

Is Lending in Central and Eastern Europe developing too fast?*

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Abstract

Credit growth in Central and South-Eastern European countries has accelerated in recent years. While low starting levels of financial intermediation help to explain the speed of credit growth, the fast pace of credit growth raises concerns from a financial and macroeconomic stability perspective. Yet, there is only a limited empirical literature on the determinants of these episodes of fast credit growth. This paper provides an econometric analysis of the macroeconomic determinants of the growth of credit for Bulgaria, Croatia, Romania and the 8 transition countries that joined the EU in May 2004. In the absence of a generally-accepted way of determining what rate of credit growth may be deemed to be “excessive,” the paper proposes a new approach to address this question. The contribution of this paper is to provide a measure of the excessiveness of credit growth while explicitly accounting for the catching up process in incomes associated with the transition from planned to market economies. To do so we model credit growth as a function of both macroeconomic fundamentals and the gap between the actual credit-to-GDP ratio and an equilibrium level. This simple model allows us to derive short-run credit elasticities as well as estimates of expected credit growth. We then compare the latter with actual credit growth, which provides us with a test to determine its “excessiveness.” Due to data availability we undertake two sets of estimates of the short-run credit elasticities, based on a group of benchmark countries and on the countries of the region respectively. Although tentative, the conclusions that emerge suggest that credit growth in a number of countries in the region cannot be fully explained by their fast economic growth, declining interest rates or the catching-up in incomes. In particular, countries with fixed exchange rate regimes seem to have experienced credit growth well above what would have been expected given its main determinants.

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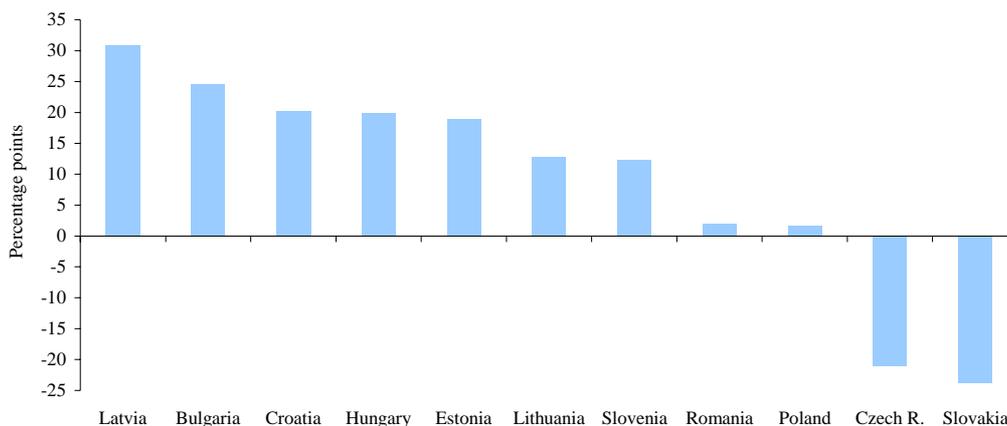
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1 Introduction

Bank credit to the private sector has seen a significant increase among many Central and (South)-Eastern European countries (CEECs). However, the speed of credit growth in the region has been far from homogeneous. The average annual credit growth in real terms over the last five years has been above 20% in four of the countries under consideration here (Latvia, Bulgaria, Lithuania and Estonia) while three other countries have exhibited average annual real growth rates above 10% (Hungary, Croatia and Romania). By contrast, credit growth in real terms has been somewhat slower in Slovenia and has been below 5% or even negative in Poland, the Czech Republic and Slovakia. However, real GDP growth has also been particularly fast among the very countries that have experienced very fast credit expansions.¹ Real per capita GDP in purchasing power terms increased by more than 50% from 1999 to 2004 in each of the Baltic states, while it was also close to that figure in Bulgaria. Moreover, despite a fast increase in GDP, there has also been a notable increase in the ratio of credit to the private sector to GDP, as shown in (1). This increase is all the more notable if one considers that the corresponding ratio for other emerging regions of the world economy has not increased notably or even has decreased. This suggests that some factors specific to the region may be at play.

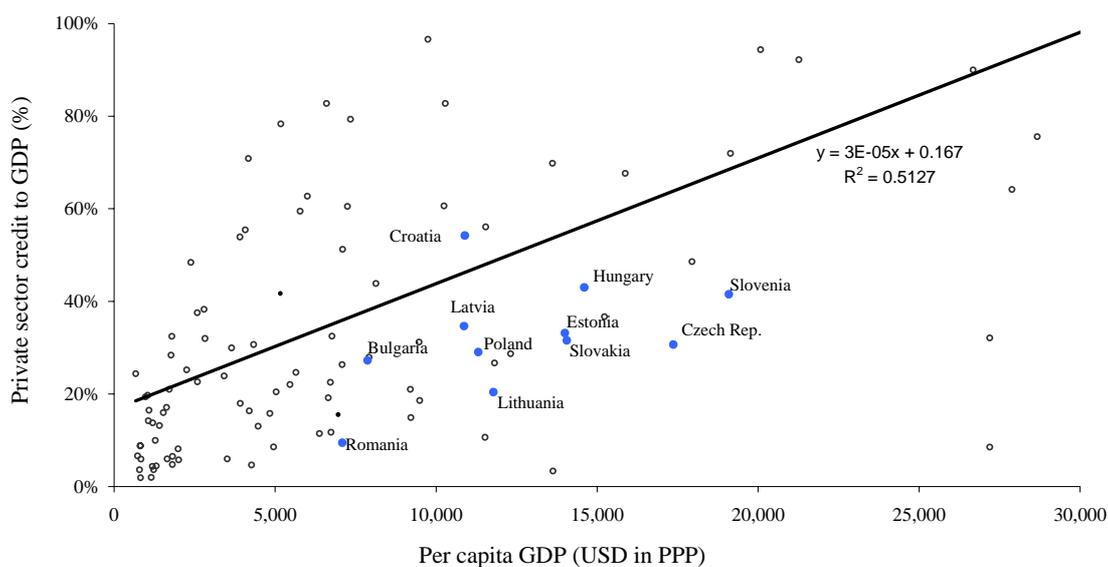


Source: Hilbers et al. (2005).

