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A Re-assessment of Credit Development in European Transition Economies

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Abstract

The aim of the paper is to re-assess the bank credit development in 11 Central and Eastern European countries and to provide new estimates of the credit-to-GDP ratio equilibrium level. Using filtering methods and dynamic panel estimations, our results suggest an “excessive” credit development for most of the studied economies until 2007. After this period, while credit has continued to remain excessive in Bulgaria, Hungary, Poland and Slovakia, it has decelerated in the other countries. However, while the results suggest a possibility of “credit crunch” in the Baltic republics and, to a less extent, in Croatia, credit deceleration may lead to “soft landing” for the Czech Republic, Romania and Slovenia.

Keywords: Bank Credit, Dynamic Panel, CEECs

JEL: C2, G21

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1. Introduction

There exists a general agreement among economists that strong credit growth has been “one of the most pervasive developments” (Enoch and Ötoker-Robe, 2007) in most of Central and Eastern European countries (CEECs hereafter) in the recent years. The strong speed of the process has raised fears about financial and economic stability in a number of countries, in particular in Bulgaria, Croatia, Estonia, Latvia, and Romania.² Credit’s future development remains however relatively uncertain. On the one hand, the ongoing financial crisis that has visibly deteriorated the liquidity and external financing of the CEECs banking sector will most probably lead to credit deceleration and even to “credit crunch”. On the other hand, dynamics of credit can increase again with the world recovery and especially with the progress of the CEECs’ economic and monetary integration with the euro area.

The main objective of this work is to shed some light on the private credit development in a group of 11 CEEC countries, analyzing whether the credit increase³ could be considered as “excessive” and its recent deceleration could be considered as a “soft landing” or rather with “credit crunch”.

The assessment of excessive credit is rather difficult to perform, especially in the case of transition economies where excessive credit with respect to long-term equilibrium (or financial sector development) can be considered as part of the “catching –up” process. To analyze excess credit we follow two approaches. The first consists of estimating excessive credit compared to *trend* financial deepening (filtering method). The second method consists of estimating credit deviations from its long-term equilibrium, where to avoid the bias of the

² Traditionally, a rapid credit growth increases banking sector exposure deteriorating the quality of balance sheets that can lead to banking crises (Demirgüç-Kunt and Detragiache, 1997; Bernanke et al., 1999). This channel is especially relevant in the case of emerging countries presenting important financial challenges such as dependence on external financing and currency and maturity mismatches that make them vulnerable to sudden stops in capital inflows (Chang and Velasco, 1998, 2000). Other important credit-crises channel works through rapidly developing financial intermediaries (Goldstein, 2001), poor regulated and/or malfunctioning banking and financial sector, and implicit or explicit public guarantees.

³ It is worth to specify that “credit growth” refers here to an increase in private sector credit ratio (level) and that credit boom and “excessive” credit growth are used interchangeably.

CEECs' adjustment process we estimate the out-of-sample equilibrium level for a panel of developed European countries (which can be considered their "natural" benchmark).⁴

The results based on these methods confirm a significant acceleration in private credit for all countries taken in exam until 2007. In particular, our findings suggest that the credit growth significantly exceeded the level which is consistent with financial development and macroeconomic fundamentals. After this period, while credit has continued to remain excessive in Bulgaria, Hungary, Poland and Slovakia, it has decelerated in the other countries. However, while the results suggest a possibility of "credit crunch" in the Baltic republics and, to a less extent, in Croatia, credit deceleration may lead to "soft landing" for the Czech Republic, Romania and Slovenia.

The rest of the paper is organized as follows. Section 2 briefly describes the stylized facts about the CEECs' financial and banking sectors over the period of 1995-2008. Section 3 presents the empirical methodology. Section 4 reports the results. Finally, Section 5 concludes.

2. Financial Structure, Banking Sector and Credit Growth in the CEECs' economies: Stylized Facts (1995-2008)

The CEECs have started their transition process at the beginning of the 1990's. Since then, the structure of their economies and financial sectors has converged toward Western European standards. However, despite a considerable progress, the convergence process is far from being completed. For example, the CEECs' banking sector and financial markets when compared with the euro zone remain relatively underdeveloped. For example, at the end of

⁴ The use of one of these two methods is a common way to treat the problem of "excessive" credit growth in transition economies. The first paper analyzes the subject was proposed by Cotterelli et al. (2005). Further developments can be found in Schadler et al. (2005), Backé et al. (2006) or Kiss et al. (2006). Some papers focus only on a group of the CEECs – Brzoza –Brzezina (2005). Some of these works are regrouped in the book edited by Ch. Enoch and I. Ötker-Robe (IMF, 2007). For more detailed analyze see for example Coudert and Pouvelle (2008).

2008 financial intermediation (total banking assets in percent of GDP) reached over 100% in five CEECs economies (Hungary, the Czech Republic, Poland, Slovakia and Slovenia), almost 80 % in the three Southern Eastern economies (Bulgaria, Croatia and Romania), which is still far from the euro-zone level: 262.3%.⁵

The CEECs' financial sectors are dominated by private banks, and credit constitutes the most important source of external financing for firms. At the end of 2008, total credit to non-banks reached on average 64.1% of GDP (127.8% in euro zone), of which almost 28.0% to household (53.1% in euro zone). Another feature of the CEECs' banking sector is the predominant presence of foreign, mostly European, banking groups (Table 1) which market share in total banking assets accounts for almost 100 percent in some countries.

Looking closely at the credit development, it is possible to notice important similarities among the CEECs such as i) a large part of foreign-denominated loans in total credits (Table 1) ; ii) an important role of external sources; iii) and an increasing role of domestic deposits for credit financing (Figure 1). At the same time, significant differences arise. For example, credit growth to the private sector has been rising at different rates (Figure 1), starting at the end of the 1990's in some countries, such as the Baltic Republics or only recently in the others (Figure 3). Indeed, credit growth has visibly increased in the Southern European countries (Croatia, Bulgaria and especially in Romania), but also in Slovenia. Credit expansion in the remaining economies but still some visible acceleration could be noticed since the period of 2006-2007.

