeted at domestic consumers.

From the time aspect, all the guidelines were introduces in the later part of the period (2006-2008). Majority of them was concerned with proposing more prudent risk assessment and lending practices with special attention to FX lending. Their main objective was to stimulate banks to adopt new policies and procedures to identify, monitor and control especially the credit and FX risks of the borrowers.

In some cases the measures were taken also in form of more binding guidelines (strengthening of the supervision). For illustration, a recommendation issued by Bulgarian authorities urged banks not to extend credit to households subject to threshold value of disposable income in 2006 when non-adherence to the recommendation could result in additional supervisory measures.

Soft measures were also effectively combined with other instruments such as in Polish Recommendation S. Alternatively, the non-binding guidelines were also often succeeded by tighter supervisory rules. Anyhow, the evaluation of the measures is not very positive. Estonia, which engaged in moral suasion for the entire period, admits the credit expansion continues nonetheless. Hungary attempted to improve customer consciousness about the underlying risks neither managed to achieve any palpable results. Yet, since the measures mostly occurred in the last phase, majority of their effects are hard to distinguish from the impact of the crisis.

4.2 Capital requirements and risk weights

Modification of capital requirements is considered to be the second most popular policy option. In this respect we need to be cautious since the researched period covers the time span within which the countries were to adopt the Basel II requirements. This fact can be potentially reflected in the popularity of the measure as well. Since this paper does not deal with the issue of the impact of Basel II, we will concentrate of other modifications of the capital requirements namely those taken predominantly to curb the credit growth. Still, it is viable to stress that that most of the economies kept the capital adequacy ratio well above 8%.

Furthermore, the survey results also clearly state the vast majority was more concerned with adjustment of the risk weights. Higher risk weights were widely applied to two cases: real-estate related loans and FX loans. The first measure was applied in countries facing real estate booms along with credit booms (e.g., Estonia, Latvia, Lithuania and Bulgaria). Weights for real-estate related loans were sometime raised to the amount of 100%. The measures were mostly targeted at mortgages of households or/and commercial property. In Bulgaria they went hand in hand with tighter eligibility criteria (limits on LTV was lowered from 70% to 50%).

The latter measure was also popular in case of real estate booms since the largest portion of private FX loans were taken in form of mortgages. For example, in 2008 Hungary capital requirements were increased for loans denominated in Japanese Yen under Pillar 2 of Basel II. On the other hand, Croatia required extra capital buyers to be created for loans to unhedged borrowers. Prior to Basel II, Croatia required higher risk weights for loans to unhedged borrowers (originally set at 25%, later increased to 50%). Later, in 2006 it introduces guidelines to banks on management of foreign currency induces credit risk (FCICR).

4.3 Reserve requirements

Four out of eleven central banks resorted to tightening of reserve requirements to dampen the effect of credit boom: Romania (2004-2005), Croatia (2004-06), Estonia (2006) and Latvia (2004-06). Interestingly, all the changes occurred in the first half of the researched period, suggesting that RR could have been one of the first measures implemented. As credit development data imply, the boom did neither stop nor slowdown in 2006 leaving the overall effectiveness questionable. Thus the questions emerge: Why was the timing so consistent among the countries? Were the measures consistent across the region as well? What were the channels of circumvention?

The time consistency issue may lie in relative simplicity of implementation. Moreover RR fall into the category of conventional monetary tools. This very argument also justifies the sudden stop of RR tightening: levels in CEE region were well above average level in euro area and their efficiency was limited by shifting more upwards. For illustration, standard RR on liabilities denominated in domestic currency were set as high as 18% in Romania and Croatia or 15% in Estonia. Nonetheless, the overall quantitative constraint was neither the strongest nor the most popular measure.

The rationale behind is that most dangerous was not the pace of credit growth per se but the underlying currency and maturity mismatches. As a result, central authorities decided to act by broadening the reserve base (Latvia in 2005 and 2006, Romania twice in 2005), differentiation by type of deposit (Latvia in 2005 and 2006) and differentiation by the currency (Romania 2004 and 2006).

Croatian experience is particularly interesting as the authority actually lowered the minimum required reserve ratio multiple times over the researched period (counter-measure) while introducing new measures marginal reserve requirements (MRR) and special reserve requirements (SRR). Although both MRR and RR differentiated by the currency have the same goal (to control the excessive FX-denominated borrowing), the contrast is in the marginal character of MRR (call for additional requirements only to the increment of FX liabilities).