Figure 1: Change in ratio of credit to the private sector to GDP, 1999-2004

To what extent can this credit expansion be explained by the rapid transition from a centrally-planned to a market-based economy in just over a decade? This question brings to the front the importance of the developmental path that these countries have followed during the last decade and a half. The early years of the transition usually exhibited a significant slump in GDP followed by a period of rapid economic growth. In some cases, during the turbulent early 1990s rapid privatization of the banking sector and expansion of

¹For an overview of developments in credit to the private sector among the new Member States from central and eastern Europe see Backé and Zumer (2005).



Source: IMF (IFS and WEO).

Figure 2: Credit to the private sector to GDP and per capita GDP, 2003 (124 countries)

the undeveloped financial markets, which were basically set up from scratch, resulted in excessive lending booms followed by credit crunches and bank runs and crises that in some cases spilled over to the entire economy. Perhaps the most illustrative example is that of Bulgaria, where problems in the banking sector were at the heart of the macroeconomic crisis that would see the annual inflation rate reaching 2000% in March 1997. The largely state-owned Bulgarian banking system had been financing for years the mounting losses from non-restructured enterprises, leading to a gradual erosion of the balance sheets of banks. By the time the crisis broke out nine out of the ten state-owned banks, which accounted for 80% of banking assets, had negative capital, and around half of the private banks were technically bankrupt. The Bulgarian National Bank increased liquidity to support the ailing banking sector, attempting to sterilise it through open market. In the end, the crisis led to the closure of 17 banks, which accounted for around one-third of total banking assets (Yotzov, 2002). Across the region, the immature banking system was often flawed by inadequate regulation, corruption and simple lack of experience of the agents involved.

Financial liberalization during that first phase of transition may have in some cases undermined real sector development (Berglof and Bolton, 2002). This turbulent recent history, together with the low levels of financial intermediation at the beginning of transition, helps to explain why the CEECs still exhibit significantly lower levels of lending in terms of GDP compared not only to developed countries but also to countries in a similar state of economic development. As shown in Figure 2, all CEECs with the exception of Croatia stood in 2003 below a simple regression line fitted for the correlation between private credit to GDP and per capita GDP across all countries in the world for which data was available.

Figure 2 suggests that indeed there may be sound reasons to expect credit growth in CEECs to be faster than in both developed countries and other emerging regions of the world. While in the early and mid-1990s banks were often engaged in connected lending to a rather restrictive number of corporate borrowers or lending into arrears to state-owned enterprises that faced soft budget constraints, progress in the transition process has done away with those practices (Bokros, 2002; Mehl, Vespro and Winkler, 2005) Assuming that catching up in incomes will proceed and that it will be accompanied by financial deepening, as suggested by the simple correlation shown above, credit will necessarily have to grow faster than GDP in the CEECs. There are numerous sound reasons that may help to explain the recent acceleration of credit growth in the region. A non-comprehensive list of such factors would include foreign bank entry, which may have brought both improved risk management techniques as well as increased access to funding from parent banks, a more competitive environment in the banking sector that may have contributed to declining interest rates, improvements in the institutional environment, improvements in the creditworthiness of borrowers on the back of improved economic prospects, as well as growing property prices which may have led to higher financing needs. The reform of the banking sector is also a key development among these transition countries. Privatisation may have led to faster financial deepening through foreign bank entry but this is not the only channel through which banking sector reform may affect the pace of financial deepening. Banking sector reform brought about both new market segments and increased competition, thus increasing the range of products available to potential borrowers and reducing the costs. This would lead to faster financial deepening. As shown in Figure 3, in some cases there appears to be a relationship between the pace of credit growth and the advancement in the progress of reform in the banking sector, as measured by the corresponding EBRD transition indicator.