When private sector credit is analyzed, some heterogeneity can also be noticed. For example, credits to households, alimented in a great part by mortgage loans, exceeded these to private firms in Croatia, Estonia, Latvia and Poland. The opposite can be remarked for Bulgaria, the Czech Republic, Hungary, Romania, Slovakia and Slovenia. In these countries

⁵ Raiffeisen Banking Sector Report (2009)

the part of credit to private firms⁶ is more important (Table 1). Moreover, in some countries the part of foreign-currency credits is more important than in the others. This is particularly visible in the Baltic countries where foreign-currency loans reached over 85% of GDP (55.6% in Lithuania), but also in the Southern Eastern European countries and Hungary (63.8%). In Slovakia and Slovenia the part of credit denominated in foreign currency, which in 2006 exceeded 55% in 2006, has visibly decreased since their euro adoption (respectively 21.8 and 9.6%). This heterogeneity in credit dynamics and distribution can have various causes, such as a different degree of economic development, development of financial intermediation, presence of foreign-owned banks and different institutional and regulatory frameworks.⁷

3. Methodology

To determine whether credit level can be considered as “excessive”, it is possible to adopt two different approaches. The first consists of estimating a country-specific trend and compare it with the actual credit development (Cottarelli et al., 2005). The second consists of estimating a country’s long-run equilibrium determined by fundamentals, and to compare it with the actual development. In both cases, the deviations between the actual and long-term values are used to detect situations of excessive credit growth.

⁶ This «sectoral breakdown» can have important implications for the sustainability of credit boom. Traditionally, the credit expansion to private firms is considered as driving economic growth investment (see Kiss et al. (2006) for sectoral analysis). However, development of credit to firms can also be substitution effects of FDI inflows generating more volatile growth and greater probability of economic downturn (see Calvo and Corricelli (1992, 1993) or more recently Corricelli and Masten (2004) for the role of credit in growth dynamics). Unfortunately data availability does not allow for more detailed bank credit data disaggregation.

⁷ See Arcalean et al., (2005) in Ch. Enoch and I. Ötker-Robe (2007) for more detailed analysis of the causes and nature of private sector credit growth in the CEECs.

3.1. Credit deviation from its trend

In the first approach we construct a country-specific backward-looking stochastic trend using the Hodrick-Prescott (HP) filter as proposed by Gourinchas et al. (2001).⁸ Then the predicted credit ratio is compared to the actual one taking into account the size of each country's banking sector (*relative deviation*) and financial development (*absolute deviation*). The *absolute deviation* is the difference between actual private credit-to-GDP ratio and its long-term trend that corresponds to financial development of the country while the *relative deviation* is measured by the rapport of financial development on actual credit-to- GDP ratio that captures the size of banking sector. To determine if the resulting deviations indicate credit boom, i.e. the situation when the level of credit-to-GDP ratio remains above its long-term trend, we employ the threshold values as established in Gourinchas et al. (2001).⁹ Following the authors, credit can be considered excessive compared to a country's banking sector development if exceed q threshold level of 4.8 percent, and as “boom” if superior to 6.4 percent. When compared to financial sector development, credit becomes excessive if exceeds the threshold of 24.9 percent, and as boom if superior to 31.1 percent.

It is important to stress that, though useful and simple to use, the aforementioned method presents some important drawbacks: i) since the threshold values are established on the basis of previous leading-to-crises experiences, their choice remains arbitrary; ii) in the case of transition economies, the short data span and especially the initial low level of banking credit may bias the estimation of the trend.

⁸ The HP filter is applied on the credit-to-GDP ratio recursively from the beginning of the sample to successively the last five year include, i.e. 1995-2002, 1995-2003, ..., 1995-2008. The smoothness parameter is set at 100, but the results are qualitatively unchanged if a smoothness parameter of 6.25. As suggested by Ravn and Uhlig (2002), the Hodrick-Prescott filter with this smoothness parameter produces cyclical components comparable to those obtained by the Band-Pass filter. Additional results are available from the authors upon request.

⁹ Gourinchas et al. (2001) analyze a large sample of credit boom episodes over 40 years and define a leading boom as a deviation of the private credit-to-GDP ratio from its stochastic trend. The authors consider two possible deviations: relative and absolute, and take into account two limit and boom threshold values for credit development. These thresholds were defined to capture exactly 100 cases of lending booms in the sample of 91 countries over the period of 1960-1996.

3.2. Credit deviation from long-term equilibrium

The second approach consists of estimating the out-of-sample long-term relationship between the credit-to-GDP ratio and its fundamentals. The variables we consider are: i) GDP per capita $\left(\frac{GDP}{Pop}\right)$ as proxy of economic development¹⁰; ii) financial liberalization, proxied by the spread between lending and deposit interest rate (S)¹¹; real interest rate as measure of borrowing costs (r); inflation (π), and banking credit to public sector $\left(\frac{BCPP}{GDP}\right)$ to capture substitution effects between private and public credit. In detail we estimate the following equation:

$$\frac{BCPS}{GDP}_{it} = f\left(\frac{GDP}{Pop}_{it}, r_{it}, \pi_{it}, S_{it}, \frac{BCPP}{GDP}_{it}\right) \quad (1),$$

where $\frac{BCPS}{GDP}_{it}$ stands for each country private-credit-to-GDP ratio.

The variables are pre-tested for the presence of unit roots, applying traditional panel unit tests.¹² The tests fail to reject the null hypothesis of a unit root, while reject the null hypothesis of a unit root in first differences. However, we do not run the cointegration tests since the error correction terms from the pooled mean group (PMG) estimations can be used for this purpose. Indeed, if the variables are cointegrated, i.e. long-term equilibrium between them exist, the coefficient associated to the error term should have a negative statistically significant sign.¹³ The long-term equilibrium is then estimated using three different specifications.