BOX : MARGINAL RESERVE REQUIREMENTS

Marginal reserve requirements (MRR) are special extension of regular reserve requirements. In our set of countries they were used in Bulgaria and Croatia. Yet, the way of measure design is substantially various and deserves a special treatment.

Croatia used the MRR mostly over the period 2004-2006. MRR were introduced on foreign exchange deposits and liabilities by requiring banks to make additional non-interest bearing deposits with the Hrvatska Narodna Banka (HNB) if the foreign liabilities increased over a defined threshold. Over the time MRR evolved and the calculation modified, however they still resemble standard RR in the tax-type nature, in particular reserve requirements differentiated by the currency. Yet the difference is in the marginal character: MRR restrict only new FX liabilities with respect to specific base (in other words only incremental values). Thus, structure of MRR lies somewhere between regular monetary and prudential tools.
The measure was particularly popular because it is directly aimed at FX borrowing and it is relatively easy to implement. One can argue that MRR help reduce financial stability risk as it may give banks an incentive to restructure funding towards more domestic deposit and increase the capitalization levels. On the other hand, circumvention to less-supervised channels can often be the case.

Bulgaria worked with MRR as a measure to reinforce credit ceilings. Bank credit that was in excess of the limit was subject to the marginal reserve requirements.Here marginal requirements were of huge size (starting at 200% and rose higher over time). The marginal character is therefore derived from the ceiling values and can also be seen as penalty deposit rate.

Nevertheless, the further modifications were again feasible – broadening of the base, change of the reference period etc. On the other hand, SRR were introduced only once (at the late stage of MRR application) and they called for special requirements of 55% on liabilities arising from issued securities. Yet again, they were also differentiated by the currency.

The outcome of various RR measures did not fulfill the expectations. On the plus side, Hilbers et al. (2005) acknowledge that in case of Estonia the term structure of FX borrowings improved. The overall effectiveness of RR was short-lived as domestic players quickly adapted to new constraints. Domestic subsidiaries externalized part of FX loan portfolios to balance sheets of foreign parent banks or the subsidiaries operated as their agent (in case of corporate clients).

Furthermore, activities were often shifted to the less regulated sector of leasing companies. Banks also started to engage in asset swaps, collateralization, accelerated NPL write-offs (Hilbers et al. 2005). All of this adversely affected data transparency. As central authorities reacted to these efforts by broadening the reserve base, local agents found new ways of circumventions.

4.3.1   Measures targeted on FX borrowing

As has been already discussed many of the listed tools were aimed at inhibiting FX borrowing (special weights on capital requirements, targeted non-binding guidelines or reserve requirement differentiated by the currency). Additionally, the survey further requested central banks to provide information whether there introduced more measured targeted on FX borrowing mainly by targeting unhedged borrowers or tighter net open positions.

Altogether five countries adopted one of the listed measures. The experience is fairly rich as it covers all the sub-regions: Poland (CEE-5), Latvia and Lithuania (BE-3) and Croatia and Romania (SE-3).

The overall evaluation is again mixed. The measures mostly managed to cut the FX lending practices of the subsidiary banks. In some cases banks only shifted their activities directly to the parent banks. On the other hand, the case of Poland illustrates a success since the measures helped to shift foreign currency lending to domestic currency lending that is easier to manage in terms of conventional policy tools especially and poses less risks especially in floating exchange rate regime framework. Two different experiences Poland and Latvia are discussed in detail in Chapter 5.