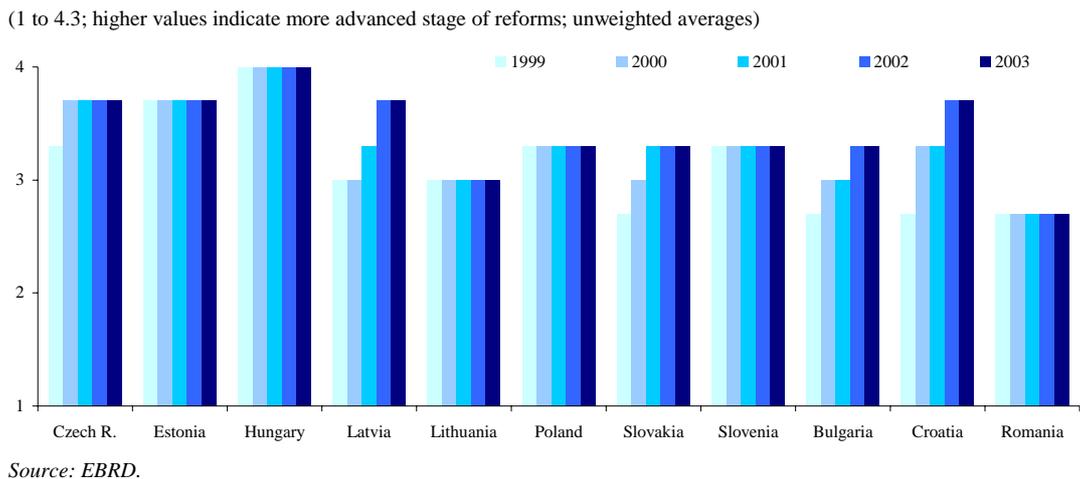


Figure 3: EBRD index of banking sector reform

However, while credit growth can be seen as a natural adjustment due to recent banking system's reforms, improved bank efficiency, and capital inflows from western European countries, some concerns have been raised as regard to the speed of these adjustments. As Borio and Lowe (2002) put it, "one of the relatively few robust findings to emerge from the literature on leading indicators of banking crisis is that rapid domestic credit growth increases the likelihood of a problem", and in some CEECs the growth rate of the credit to GDP ratio is close to that observed in, for instance, Indonesia, Korea, or Sweden, prior to their financial crises in the 1990s.

The purpose of this paper is to incorporate this key characteristic among CEECs of catching up in both real incomes and in financial deepening into an statistical framework that provides a way to address the question of whether credit may be growing excessively fast. In doing so the paper builds upon a limited existing literature that is discussed briefly below. Following the discussion of the existing literature the paper proposes two methods to address the question of what may be considered "excessive" credit growth given the catching up process. The paper then cross-checks the results obtained from these two methods, explores a number of themes highlighted by the results and finally provides some concluding comments.

2 Overview of the empirical literature on lending booms

The empirical literature on lending booms faces the enormous challenge of having to provide a working definition what can be considered to be an "excessive" rate of credit growth. In theory an episode of credit growth can be thought of as "excessive" if either (i) it endangers financial stability via financing undeserving projects that will eventually turn into bad loans; or, (ii) it leads to unsustainable macroeconomic developments, such as a deteriorating external position leading to an unsustainable build up of external debt. None of these two effects can be easily measured or forecast. It is thus unsurprising that the empirical literature on the measurement of "excessiveness" has been very limited.

Despite this intrinsic difficulty, policy-makers and market participants alike are faced with the need to assess credit growth developments. From an operational point of view an episode of rapid credit growth is typically labelled "excessive" or as an unsustainable "credit boom" when the observed growth rates exceed a given threshold. This threshold is usually estimated on the basis of the country's trend credit growth, using a Hodrick-Prescott filter. For example, IMF (2004a) labels a credit expansion a "credit boom" if it exceed 1.75 times the standard deviation of the country's average credit fluctuation around the trend. The threshold value in this case is selected because, assuming the observations of credit growth were drawn from a normal distribution, there would only be a 5% probability that they would lie more than 1.75 times outside the standard deviation. While the specific thresholds may differ, it is common in this literature to focus on deviations from an estimated trend (Gourinchas et al., 2001; Tornell and Westermann, 2002; Ottens et al., 2005). However, as has been often pointed out in the literature, in the context of transition this is particularly

difficult given both the short time series and the likely structural breaks in the series (Duenwald et al., 2005). While this difficulty has often been recognized in the literature, it is particularly unsatisfactory given the acceleration in the pace of credit in the region in recent years.

There has been in fact a growing literature on lending booms in European transition economies. However, most of these papers describe credit developments and their implications on the rest of the economy (Cottarelli et al., 2005; Duenwald et al., 2005; Kraft and Jankov, 2005). While extremely valuable in themselves, none of these papers provide an econometric analysis of the growth of the credit-to-GDP ratio. In particular, Cottarelli et al. (2005) explicitly refrain from exploring this question, focusing instead on deriving a static model of the expected credit-to-GDP ratio on the basis of economic fundamentals. Their conclusion that many countries in the region exhibited credit-to-GDP ratios below the level that would be warranted by their economic fundamentals only serves to underscore the importance of exploring what can be said about the different paths followed by these countries in their approach towards their credit-to-GDP equilibrium levels.

Schadler et al. (2004) provides a useful approach to the question of measuring excessive credit growth, even though the paper deals mainly with the issue of whether rapid credit growth should affect plans for euro adoption in new Member States. Acknowledging the challenges posed by the transition, their approach is to draw on the experience of existing members of the euro area to draw some inferences about likely trends in the new Member States since “historical data from the CEECs would not be relevant to predicting future credit developments” (Schadler et al., 2004:4). The paper estimates a vector error correction model (VECM) on quarterly euro area data for 1991-2002. The VECM of the demand for credit includes three variables: (i) the credit-to-GDP ratio; (ii) a proxy for the cost of credit (long-run real interest rate on government bonds); and (iii) per capita income. A cointegrating relationship between these variables is then found, which can be used to draw some inferences about likely future developments in the CEECs. For example, a 10 percent increase in per capita income raises the credit-to-GDP ratio by around 3 percentage points in the long run.

3 Detecting excessive credit growth

In the absence of a generally-accepted way of determining what rate of credit growth may be deemed to be “excessive” we propose to focus on both macroeconomic fundamentals as well as on the gap between the actual credit-to-GDP ratio and an equilibrium level. The latter is important for the analysis since the countries in the region have been experiencing major structural changes related to the transition process. Our approach is to model credit growth as a simple function of its main macroeconomic determinants, namely GDP growth and interest rate, as well as the gap between the observed credit-to-GDP ratio and its equilibrium level. This allows us to estimate the elasticity of credit with regard to those variables and to derive estimates of expected credit growth in the countries of the region. The comparison of the observed with the expected credit growth provides us with a measure of “excessive” credit growth. We will consider that credit growth is "excessive"

when it is higher than the level implied by its three main determinants given the estimated elasticities. Two key steps in this simple approach are the determination of the equilibrium credit-to-GDP ratio and the estimation of the credit elasticities.