The first specification consists in the traditional static panel model using a fixed-effects estimator. However, given possible endogeneity problems in the second specification we estimate a dynamic panel model by the GMM-Arellano and Bond estimator (1991).

¹⁰ This argument is supported by partisans of “supply-leading phenomenon” (McKinnon, 1973) and used in some growth models incorporating financial sector (Lucas 1988; Grossman and Helpman, 1991; Aghion and Howitt, 1992). For more details see for example Levine, 1997.

¹¹ See, for example, Kaminsky and Reinhart (1999) and Aghion et al. (1999).

¹² Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-type tests. The results are available from the author upon request.

¹³ See Table 7-9.

The two aforementioned models can already provide useful information about credit developments, but their major limitation is that they estimate the average values of the parameters assuming homogeneity across the sample.¹⁴ So, we also model credit dynamics applying the following pooled mean group (PMG) estimator as developed by Pesaran, Shin and Smith (1999):¹⁵

$$\Delta Y_{it} = \alpha_i + \theta_i(y_{i,t-1} - \beta'x_{i,t-1}) + \sum_{j=1}^{p-1} \gamma_{ij}\Delta y_{i,t-j} + \sum_{j=1}^{q-1} \gamma'_{ij}\Delta x_{i,t-j} + \varepsilon_{i,t} \quad (2),$$

where, the ΔY_{it} stands for the actual credit-to-GDP ratio, β are the common long-run parameters, $x_{i,t-j}$ is the vector of explanatory variables for group i . The country-specific short-term dynamics are measured by the θ_i parameters (error correction terms) while unexplained country-specific effects are captured by α_i . This heterogeneous dynamic model has incontestable advantages in explaining credit growth development in the new EU countries, since different countries' features may imply different dynamics (speed) toward a common long-term equilibrium (Kiss et al., 2006).

Equation (1) and (2) are estimated for a sample of Western European countries¹⁶, which constitute a "natural" benchmark for the CEECs' economies.¹⁷ The estimated long-term coefficients are then applied to compute the equilibrium level of credit for each CEEC and to calculate the deviation between actual and predicted credit values.

¹⁴ Moreover the GMM –Arellano-Bond estimator has been designed for panels with a large number of groups (N) relative to number of time series (T) which is not the case in our study.

¹⁵ This estimator allows the intercepts, short-run coefficients and errors variances to differ, but the long –run coefficients are constrained to be the same across groups. Indeed, there are good reasons to expect the long –run equilibrium relationships between variables to be similar across groups due, for example, to arbitrage conditions or common technologies influencing all groups in a similar way.

¹⁶ Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

¹⁷ We also run the in-sample estimations, but when the initial specification is applied, not all variables seem to be cointegrated, and some long-term coefficients are statistically insignificant and/or have unexpected signs, which confirms the existence of the “transition bias”. The results are available from the authors upon request.

4. Results

4.1. Credit Deviation from Trend

Table 2 reports the credit-to-GDP ratio and its *absolute deviation* from the trend. Looking at the table we can see that in 2008, five of the studied countries (i.e. Bulgaria, the Czech Republic, Poland, Slovakia and Slovenia) have credit levels well above the boom threshold and two of them (Hungary and Romania) above the excess threshold.

These findings constitute a significant change when compared with previous credit developments. Indeed looking at the recent past, in 2002, only one country, Latvia, had an increase in the credit-to-GDP ratio that could be classified as excessive. In 2004, the credit level in Bulgaria was over the boom threshold and three countries (Estonia, the Czech Republic and Lithuania) were in a situation of excessive credit. In 2006, three more countries (Croatia, Romania and Slovakia) experienced excessive credit levels. In 2007, seven countries had credit levels well above the upper threshold (Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Romania and Slovenia) and one country (Slovenia) had an excessive credit close to boom.

However, when credit developments are compared to the size of banking sector (*relative deviation*) credits seem to be below the excess limit for several countries in most of the sample period (Table 3). For example, in 2008 all countries had a relative deviation well below the lower thresholds. In particular, the only countries that experienced a situation of excessive or boom credit over the 2002-2007 period were: Bulgaria (2003, 2004, 2005 and 2007); the Czech Republic (2005, 2006, 2007); Lithuania (2005); and Romania (2007).

However, a closer examination of the results (Table 2 and 3) reveals that the credit increase is particularly important in almost all of the countries under consideration until 2007. In some of them (the Czech Republic, Hungary, Poland, Slovakia and Slovenia) credit increase has continued even in 2008.

4.2. Credit Deviation from long-term equilibrium

Long term credit equilibrium levels are estimated for Western European countries over the period 1980-2008. In doing so we employed three estimation techniques (FE OLS, GMM and PMG) which suggested that the most robust determinants of credit are GDP per capita and inflation¹⁸ (Table 4). Out-of-sample credit equilibrium levels and the credit deviations are then computed using the estimated coefficient in Table 4. In particular, given the advantage, in terms of econometric properties, of the PMG over the other two econometric techniques, the PMG estimates were used.

Looking at the out-of-sample estimations of credit growth and its deviations from actual values (Figure 2), the results suggest that for several countries credit was excessive in the recent years. In detail, the countries that suffered from the credit contraction in the 1990's seem to improve their credit dynamics. The credit equilibrium has been achieved and even exceeded recently for Bulgaria, Hungary and Lithuania. In the Czech and Slovak Republics, the credit-to-GDP ratio showed a positive turning point in 2004. However, this tendency was much slower for Poland and Romania, where credit dynamics have been relatively stable, but some recent increase, especially in the case of Poland can be remarked.¹⁹

For the last group of countries, Croatia, Estonia, Latvia and recently Slovenia, our findings confirm the persisting “overshooting” in credit development. Indeed, these countries’ credit-to-GDP ratio has stayed well beyond their long-term equilibrium for at least the three or four last years. In the case of Estonia, a visible deceleration in credit growth can already be

¹⁸ The full set of results and specification is available from the author upon request. GDP per capita and interest rate are included in all studies treating private credit growth. For example, Schadler et al. (2005) use PPP-based GDP and real long-term interest rate; Boissay et al. (2005) real GDP, real interbank rate and real retail lending rate and time trend; Backé et al. (2006) among other variables PPP-based GDP, short and long interest rate, inflation ; Kiss et al. (2006) use GDP per capita, interest rate and inflation.