4.4   Regional view

4.4.1   Southeastern economies

Figure 5: Number of policy measures over time in SE-3 (quarterly data)
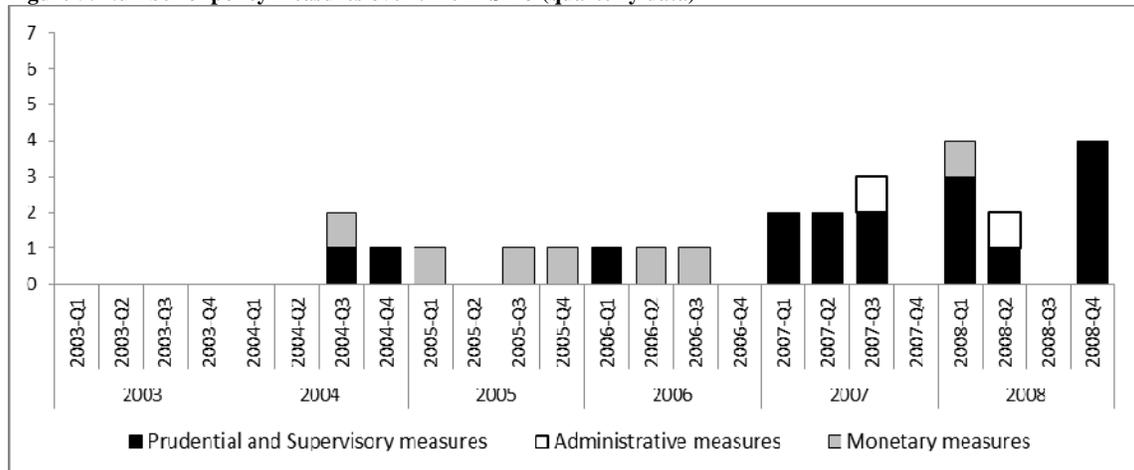
Group of Southeastern European economies (SE-3) consists of Bulgaria, Romania and Croatia. All listed countries were particularly active over the entire period by means of implementing wide range of measures to curb the credit growth. Besides the conventional practices, SE-3 has rich record of nonconventional measures such as marginal reserve requirements, special reserve requirement or credit ceilings. This was also because the listed countries faced substantial capital inflows that strongly influenced the local developments. On the other hand, by the end of the 2008 these economies were among the first ones that implemented countermeasures (e.g., relaxation of reserve requirements at the end of 2008 in Bulgaria).

The activeness of policymakers rocketed in 2005 and 2006 when measures taken within SE-3 amounted to 90% of all the measures in CEE region. This is also why SE-3 can provide useful lessons learned for other, not strictly CEE, countries. Interestingly, all three economies have personal experience with the most evasive instrument, credit ceilings, to curb the predatory FX lending practices and capital inflows. Anyway, the overall effect of administrative measure was

mostly short-term. When evaluating the effectiveness of quantitative measures in the SE-3, the policymakers agree that the long-term effectiveness eroded over time due to many circumvention practices. Side-effects, evasion techniques and synergies between domestic subsidiaries and foreign parent banks were often the case.

Furthermore, Romanian authorities add that some credit institutions resorted to the reconfiguration of key features of their loan offer, trying to dilute the constraints exercised by the administrative and prudential measures on indebtedness level of households. On the top of that reduction of the debt service burden at origination was often altered by increasing the maturity of loans or by using different promotional offers with reduced rates in the first years of the facility.

4.4.2 Central European Economies

Figure 6: Number of policy measures over time in CEE-5 (quarterly data)
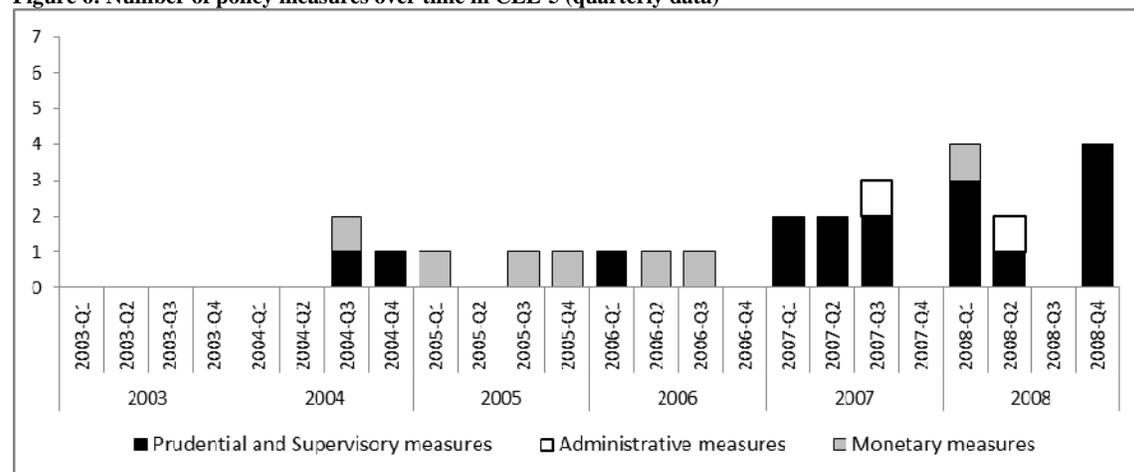
This set is the largest since it includes almost half of the CEE countries (Czech Republic, Slovakia, Slovenia, Hungary and Poland). Nonetheless, it is also a set of five countries that showed more neglect towards policy intervetions. The small rate of active participation is however reasonable provided the countries did not face large external vulnerabilities connected with the credit developments.