3.1 Equilibrium credit-to-GDP ratios

For CEECs, the equilibrium credit-to-GDP ratio is difficult to measure because it has to account for the effects of the transition from a centrally-planned to a market-based economy, which are not straightforwardly measurable. Credit does not only depend on its traditional macroeconomic determinants, but also on the new circumstances arising from the financial liberalization during the transition process. These new circumstances may affect the banking sector and credit supply in various ways. For example, free entry into the banking sector, the possibility for foreign banks to own local banks or create local branches, and the gradual expansion of these banks in the retail credit markets have certainly worked to increase credit supply and lower lending rates (de Haas and Naaborg, 2005). On the other hand, however, stricter supervisory requirements might have had opposite effects. The fact that the overall impact of financial liberalization on credit supply is probably gradual and perhaps ambiguous makes it difficult to measure and, a fortiori, to model. For simplicity, however, we will assume that the effects over time of financial liberalization on aggregate credit supply can be approximated by a deterministic non-linear time trend (see below).

Our formal definition of the equilibrium level of credit builds on the following credit demand/supply nexus:

$$\begin{cases} C^s = \mathcal{C}^s \left(\begin{matrix} R^\ell - R, & Y, & Z \\ (+) & (+) & (?) \end{matrix} \right) \\ C^d = \mathcal{C}^d \left(\begin{matrix} R^\ell, & Y \\ (-) & (+) \end{matrix} \right) \end{cases} \Rightarrow C^* = \mathcal{C} \left(\begin{matrix} Y, & R, & Z \\ (+) & (-) & (?) \end{matrix} \right)$$

where C^s , C^d and C^* denote the aggregate real credit supply, demand, and equilibrium levels respectively, Y is real GDP, R is the real interbank rate, R^ℓ is the real retail lending rate, and Z captures the effects of financial liberalization on credit supply. While Y and R are the main standard determinants of aggregate credit, the Z factor is specific to transition economies. As is common practice in the literature, at this stage we will model the equilibrium credit-to-GDP ratio rather than credit itself. For transition economies the evolution of the credit-to-GDP ratio can be seen as depending not only on the real interest rate but also on the transition path to a market-based economy, which we will model as a gradual time trend:

$$\begin{cases} \frac{C_{it}}{Y_{it}} = \alpha_i + \beta_i R_{it} + \gamma_i Z_{it} = \left(\frac{C}{Y}\right)_{it}^* + \varepsilon_{it} \\ Z_{it} = \gamma_{i1} \cdot t + \gamma_{i2} \cdot t^2 \end{cases} \quad (1)$$

where t stands for time (quarters) and i for the country, $\left(\frac{C}{Y}\right)_{it}^*$ denotes the equilibrium credit-to-GDP ratio, and ε_{it} is the gap between the observed credit-to-GDP ratio and its equilibrium level. This equilibrium ratio represents the credit-to-GDP ratio that we would expect to observe in the absence of short term shocks, given the interest rate, R_{it} , and the position of the economy on its way to a market-based economy, Z_{it} . To

overcome the issue of the non-measurability of financial liberalization, and in line with the observation, we model the Z factor as a deterministic and non-linear time trend, so that we obtain a mean stationary gap ε_{it} .

3.2 Estimates of credit elasticities

We estimate elasticities on the basis of the following short run dynamic equation of credit growth:

$$\Delta \log C_{it} = \beta + \beta_c \Delta \log C_{it-k} + \beta_y \Delta \log Y_{it-l} + \beta_r \Delta R_{it-j} + \lambda \left[\log \left(\frac{C_{it-m}}{Y_{it-m}} \right) - \log \left(\left(\frac{C}{Y} \right)_{it-m}^* \right) \right] + \gamma_i \mathbf{1}_\Delta + \varepsilon_{it} \quad (2)$$

where $\mathbf{1}_\Delta$ is a dummy variable equal to one during period Δ and to zero otherwise, the coefficients $(\beta, \beta_c, \beta_y, \beta_r, \lambda)$ are credit elasticities and ε_{it} is the residual. The dummy variable $\mathbf{1}_\Delta$ allows us to design a test for "excessive" credit growth since the coefficient on this dummy variable is, by construction, the difference between the observed credit growth and the credit growth implied by the macroeconomic variables (GDP and interest rates) and the gap between the observed credit-to-GDP ratio and its equilibrium level.

The limited availability of data poses, however, a challenge to estimate these elasticities for each of the countries in the region. To circumvent this issue, and to gain some comfort that the results are not driven exclusively by the choice of methodology, we will estimate two sets of elasticities:

- First, we will estimate the credit elasticities for a number of benchmark countries where the credit-to-GDP ratio had been relatively stable over a long period of time. These countries are chosen for two main reasons. First, the long time series available for these countries makes it possible to derive robust estimates of the elasticities for each of these countries. Second, precisely because we use countries with stable credit-to-GDP ratios as benchmarks, we are likely to obtain lower elasticities than may be expected for catching up countries. Since we use these elasticities to derive the expected credit growth in the CEECs, and the measure of "excessive" credit growth is the difference between the actual and the expected credit growth, we are likely to bias the results towards making it more likely that we will detect "excessive" credit growth. This gives us an upper-bound for our measure of "excessive" credit growth.
- Second, we will estimate the credit elasticities using data for the countries in the region. Given the limited length of the time series of data available for each country we will estimate relation (2) using a data panel but constraining the elasticities to be identical across all CEECs. We thus estimate elasticities for the "average" country in our panel. In contrast with the benchmark countries most of the countries in the panel experience rising credit-to-GDP ratios. Therefore, we are likely to obtain higher elasticities than with the benchmark countries and to bias our results towards making it less likely that we will detect "excessive" credit growth. This gives us a lower-bound for our measure of "excessive" credit growth