¹⁹ It is worth to underline that in the case of these two countries credit growth did accelerate in the recent period, but this tendency has also concerned the GDP per capita evolution, a variable used to determine the credit long-term equilibrium in our study.

noticed since 2007. At the same time, a deceleration in credit growth can also be remarked in the Czech Republic, Lithuania and Romania.

4.3. “2008” - End of excessive Credit? Soft Landing? Credit Crunch?

Considering both estimation methods (Table 6), we can depict visible excessive credit for all of the CEECs. Indeed, all countries experienced excessive peaks in credit expansion during the period under exam. However, comparing the results from the different methods, some differences emerge. For example, filtering methods depict credit boom for the Czech Republic, Romania, Slovakia, and recently for Poland while the out-of-sample estimations find that credit level in these countries has stayed below its long-term equilibrium. Other important differences when these two approaches are compared concern the timing and duration of excessive credit. For example, filtering methods detect excessive credit growth earlier than panel estimations in the case of Bulgaria, Latvia and Lithuania and latter in case of Croatia, Estonia and Hungary.²⁰ However, both methods confirm excessive credit in Slovenia since 2005, a visible acceleration in credit development in Poland and deceleration in Lithuania and Romania since 2007.

When comparing with some previous analyses, we find the confirmation of “excessive” credit increase in the case of Estonia and Latvia, but also, to a less extent, in the case of Bulgaria, Croatia, Hungary, Lithuania and Slovenia. For other countries, such as the Czech Republic and Slovak Republic, Romania and especially, until recently, for Poland the risk of credit boom has been low. The difference in the results can arise from *different* definition of credit boom, different methods used (filtering and long-term equilibrium methods), and different time periods covered. Indeed, the authors find that in some countries,

²⁰These differences can arise from an uncertain causality relation between financial sector deepening and economic development. For more detailed analysis of causality see, for example, Diev and Pouvelle, 2008.

credit has reached its equilibrium level at the end of their estimation period and prolonging the estimation period we find that private credit has crossed this level.

In all, it is possible to notice “excessive” credit developments in all CEE countries over the studied period. More precisely, in Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania and Slovenia, and close to “excessive” credit growth in the Czech Republic, Poland and Slovakia. In the case of one country – Romania, we can remark a visible credit increase, but the risk of “credit boom” remained relatively low.

Credit boom episodes must end eventually, but whether it will be absorbed (“soft landing”) or followed by bursts (“credit crunch”) depends on many factors such as: sources of credit financing, currency and maturity structure of private sector and banks’ balance sheets, general and regional economic outlook, political environment, quality of bank supervision, prudential controls and financial development in the rest of the world. The excessiveness in credit development can become problematic and increases in most of the case the vulnerability of the countries. For example, growing foreign financing of private credit may lead to expensive “credit crunch” in the occurrence of sudden reversals in capital inflows. Moreover, in situation where credit growth is mostly denominated in foreign currencies, a sharp depreciation may increase debt burden and lead to solvability problems, banking and debt crises. In addition, it is also possible that credit “excessiveness” will increase the fear about financial sustainability, entailing banks deposits withdraws and lead to “bank runs” and crises. Finally, the fact that countries have the same *lender* can lead to a shift in investors’ behavior and increase the risk of contagion in the region.

Although the lack of data for the last period makes impossible to draw more definitive conclusions about the CEECs mid-2000s “credit booms” and their ending, some interesting remarks can already be drawn:

i) The countries with the greatest (Estonia, Latvia and Lithuania) or growing (Croatia and Romania) financial disequilibria (currency mismatch, foreign credit financing) have noted a slightly increase in credit-to-GDP ratio in 2008. However, credit level compared to its long-term trend has visibly decreased in all these countries. When we compare credit to their long-term equilibrium level, we can notice a visible decrease in credit levels in Estonia, Latvia and Lithuania since 2007, while in Romania and Croatia the deceleration has been less important. In all, our results seem to suggest that in these countries the mid-2000s “credit boom” has decelerated rapidly because of the negative turn in capital movements. In the Baltic Republic, especially in Estonia and Latvia, credit and demand booms raised fears about economic overheating already in 2007 alimending the doubts about these countries financial and economic stability. The word liquidity crunch amplified risks reducing sharply bank credit, stock and housing prices and finally domestic demand and economic growth. Croatia has also suffered from the uncertainty about banking and financial stability, and has been confronted to slower foreign capitals inflows and deposits withdrawals that reinforced private credit contraction. In Romania, the authorities tried to curb “credit boom” implementing restrictive measures, but since the 4th quarter of 2008, the tightened lending conditions (liquidity constrains, external financing scarcity) have slowed credit demand contributing to economic slowdown. Except the above-mentioned countries, “credit crunch” can occur in the near future in Hungary. In fact, this country has reported a continuous increase in credit-to-GDP ratio as compared to its long-term trend and equilibrium, but since 2006 growing financial disequilibria and recession (resulting from the necessity of twin deficits correction) have increased the risk of expensive credit burst.