All the countries but Hungary experienced the least pronounced credit boom especially with comparison to the rest of the region. As a consequence, the amount of policy responses was justifiably smaller.

Furthermore, all the listed tools were of prudential and supervisory nature and were either aimed at improvement of the resiliency of the banking sector (especially via capital requirements or non-binding guidelines for banks) or control of the FX borrowing that could be particularly dangerous if domestic agents undervalue the FX risks of floating exchange rate regimes.

The most important intervention is the Recommendation S introduced by Polish authorities in the third quarter of 2006 which is analyzed in detail in Chapter 6. Yet it is crucial to stress that it was originally designed to the specific problem of high portion of unhedged FX borrowing.

The fact that the economies did not attribute many resources to introduce measures that would be directly aimed to control for the credit development allows us to use the countries as control samples in event studies exercises. Namely, we will work with Czech Republic (entire period) and Slovakia (2003-2007). At the verge of financial turmoil in October 2008, Slovak authorities

implemented soft measures connected with the introduction of the new liquidity asset indicator and close daily monitoring of the liquidity indicator. Given the timing the measures were however mostly linked to a closer management of the liquidity risk rather than credit boom issues.

The responses in Hungary were also scheduled only to the later phase (since February 2008). The objective of the measures was more targeted to limit growth of FX lending. Central authorities introduced complex measures to account for FX risk in capital requirements and also to improve the risk consciousness of both consumers and financial institutions. The phenomenon of FX lending became more relevant issue since 2003 when conditions for government subsidized mortgages tightened and borrowers opted for FX lending schemes instead. Provided the measures had been employed earlier, it would have been possible to analyze their effectiveness. Given the fact that all of them occurred in 2008, they coincide with the financial crisis and thus the assessment of the slowdown cannot be attributed to the measures themselves. Another interesting factor to consider in this region is that even though the economies operate under the floating exchange rate regimes, the FX risk did not contribute as significantly to the measure responses as in case of the economies with currency pegs.

4.4.3   Baltic countries

Figure 7: Number of policy measures over time in BE-3 (quarterly data)
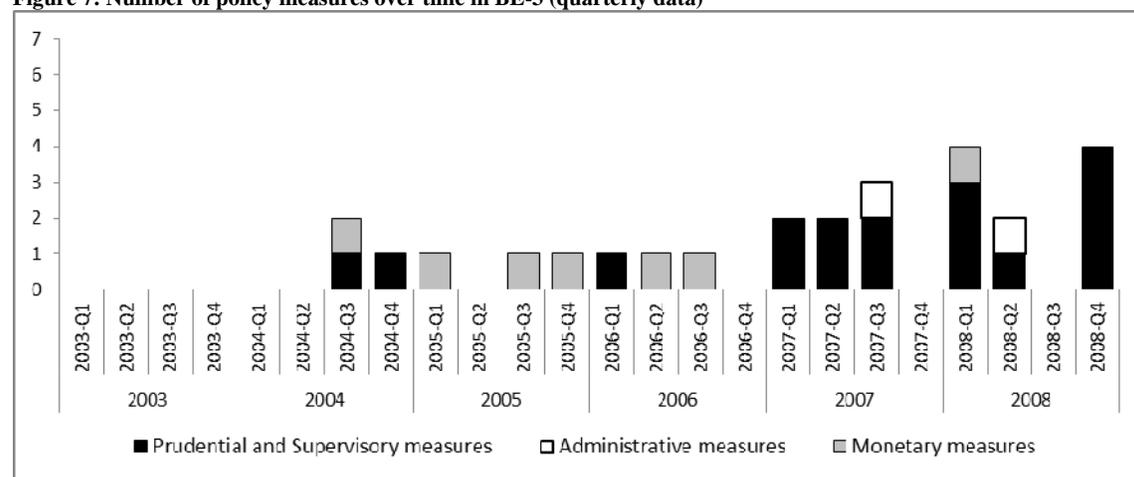
Based on the suvey responses for BE-3, we can observe continual shift from monetary instruments to prudential and supervisory tools. In the late 2007 and early 2008 we can even encounter two administrative procedures. In the third quarter it is a case of change in taxation on real estate transactions in as a part of comprehensive Anti-inflationary plan in Latvia and in mid-2008 it is a case of Lithuanian capital controls.