3.3 Test strategy

Our test for excessive credit growth during a period Δ focuses on parameter γ_i , which is the only country specific parameter in relation (2). A strictly positive γ_i means that credit in country i grew faster during period Δ than what its standard determinants would have implied. In this case, we conclude that credit growth was excessive by γ_i percent on average through the period Δ . Note that an appealing feature of our test strategy is the comparability of the coefficient γ_i across countries, which enables us to rank countries according to the excessiveness of their credit growth: the higher γ_i , the higher excessive credit growth during period Δ . To sum up, the steps to perform our test are the following:

- 1- Estimate relation (1) and compute the implied equilibrium credit-to-GDP ratio $(\frac{C}{Y})_{it}^*$ for each country;
- 2- For the test using the elasticities of the benchmark countries:
 - a- Estimate the short run elasticities $(\beta, \beta_c, \beta_y, \beta_r, \lambda)$ for each benchmark country (relation (2));
 - b- Use these estimates and the data from CEECs to compute the implied growth rates of credit for each CEEC;
 - c- Compute the average difference γ_i between observed and implied growth rates of credit for each CEEC;
 - d- Discuss whether $\gamma_i > 0$ or not and rank the countries according to their γ_i .
- 3- For the test using the elasticities of the average CEEC:
 - a- Estimate the short run elasticities $(\beta, \beta_c, \beta_y, \beta_r, \lambda)$ common to all CEECs as well as the country specific coefficients γ_i (relation (2));
 - b- Test whether $\gamma_i > 0$ or not and rank the countries according to their γ_i .

The above test for “excessive” credit growth must be interpreted with caution since our working definition of “excessiveness” is necessarily conditional on the model that we use. In particular, macroeconomic variables other than those considered here (GDP and interest rates) could also influence credit growth. In addition, our test is also conditional on the equilibrium level of the credit-to-GDP ratio, which is estimated to fit the data. While the increase in the latter may reflect the nature of the transition process, it cannot be ruled out that it may lead to unsustainable developments and financial and/or macroeconomic instability.

3.4 Data

The CEECs had levels significantly lower than the EU average throughout the sample period (1996-2004). By 1998 all 8 of the countries considered in the study had total outstanding loans to yearly GDP ratios below 40%,

the lowest being Bulgaria which was still coping with the aftermath of the banking crisis, Latvia, Lithuania and Romania. All four of these countries had a ratio value below 20%. Croatia had the highest stock of loans at around 40% of GDP. By 1996-1997, a vast majority of loans was denominated in domestic currencies (DC loans), apart from in Latvia and Romania. In Estonia, Hungary, Lithuania, Slovenia and Croatia, the share of DC loans was around 70-80%. In 2004 however, the Baltic States and Romania all had a share of DC loans below 50%, while Croatia and Slovenia remained at around 70-80%. In 1996 only Estonia and Slovenia had a share of long term loans (i.e. with more than one year of maturity) higher than 50%, while in 2004 this share was above 50% in practically all the countries. Regarding the share of loans to households, only Hungary and Slovenia had it above 20% in 1997, while by 2004 this share was around 30% in Slovenia and Bulgaria, slightly higher in Latvia and around 45-55% in Croatia, Estonia, Hungary and Romania.

	Domestic Currency	Long Term loans	Credit to Households
Bulgaria	53.5	86.5	32.1
Croatia	88.0	-	54.5
Estonia	20.0	91.4	47.0
Hungary	56.0	62.3	44.6
Latvia	40.8	85.3	35.4
Lithuania	36.5	-	-
Romania ²	39.1	49.9	46.2
Slovenia	69.3	69.1	28.9

Share of loans in Total Lending to the private non-financial sector in 2004 (in %)

As a result of the banking crisis, total loans to GDP ratio dropped from levels reaching 70% to below 10% in Bulgaria in 1996-1997. Subsequent years brought a gradual recovery, growth picked-up especially after 2000 and total loans reached levels above half of the ones preceding the crisis. Before the crash, a vast majority of loans were denominated in foreign currencies while this ratio is now more balanced. About half of the loans before the crisis were loans to private enterprises, while households had a share of about 20%. Most of the loans to these two sectors were short term loans. This changed during the recovery, as most loans went to the private sector and now have a longer maturity. Croatia was characterized by a fairly steady growth of loans, mainly to households and denominated in domestic currency. Loans to corporations constituted the majority of loans in 1998 and about half of loans in 2004 while loans in foreign were far lower than domestic currency loans. Both of the latter categories remained fairly constant in comparison to GDP. In case of Hungary, total loans doubled in the last 9 years, reaching 45% of GDP. Most of this growth was imputable to long term

²As the breakdown short term/long term and households/corporates is available only for domestic currency denominated loans, the figures are in percentage of domestic currency denominated loans.

loans, foreign currency denominated loans, and loans to households while domestic currency loans and short term loans stayed fairly stable and loans to enterprise grew at a relatively slow pace. In Romania total loans (as percentage of GDP) fell from 1998 to 2000, and picked up from 2000 onwards to double in the following 4 years and reach about 20% of GDP. While credit to corporations was not as severely affected by the fall, most of the recovery was due to a rise in credit to households. The currency composition was almost unaffected by these movements. Total loans in Slovenia doubled with respect to GDP from about 28% in 1996 to almost 50 % in 2004. Foreign currency denominated loans grew faster than those denominated in domestic currency, growing from 5% of GDP in 1996 to 33.1% in 2004. Overall the fastest expansion of credit relatively to GDP took place in the Baltic states. Starting from the lowest levels in our sample in 1996, Estonia and Latvia now have the highest credit-to-GDP ratios of our sample. In case of Lithuania, the credit-to-GDP ratio doubled over the last decade.