ii) Credit boom has continued despite the general slowing credit dynamics in Bulgaria, Poland and Slovakia. More precisely, the credit-to-GDP ratio has continued to increase especially to the long-term equilibrium. Our findings may suggest that these countries have preserved their

banking and financial stability thanks to their strong fundamentals, growth perspective and, for Bulgaria and Slovakia, exchange rate agreements. For example, in Poland where after initial and short-lasting deposits withdrawals, credit has continued to growth thanks to strong fundamentals, sustained growth and authorities' actions. Bulgaria has also noted an exceptional growth dynamics and financial sector stability during the ongoing financial crises. This was undoubtedly due to the very large foreign exchange rate reserves. Finally, Slovakia has been well protected by the euro adoption and remained almost completely unaffected by the financial crisis showing an increase in the private credit during the whole period.

iii) For the remaining countries, the Czech Republic and Slovenia, we can remark a visible deceleration in credit ratio as compared to its trend and equilibrium since 2007, but whether this deceleration finishes “softly” or “crushed” remains uncertain. On the one hand, these countries seem to be well protected from financial turmoil by the low dependence on external financing and the liquid and stable banking sector, and in the case of Slovenia – by the euro. On the other side, their small and open economies have suffered already from the global economic slowdown and the general uncertainty that affected internal and credit demands.

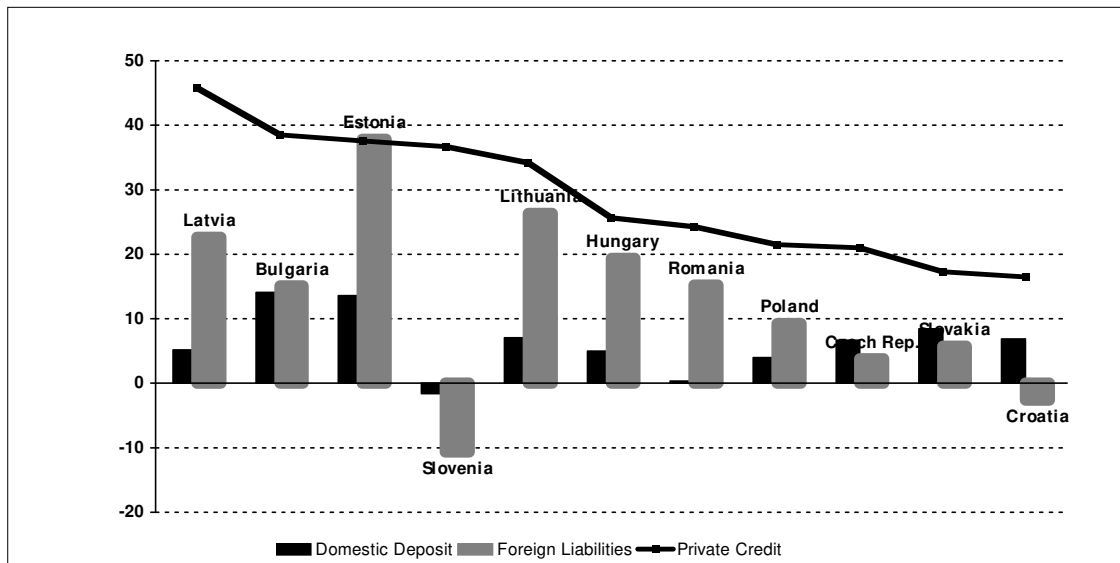
5. Conclusion

The aim of this work was to re-assess the bank credit development in 11 Central and Eastern European countries. In particular we tried to determine whether the mid-2000s credit expansion could be considered as “credit boom” and the recent slowdown in credit growth qualified as “soft-landing” or rather “credit crunch”. For this purpose we considered credit level as “excessive” when it exceeded the equilibrium value that could be justified by country's financial development and economic fundamentals. The critical values were determined on the basis of a stochastic trend and panel estimations of the long-term

equilibrium. The first method was carried out using the Hodrick-Prescott filter, and the second one applying the fixed-effects, dynamic and pooled mean group estimators.

Our estimation results reported the “excessive” or close to “excessive” credit development in the case of all studied economies at least until 2007. After, this period, our findings corroborated the thesis about “credit crunch” in at least five of analyzed CEECs. More precisely, a general peak in credit expansion that can be qualified as “excessive” and continue to nowadays can be noticed for Bulgaria since at least 2003. Poland and Slovakia have visibly improved their credit dynamics since respectively 2006 and 2008. For the Baltic Republics, especially Estonia and Latvia, “credit boom” started at least in 2004 and finished in 2007 by the sharp decrease of credit ratio, that, accompanied by an important turn in capital inflows and economic slowdown, can be qualified as “credit crunch”. In two Southern Eastern European countries, Croatia and Romania, our results reported an important credit increase during at least 2006, but we also noticed, especially for Croatia, a sharp deceleration in credit growth after 2007. In the case of three Central European countries, the Czech Republic, Hungary and Slovenia, our finding confirmed a visible acceleration in credit dynamics that can be qualified as “excessive” in the case of Hungary and Slovenia since 2006 and 2005.