Until 2006, the measures were almost exclusively oriented on either reserve requirements or capital requirements. The only reported exception is strengthening supervision in Latvia in 2004. In the second half of the period (since 2007), policymakers devoted more to specific instruments to curb the real estate growth and real estate related borrowing (Table 5). Development of the real estate sector is identified to be one of the main problems in this regional context (including overestimation of collateral, predatory lending practices of foreign banks and over-optimism about the future).

Table 5: Survey results - specic policy responses applied in BE-3 in the second half of the period

	Measures	Frequency
2007	Change in taxes on real estate transactions	1
	Limit on LTV	1
	Soft measures - new non-binding guidelines for banks	3
	FX measures - tighter net open position limits	2
2008	Capital controls	1
	Capital requirements (higher/differentiated) or higher risk weights	2
	Changes in the required level	1
	Limit on LTV	1
	Soft measures - new non-binding guidelines for banks	1
	Tighter provisioning rules	1
	Tighter supervision	1
Total		15

Even though the structure of the economies is fairly similar, the scale and responses very much differ from each other. On one hand we can see Latvia as the most active player (see also specific country experience of Anti-inflationary plan in Chapter 6). On the other hand, Estonia implemented only limited amount measures and what is more relatively market-friendly. Hence we will also use Estonian case as a control country to discuss the measures taken elsewhere in the BE-3.

5 Difference-in-Differences: Selected cases

5.1 Methodology

Difference-in-differences (DID) allows to "experiment" on real (non-experimental) data. DID tries to find a naturally occurring comparison group that could mimic the properties of the control group in the properly designed experimental context (Blundell & Costa Dias, 2000). In our case the series of non-experimental data is the private credit growth in countries of CEE region. Since not all the countries intervened against credit growth the dataset of eleven countries can be divided into two groups: control and treated countries.

The DID approach is often applied to look at the effectiveness of the policy measures - mostly in labour economics (e.g. effect of weekly benefit of workers on injuries Meyer et al., 1995 or impact of minimum wage in Card and Krueger, 1994). Other ample field of DID research is study of mergers and acquisitions such as anti-takeover laws on leverage of firms in Garvey and Hanka (1999). With respect to the CEE region, Haselmann et al. (2010) used the DID to test the effects of law on lending. Nonetheless, the application on our point of interest is rare.

Let us start by introducing the basic terminology. We define the event as a month and a year when the central authority applied a measure to control the credit growth. Event window will be set for (a) 6 months, (b) 12 months and (c) 18 months prior and after the intervention. The most favourable would be to observe the outcome on the longest time span - case (c), unfortunately due to the high frequency of policy measures, long periods are often influenced by another policy measures that may bias the results. On the other hand, results from different event windows can reveal useful information about the duration of the success of the measure.

Time series are credit to private sector obtained from IFS IMF database (recalculated into annual growth rates). When needed, we further work with specific data on only housing loans or credit differentiated subject to currency (FX-denominated loans, domestic currency denominated loans).

Success of a measure is the most challenging issue. Given a pronounced credit boom, it is unlikely that direction criterion (change from credit increase to credit decrease) would be of much help. Hence the

success is judged by the smoothing criterion, i.e., measures that led to slowing down credit growth compared to the preceding period:

$$Y_{i,t0} > Y_{i,t1} \qquad (1)$$

Furthermore, the success is justified on a country comparison based on difference-in-differences estimator. The basic DID framework can be described as follows:

$$Y_{i,t} = \alpha + \beta T_i + \gamma P_t + \delta T_i P_t + v_{i,t} \qquad (2)$$

where $Y_{i,t}$ represents a annual credit growth. We split the researched period t into two parts: pre-treatment period (t=0) and post-treatment period (t=1). In the pre-treatment period none of the countries intervened against the credit growth and we may assume they were following the parallel paths. P_t is a time dummy variable:

$$P_t = \begin{cases} 1 & \text{post-treatment period} \\ 0 & \text{pre-treatment period} \end{cases} \qquad (3)$$

Based on Wooldridge (2003) time period dummy T_i captures aggregate factors that would cause changes in Y even in the absence of the measure.