3.5 Test using benchmarks

We estimated relations (1) and (2) for 11 benchmark countries whose credit-to-GDP ratio had been stable over a long period of time (on average 19 years) since 1960. These countries are Australia (1960Q2-1984Q3), Belgium (1989Q4-2004Q4), Finland (1960Q2-1980Q4), France (1974Q1-1986Q4), Germany (1968Q1-1983Q4), Greece (1960Q2-1978Q4 and 1981Q2-1995Q4), Ireland (1979Q2-1995Q4), Norway (1960Q2-1983Q4), Spain (1973Q1-1996Q4), Sweden (1970Q1-1988Q1), and United States (1981Q2-1995Q4). For comparison purposes and given the availability of data, we considered total lending to the private sector only.

We also estimated relation (1) for the 8 CEECs in order to compute their equilibrium credit-to-GDP ratio. As the interbank interest rate was not available for all these countries, and given that a large fraction of the CEEC banking system is own by foreign (European) banks, we used the Euribor in the estimations. The estimates of relation (1) are reported in Table 1 below.

The quadratic time trend is significant in all countries but Slovenia and the comparison of the equilibrium with the realized credit-to-GDP ratios shows that the quadratic time trends capture a great deal of the evolution of credit in CEECs over the past 7 years, as shown in Figure 4. As this trend is assumed to control for the effects of transition-related processes such as banking sector reform, we therefore implicitly assume that the latter explains a large part of the acceleration of credit observed over the past 7 years.

The growth rates of credit implied by the standard elasticities and the observed growth rates are reported in Figure ?? , and the average difference between these growth rates over the period 2001-2004 for each CEEC is reported in Table 2. We find that Slovenia and Romania are the only two countries where aggregate credit grew in line with its main determinants. In contrast, the quarterly growth rate of credit in Bulgaria and Latvia was on average more than 7pp higher than what the evolution of GDP, interest rates, and financial