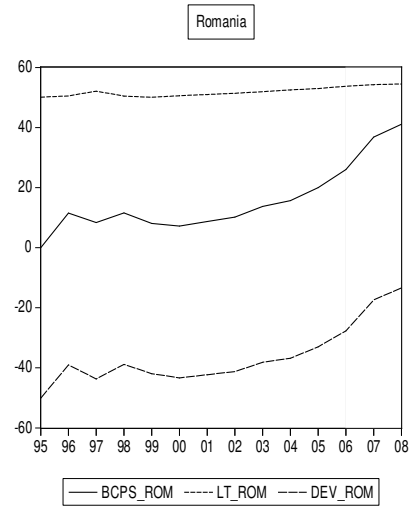
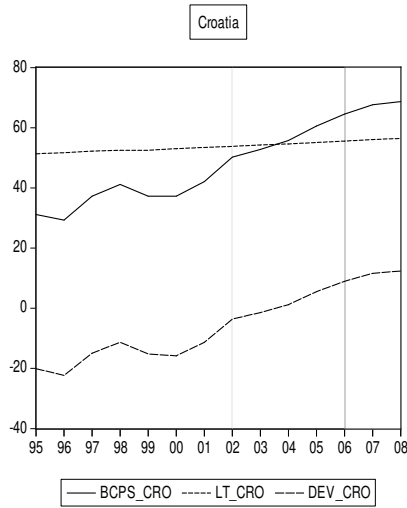
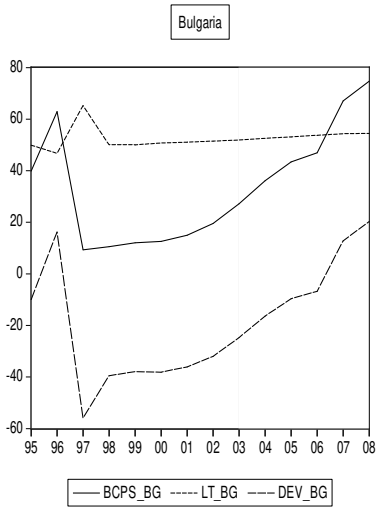
Figure 1: Change in Credit-to-GDP ratio, Banks Domestic Deposits and Net Foreign Liabilities in the CEECs (2004-2007)



Source: IMF, Author's calculations

Figure 2 : Credit Deviation in the CEECs (out-of-sample estimations)

A. The Southern Eastern European Countries



B. The Baltics Countries

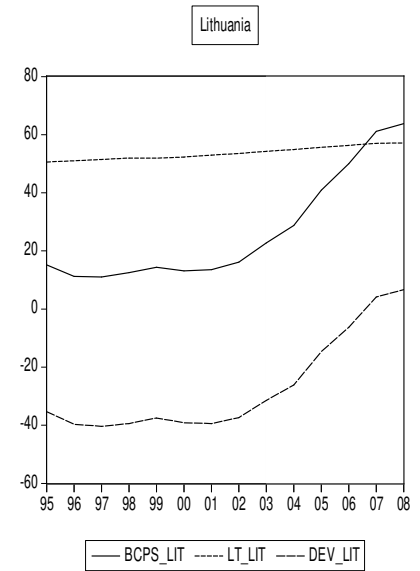
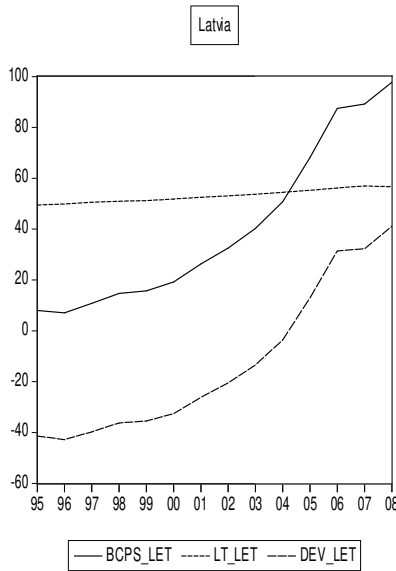
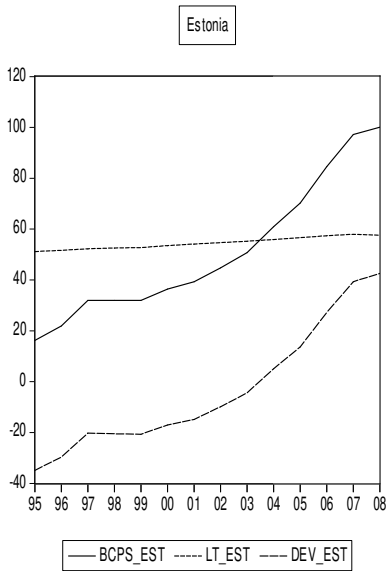
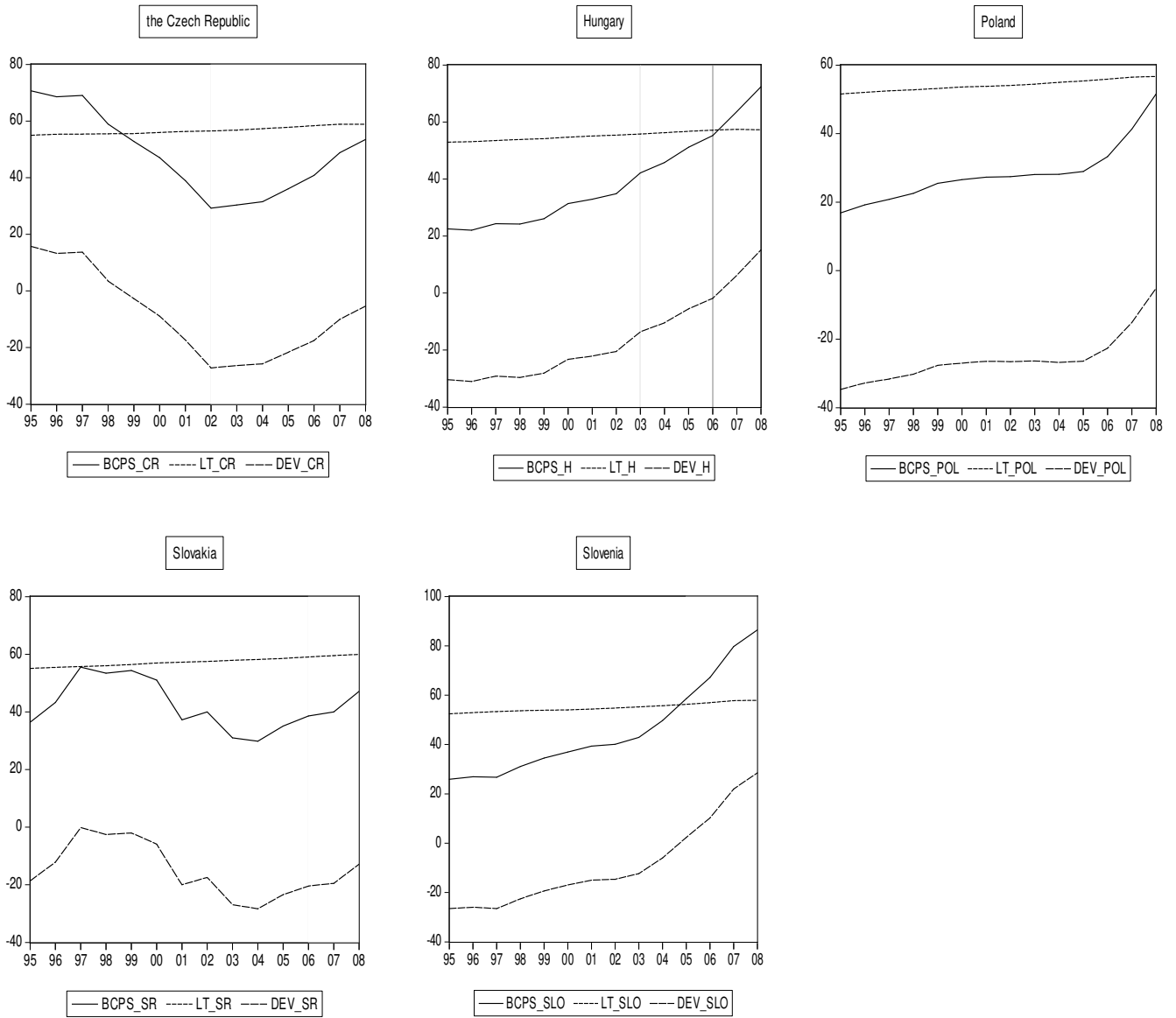