Dummy variable T_i represents the treated and control countries:

$$T_i = \begin{cases} 1 & \text{treated country} \\ 0 & \text{control country} \end{cases} \qquad (4)$$

Importantly, δ_1 stands for the impact of treatment as this coefficient multiplies the interaction term $T_i P_t$ that is

$$T_i P_t = \begin{cases} 1 & \text{treated group in post-treatment period (t=1)} \\ 0 & \text{otherwise} \end{cases} \qquad (5)$$

The crucial assumption for simple DID estimator is the parallelism - we require similarity between comparison groups. (Haselmann et al, 2010)

If the country selection permits, we will work with two control countries rather than one. The selection of control values is undermined by foreign currency regime and relative proximity of the economies. In case of Baltic countries, Estonia will be used as control country.[6] As for the floating ER regimes, we select two countries: Czech Republic (entire period) and Slovakia (2003-2007).[7]

We still recognize further potential drawbacks of the event studies. Therefore, we will not judge the measures purely subject to the DID estimators. For instance, one particular problem may be rooted in the adverse selection of the countries resorting to policy measures. Since any of the listed measures

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[6] In 2006, Estonia resorted to new procedures in reserve requirements and capital weight. Moral suasion persistently occurred over the entire period. The capital weights were adjusted so that they are in line with Basel II standards.
[7] In 2008 Slovak central authorities implemented tools against the credit growth.

bear costs and distortion, it is quite natural to expect that only countries facing serious issues would exercise them. The selection process can be formulated:

$$T_i P_t = \begin{cases} 1 & Y_{i,t-k} > \bar{Z} \\ 0 & \text{otherwise} \end{cases} \tag{6}$$

where $\bar{Z}$ stands for an excessive level of credit growth. $Y_{i,t-k}$ represents the credit growth in recent period (k is positive integer). Nonetheless, the estimation of excessiveness of credit growth is a demanding issue itself .

5.2 Recommendation S – Case of Poland

In July 2006, Poland applied the Recommendation S to address the issue of large share of housing loans denominated in FX currency. Recommendation S combined measures targeted at FX borrowing (namely by targeting unhedged households) and non-binding guidelines for banks. The measure called banks to both assess and inform customers about FX risks. Among others, banks were to evaluate the ability of borrowers to repay FX loans in case of 20% depreciation od the zloty and interest rate at least equal to the level of the zloty interest rate when granting the FX loans (NBP 2007).

Table 6: DID results - Case of Poland

	const	P_t	T_i	Delta	Adj. R^2
Case C **+/-18 months**	0.200245*** *(0.00692549)*	0.0308378*** *(0.00966439)*	-0.127259*** *(0.0119953)*	**0.167129***** *(0.0167392)*	 0.687065
Case B **+/- 12 months**	0.218651*** *(0.00776419)*	0.00515062 *(0.010767)*	-0.133478*** *(0.013448)*	**0.156194***** *(0.018649)*	 0.655756
Case A **+/- 6 months**	0.246077*** *(0.00732493)*	-0.0188976* *(0.0099822)*	-0.138639*** *(0.0126872)*	**0.117854***** *(0.0172897)*	 0.768007
Values in parentheses are standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% significance level, respectively.					

Table 6 illustrates DID results of annual private credit growth with the application of Recommendation S in July 2006. Here DID can applied on two controls: as neither Czech Republic nor Slovakia attempted to use any measures. Table 6 implies that the measures did not manage to slow down the boom but rather the other way round (positive and statitically significant DID estimator – *Delta* for all three time scenarios).