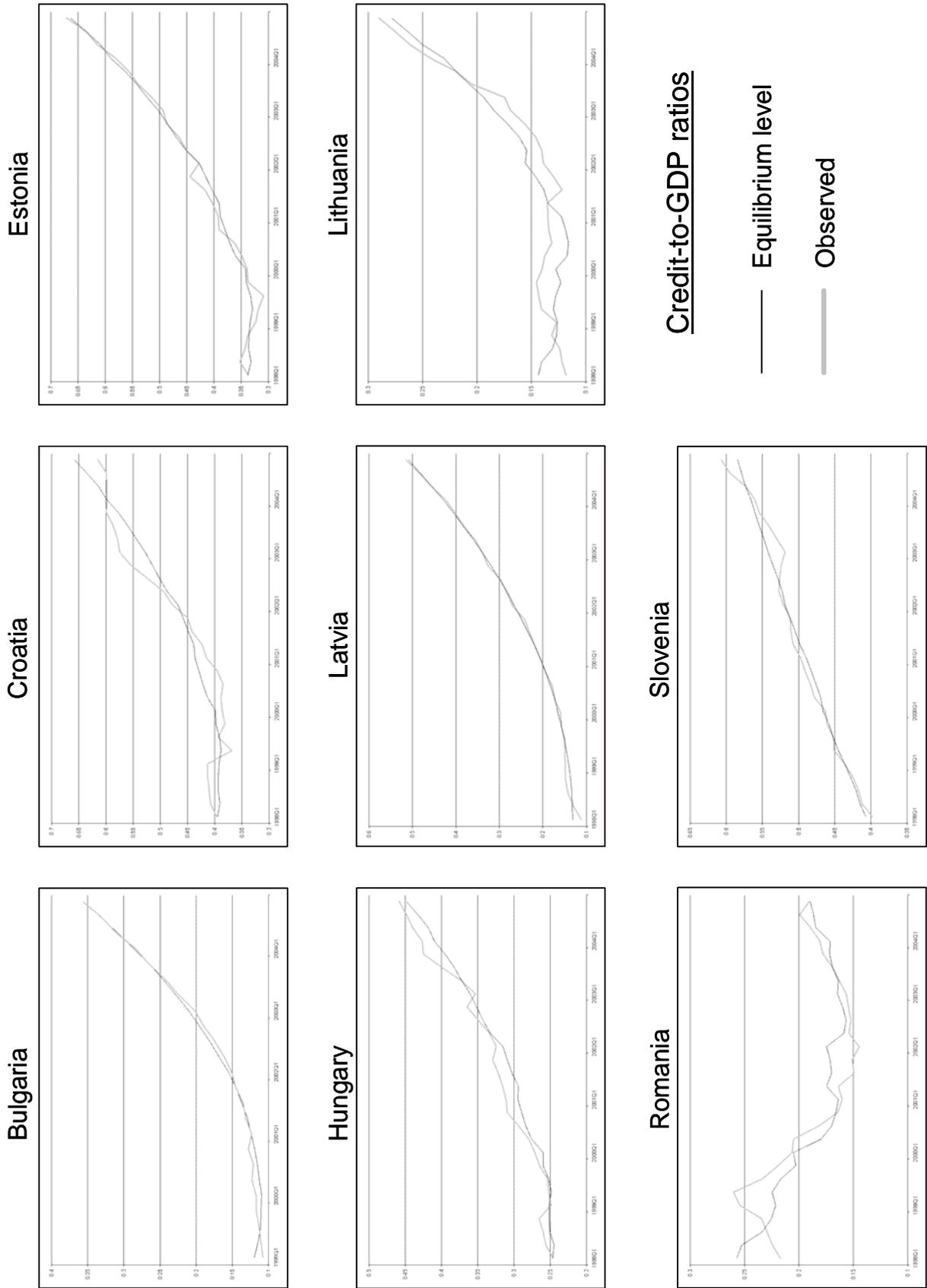


Figure 4: Equilibrium and observed credit-to-GDP ratios - Total lending

Outstanding loans of MFI sector (ex.CB) to non-MFIs end of quarter, to yearly GDP								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
time ²	0.0006 (14.58)*	0.0004 (5.76)*	0.0005 (11.79)*	0.0002 (13.22)*	0.0005 (16.24)*	0.0003 (5.73)*	0.0002 (2.45)**	-0.0000 (-0.97)
time	-0.0064 (-5.82)*	-0.0032 (-1.51)	-0.0042 (-3.42)*	-0.0001 (-0.23)	-0.0010 (-1.19)	-0.0070 (-3.95)*	-0.0110 (-4.24)*	0.0074 (7.28)*
RIR	0.26 (0.82)	0.77 (0.72)	1.02 (1.77)***	0.89 (3.61)*	-0.21 (-0.9)	-0.91 (-1.24)	-1.62 (-1.74)***	-0.26 (-0.9)
const	0.11 (15.06)*	0.37 (11.16)*	0.31 (16.84)*	0.21 (27.45)*	0.14 (25.71)*	0.17 (7.78)*	0.31 (10.59)*	0.40 (42.49)*
obs.	24	28	28	28	28	28	28	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance respectively.

Table 1: Estimates of relation (1) - Total lending

liberalization would have implied. Although to a lower extent, we find that Lithuania, Estonia, Hungary and Croatia have also experienced excessive credit growth since 2001.

Countries i (ranked)	Coefficients γ_i
Bulgaria	7.8
Latvia	7.4
Lithuania	5.5
Estonia	4.1
Hungary	3.9
Croatia	2.9
Slovenia	0.3
Romania	0.0

Table 2: Average quarterly excessive credit growth over the period 2001-2004 (in %)

3.6 Test using CEEC data

We now turn to our second test and use our panel of quarterly observations for the countries in the region starting in 1998. We will consider various credit aggregates, in particular, total lending (outstanding stock of total loans of MFIs to the non-MFIs), loans broken-down by currency denomination (domestic and foreign), maturity (short and long term) and by type (to households or corporations). Table 3 sums up the results (the detailed results of the estimations are given in the Appendix).