Figure 2 (cont.) : Credit Deviation in the CEECs (out-of-sample estimations)

C. The Central Eastern European Countries



Source: Author's estimations

Table 1: Banking Sector Survey, end of 2008

	Number of Banks	Foreign-owned banks(% of total)	Capital Adequacy in risk weighted assets	ROA	ROE	Foreign currency credit in total credit (%)	Credit to households (% of GDP)	Mortgage Loans (% of GDP)	Credits to firms (% of GDP)
Bulgaria	30	86.3	14.9	2.2	15.8	57.2	26.0	12.4	49.2
Croatia	33	90	14.2	1.6	10.1	63.8	36.8	15.3	28.3
Czech Rep	37	88.5	12.3	1.2	21.7	14.1	21.8	14.3	23.0
Estonia	17	98.2	12.9**	2.0**	21.4**	85.7**	46.9	41.0	30.5***
Hungary	38	83.5	11.1	1.2	16.1	63.8	28.1	22.5	30.5
Latvia	27	65.7	11.8	0.3	4.8	85.0	39.2	31.1	27.5***
Lithuania	17	92.1	10.9*	2.0*	27.2*	55.6*	25.6	18.6	22.5***
Poland	70	67	11.5	2.1	26.4	34.3	29.0	16.9	17.1
Romania	42	88.1	12.3	1.7	18.1	57.8	19.7	4.1	18.8
Slovakia	26	96.3	12.0	1.2	17.8	21.8	17.5	12.3	23.3
Slovenia	19	28.7	11.2	0.7	7.7	9.6*	17.8	n.a.	72.0

*end of 2007; ** September 2008; *** end of 2006

Source: Raiffeisen Bank Report, IMF Country Reports, EBRD

Table 2: BCPS Ratio *Absolute Deviation from Trend, 2002-2008**

	2002	2003	2004	2005	2006	2007	2008
Bulgaria	3.4	14.3	10.0	14.3	10.0	16.6	11.9
Croatia	3.9	2.5	1.8	2.3	4.6	3.9	-1.0
Czech Rep.	-4.2	1.7	5.4	9.5	13.3	11.5	12.2
Estonia	0.4	1.7	5.0	6.2	9.7	9.3	3.2
Hungary	1.6	4.4	3.6	3.9	3.1	3.5	5.7
Latvia	5.2	6.1	8.0	12.9	16.4	9.0	2.8
Lithuania	1.5	5.1	5.8	10.5	10.0	10.5	4.7
Poland	-1.0	-1.1	-1.4	-1.1	1.5	4.3	8.8
Romania	-0.7	1.3	1.4	2.8	4.7	8.7	6.2
Slovakia	-0.7	1.3	1.4	2.8	4.7	6.3	8.4
Slovenia	-0.6	-0.8	2.8	5.7	6.9	9.7	6.9

*Absolute Deviation = Actual BCPS-Estimated (HP filter) BCPS Ratio; "excessive threshold" at 4.8 percent in bold and italic, "boom threshold" at 6.4 percent in bold.

Source: IMF, Author's calculations

Table 3: BCPS Ratio Relative Deviation*, 2002-2008

	2002	2003	2004	2005	2006	2007	2008
Bulgaria	23.0	52.0	43.3	33.0	22.6	33.9	15.9
Croatia	7.9	4.8	3.2	3.7	6.7	3.7	-1.5
Czech Rep.	-14.5	5.9	17.2	26.3	28.1	38.5	22.9
Estonia	0.9	3.3	8.3	8.8	11.4	10.8	3.2
Hungary	4.7	10.5	7.8	7.7	5.5	6.2	7.9
Latvia	16.1	15.1	15.7	18.9	18.7	10.6	2.8
Lithuania	9.5	22.4	20.0	25.7	20.0	20.8	7.3
Poland	-3.7	-3.8	-5.0	-3.6	4.5	12.3	17.0
Romania	-6.5	9.5	9.1	14.5	18.1	30.7	15.1
Slovakia	-15.6	-27.1	-16.3	4.9	12.1	17.7	8.0
Slovenia	-1.5	-0.2	5.6	9.7	10.3	13.8	17.8

*Relative Deviation= (Actual BCPS Ratio-Estimated (HP) BCPS Ratio)/Actual BCPS; "limit threshold" at 24.9 percent in bold and italic, "boom threshold" at 31.1 percent in bold.