In order to get more specific results, we need to look at the targeted group of the measure: FX-denominated housing loans. According to the Figure 8 Recommendation S may have be efficient in slowing down the FX-denominated housing loans for the sake of increasing zloty-denominated lending.[8]

This conclusion is also in line with National Bank of Poland that also stresses the mixed effect of the tool. On plus side, it appears that the Recommendation was successful in raising the public awareness of FX risks stemmed from underlying fluctuation of the zloty exchange rate and interest

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[8] Wtihin the event window we may observe two other policy intervention. As for the pre-treatment period intervetions, Poland strenghted capital requiremnets in January 2005. In the post-treatment part in April 2007, Poland again adjusted the capital requirements which could be a source of further bias. Anyhow, as we discuss the overall private credit is not the best approach and when analyzing FX-denominated housing loans the capital adequacy did not have a major effect.

rates which is why the central authority managed to cut the FX lending (Figure 8 illustrates the overall development of FX housing loans). On the minus side, the credit growth continued to rise (even at faster pace). The justification is that the banks adapted to the measure by easing credit standards (e.g., easing eligibility criteria by means of LTV or LTI or extending maturities). The measure could have been even more effective since National Bank of Poland admits that such circumvention took place also for FX loans (NBP 2007). To conclude, in this case the risk arising from foreign currency exposures was transferred to some extent into credit risk.

Figure 8: Share of FX loans of amounts of growth of housing loans to households (moving averages, adjusted for exchange rate differences)
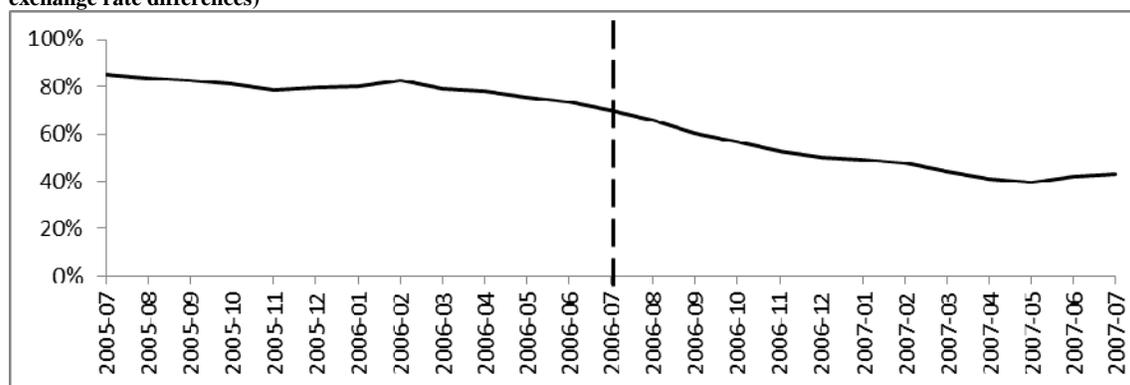
5.3   Anti-inflationary plan – Case of Latvia

In July 2007, Latvia introduced a new regulation to contain excessive real estate related credit boom. The measure named Anti-inflationary plan (or Economic stabilization plan) was targeted at both banks and real estate buyers. The toolkit included a set of comprehensive requirements, including limits on LTV and changes in taxes on real estate transactions. The minimum amount of initial down payment on real estate purchases was set at 10% while the limit on LTV of mortgage-backed credit at 90%. Stricter valuation criteria were also placed with respect to income situation of the borrowers - in case of loans in excess of 100 minimum monthly wages, statement of legal income was made compulsory. Furthermore, real estate stamp duty was increased and amendments to the Personal Income Law posed further requirements on speculative demand (Latvijas Banka 2007).[9]

The measures were to promote a gradual correction in real estate (mainly housing) market. The DID results of the developments of housing loans prior and after the implementation of Anti-inflationary plan are illustrated in Table 7 (total private credit growth) and Table 8 (growth of housing loans).

DID results report slowdown of the housing lending developments, hence success of the measure (the pace of credit housing loan growth in treated Latvia slowed down more than in case of control country Estonia). Since housing loans amount to significant percentage of the private credit, the same conclusion can be applied for overall credit developments (Figure 5.5).

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[9] The revised law claimed that upon selling a real estate registered with the Land Register after 12 June 2007, the income tax must amount to 25% of the difference between the property purchase and sales prices. It is to be collected in the case of the respective property having been held by the seller for less than 60 months after its registration with the Land Register (Latvijas Banka 2007).

Table 7: DID results - case of Latvia (total private credit)

	const	Event	Treated	DID	Adj. R²
Case C **+/-18 months**	0.380602*** *(0.0219019)*	-0.137753*** *(0.0305637)*	0.217524*** *(0.030974)*	**-0.187442*** *(0.0432237)*	0.689402
Case B **+/- 12 months**	0.373974*** *(0.022097)*	-0.0662986** *(0.030643)*	0.213424*** *(0.0312498)*	**-0.18987*** *(0.0433357)*	0.670322
Case A **+/- 6 months**	0.39531*** *(0.020941)*	-0.0191119 *(0.0285378)*	0.213424*** *(0.029615)*	**-0.144492*** *(0.0403585)*	0.702313
Values in parentheses are standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% significance level, respectively.					