Source: Author's calculations

Table 4: Long-term relationships between the credit-to-GDP ratio and explanatory variables: Western European countries.

Estimator/Variables	GDP/Capita	Interest Rate
Fixed Effect	0.76***	-0.06*
GMM	0.67***	-1.20***
PMG	0.60***	-1.95***

*/**/*** significant respectively at the 10%, 5% and 1%.

Source: Author's estimations

Table 5: Error Correction Terms (θ_t) from the PMG estimator: Western European countries.

Belgium	-0.28**
Denmark	-0.62***
Finland	-0.08**
France	-0.45***
Germany	-0.10***
Ireland	-0.63***
Italy	-0.39***
The Netherlands	-0.39**
Portugal	-0.11**
Spain	-0.26**
Sweden	-0.81***
The United Kingdom	-0.12**

*/**/*** significant respectively at the 10%, 5% and 1%.

Source: Author's estimation

Table 6: Private Credit Boom in the CEECs: comparison

	Trend Methods	Long-term Equilibrium Method	Backé et al. (2006)	Kiss et al. (2006)
Bulgaria	2003	2006	e(2004)	n.a.
Croatia	2006-2007	2002	1994-2004	n.a.
Czech Rep.	2004	X	X	Low risk of credit boom
Estonia	2004-2007	2003	e(2003)	High risk of credit boom
Hungary	2008	2006	e(2003)	Medium risk of credit boom
Latvia	2002-2007	2004	e(2003)	High risk of credit boom
Lithuania	2003-2007	2007	X	Medium risk of credit boom
Poland	2008	X	X	Low risk of credit boom
Romania	2006	X	X	n.a.
Slovakia	2006	X	X	Low risk of credit boom
Slovenia	2005	2005	e(2004)	Medium risk of credit

The table should be read as follows: 1) The second and third columns report the date indicated the beginning (and eventually the end) of “excessive” credit growth, i.e. the year when credit level exceeds the level determined by financial development and fundamentals as estimated by our trend and long-term equilibrium methods. 2) The forth column present the results from Backé et al. (2006). The authors apply fixed-effect and panel dynamic ordinary least square, and mean group estimator and find that only Croatia has reached equilibrium in credit development in 2004 or rather over all studied period (bold figures). Other countries, namely Bulgaria, Estonia, Hungary, Latvia and Slovenia might reach the equilibrium level as well. Poland has recently approached its long-term equilibrium, while The Czech and Slovak Republics, Lithuania and Romania remain far from the equilibrium level. 3) The fifth column reports the results from Kiss et al. (2006). The authors also use the pooled mean group estimator for out-of-sample estimations in new EU countries (CEECs-8; n.a. not treated) and find that risk of credit boom is high in Estonia and Latvia. Estonia reached credit the highest equilibrium level determined for Luxembourg (constant term) in 2005 and Latvia has approached it. For other countries this risk is moderate or low. The CEECs have archived the lowest equilibrium level for Greece (constant term). It is worth to remain that we use the median value of a range of constants (see footnote 22).

Annex

Table A1: Exchange Rate Regimes in the CEECs

Bulgaria	Managed Floating since Feb 1991 Currency Board peg to Euro (DM) since July 1997
Croatia	Fixed Peg since 1992 Managed Floating since Oct 1993
Czech Rep.	Managed Floating since May 1997
Estonia	Currency Board peg to euro (DM) since Jan 1996 ERM 2 since June 2004
Hungary	Fixed Exchange Rate to the Basket of Currencies since Dec 1991 Crawling peg/band to basket (+/- 2.25% bands) since Mar 1995 To Euro since Jan 2000, +/- 15% bands since May 2001 Floating since the end of 2003
Latvia	Fixed Exchange Rate peg to SDR since 1994 (+/-1%) Peg to euro since Jan 2005, ERM 2 since May 2005
Lithuania	Currency Board peg to USD since Apr 1994 Peg to Euro since Feb 2002, ERM 2 since Jun 2004
Poland	Fixed Exchange Rate peg to basket since May 1991 Crawling peg/band to basket since Oct 1991 Bands widened since Mar 1995 (+/-2.0%) to Mar 1999 (+/-15%) Free Floating since Apr 2000
Romania	Managed Floating since Aug 1992
Slovakia	Fixed Exchange Rate peg to basket since Jan 1991 Bands widened since Jan 1996 (+/-3%) and since Jan 1997 (+/- 7%) Managed Floating since Oct 1998, ERM 2 since Nov 2005 Euro adoption Jan 2009
Slovenia	Managed Floating since Oct 1991 ERM 2 since Jun 2004, Euro adoption Jan 2007

Source: IMF, National Central Bank

Table A2: Variables description

The Credit-to-GDP ratio	It is rather common in the case of the CEECs' economies to model the equilibrium credit-to-GDP ratio instead of credit itself (Boissay <i>et al.</i> , 2005) since the evolution of this ratio can be considered as the progress in their transition process.
GDP per Capita	A positive relation between two variables is expected since financial deepening increases with economic development and permanent income and vice-versa.
Real Interest Rate	Interest Rate is adjusted by current inflation rate to capture the cost of borrowing.
Inflation Threshold.	High inflation, i.e. exceeding certain threshold value, is expected to have negative effect on credit growth. The non-linear threshold is set as in Cottarelli <i>et al.</i> (2003) and Khan <i>et al.</i> (2001) at 4 percent and inflation dummy is computed as follows: $inf = dum \times CPI$.
Financial Liberalization Effect	Several authors establish a positive effect that financial liberalization has on financial deepening. This effect is approximated by a decreasing spread between lending and deposit rates.
Crowding-in, Crowding-out effect	A negative relation between an increase in bank credit to the public sector and financial development is rather straightforward.

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