Table 8: DID results - case of Latvia (housing loans)

	const	Event	Treated	DID	Adj. R²
Case C **+/-18 months**	0.664336*** *(0.0326597)*	-0.418969*** *(0.0455761)*	0.211587*** *(0.0461878)*	**-0.144552** *(0.0644543)*	0.775774
Case B **+/- 12 months**	0.619119*** *(0.0347719)*	-0.307764*** *(0.0482199)*	0.245854*** *(0.0491748)*	**-0.145682** *(0.0681932)*	0.755114
Case A **+/- 6 months**	0.573558*** *(0.0330448)*	-0.18667*** *(0.0450325)*	0.289962*** *(0.0467324)*	**-0.108409** *(0.0636856)*	0.815264
Values in parentheses are standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% significance level, respectively.					

Notwithstanding, event window should be treated with caution. In the first half of 2007, Latvia also introduced soft measures and by tightening net open positions. Post-treatment period is not directly affected by any measures (next interventions occurred in January 2008 and raised risk weighting for mortgages in commercial property). The overall assessment of Anti-inflationary plan especially in longer scenarios is rather difficult as it coincides with the early stage of global financial crisis.

The developments had a dampening effect of real estate credit dynamics. Martin et al. (2009) argue that raised funding costs, lack of confidence and limited resource availability in the global financial markets adversely affected the Latvian banking sector, resulting in more conservative lending standards of Latvian banks. Latvijas Banka (2007) reported the drop in demand and consequent fall of real estate prices. Simultaneously, by tightened lending standards, banks also constrained financing of new projects of developers. One of the reported means of circumventions was an attempt to boost the demand via various discount offers and bonuses that however did not prove particularly successful. The corrections in the real estate market and a contraction of domestic demand materialized however the contribution of Anti-inflationary plan at the eve of financial turmoil is hard to assess separately.

6 Conclusion

Within eleven CEE countries we are able to identify various paths of credit development and degrees of interventions to the dampen its dynamics. Rapid credit growth poses many risks to the financial stability. Hence, we performed a survey across the central banks in the region aimed at identification of the behavior of policymakers to the credit boom. The survey consisted of three main issues: a) monetary policy measures, b) prudential and supervisory measures, and c) administrative and other administrative measures.

The main conclusions are as follows. First, exchange rate framework played a crucial role both in scale and scope of the responses. The fears about the excessiveness of the credit growth originated

mainly in fixed exchange regimes. Having their hand tied in case of interest rate or exchange rate tools, countries introduced a wide scale of prudential, supervisory and administrative measures. Yet the effectiveness of the measures with respect to the credit slowdown was often fairly limited and short-lived as banks and local agents quickly found a new way of circumvention.

Nevertheless, we acknowledge that specific prudential tools may have contributed to fostering the resiliency of the financial sector per se. On the other hand, flexible exchange rate regimes did not face such a dramatic credit evolution. These countries mostly attempted to correct for maturity or currency mismatches.

Second, excessive FX borrowing was very often the main target of the policy measures. Unfortunately, the success was rare due to a number of circumvention practices. Among others, the most common circumvention was to switch to direct cross-border borrowing from the foreign parent banks or to shift to less supervised channels such as leasing companies. The cross-border borrowing did not only substantially limit the effectiveness of the measures but it also introduced more distortions as the system did not respond appropriately to the conventional measures for instance interest rates or reserve requirements. As a result, we strongly argue that design of the policy tool must reflect domestic environment and position of the foreign banks to help alleviate the risks entailed in the credit growth.

Third, last part of the paper was dedicated to the difference-in-differences (DID) estimations to study the impact of policy measures. Based on the survey results we were able to find matching control and treated countries to observe the effect of a policy intervention. The DID illustrated results of mixed successes due to the wide-spread circumvention practices.

In total we obtained 82 specific policy measures implemented separately or as a policy mix. This is an extremely rich record given the amount of economies and the time span. Unfortunately, since majority of the measures were implemented in the late phase, they coincide with the financial crisis and hence their contribution to the slowdown is very hard to assess.

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