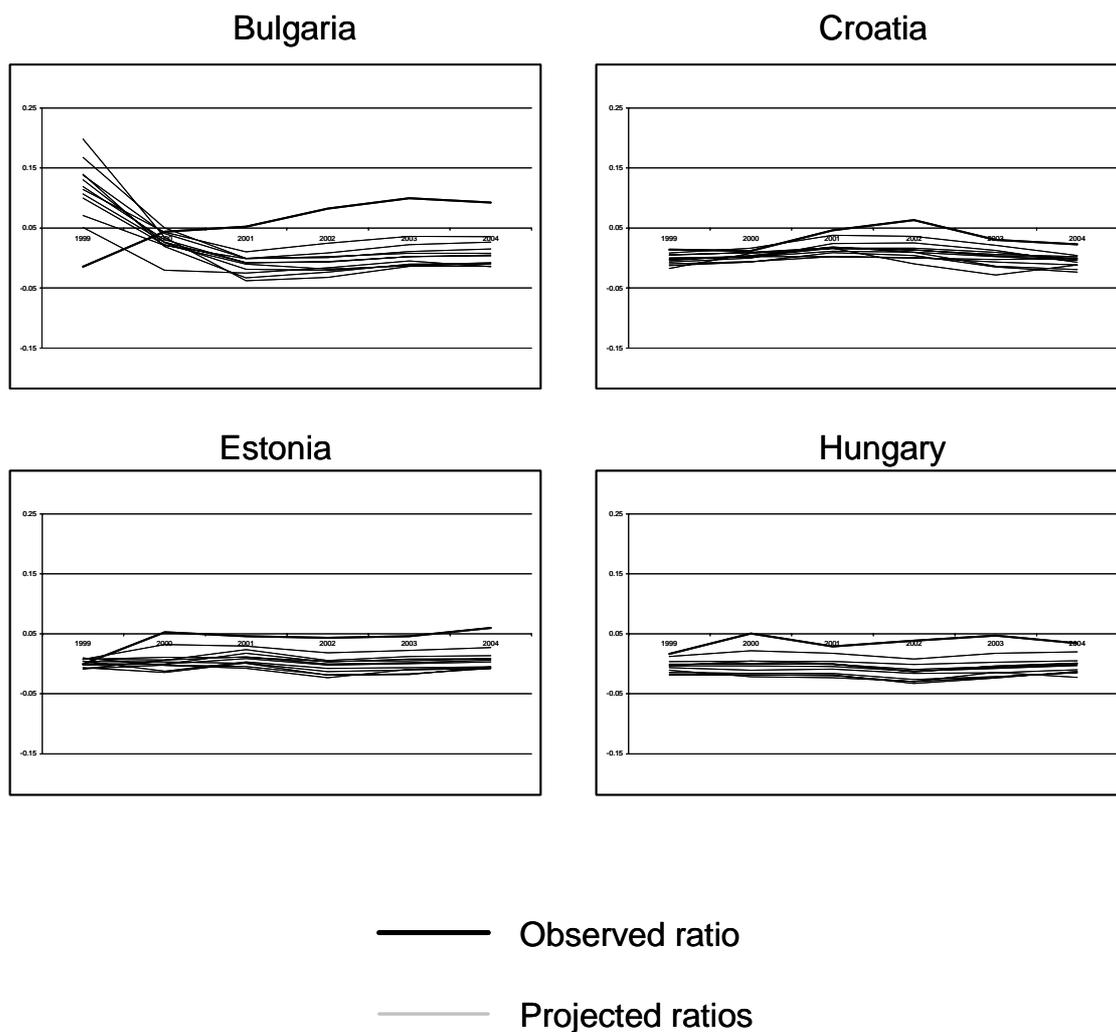


Figure 5: Observed versus implied growth rates of credit - Total lending

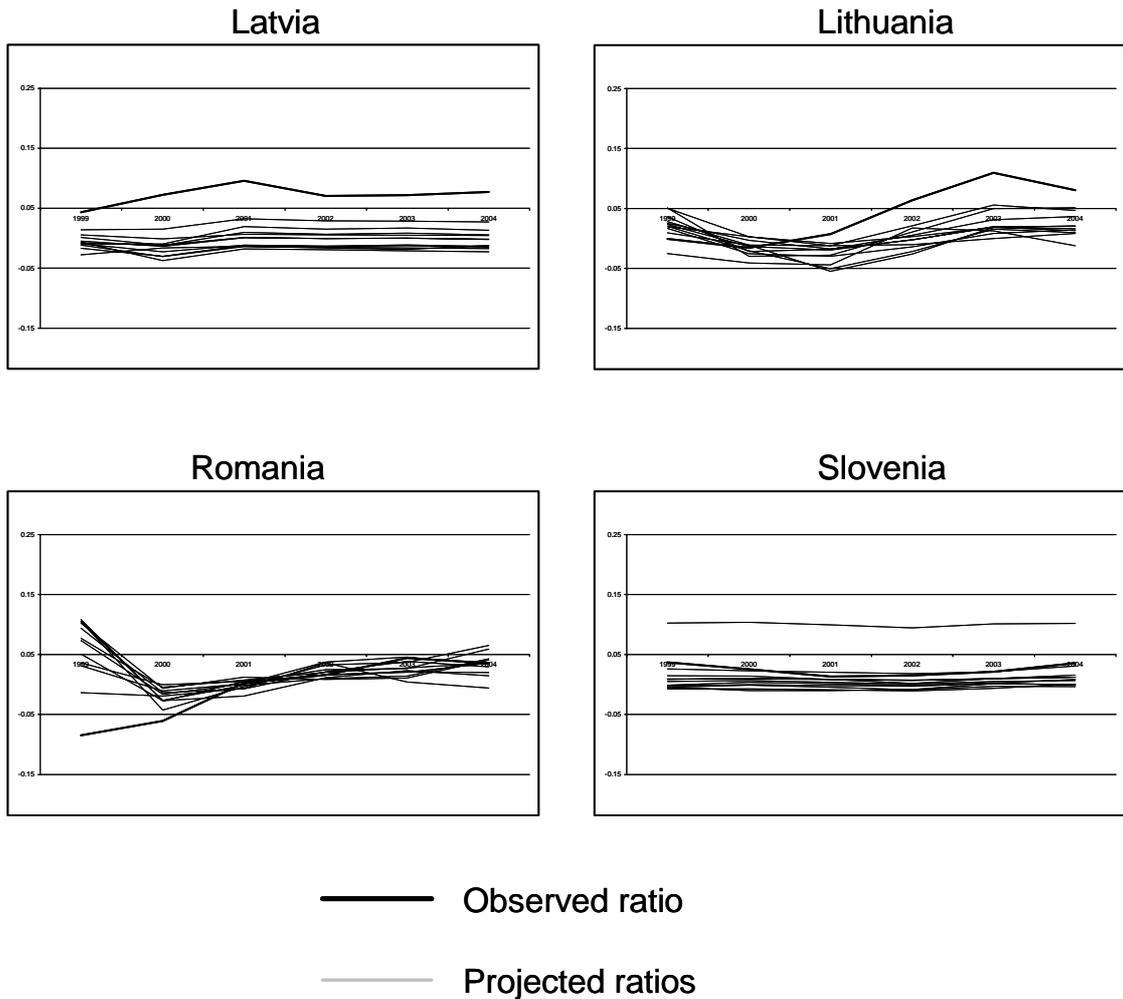


Figure 6: Observed versus implied growth rates of credit - Total lending

Countries i (ranked)	Coefficients γ_i						
	Total Loans	Foreign Currency	Domestic Currency	Short Term	Long Term	Credit to HHs	Credit to Corp.
Bulgaria	5.6*	6.4*	5.6*	3.4**	2.1***	4.8*	5.5*
Latvia	5.4*	5.2*	5.1*	4.8*	0.5	4.5*	5.0*
Lithuania	4.0*	2.0	6.0*	-	-	-	4.9*
Estonia	2.9*	2.5**	3.8*	2.1	-3.1	2.5**	1.6
Croatia	2.2*	0.9	3.3*	-	-	0.9	1.0
Hungary	2.0*	0.1	0.6	0.3	0.4	3.1**	0.0
Slovenia	0.4	4.1*	0.4	1.1	-0.2	-1.8	1.7**
Romania	0.0	2.1	4.2**	1.4	1.2*	5.6***	0.5

*, **, *** denote 1%, 5%, and 10% significance respectively

Table 3: Average quarterly excessive credit growth over the period 2001-2004 (in %)

The results of Table 3 broadly confirm those of Table 2. The growth of total lending in Slovenia and Romania has not been excessive since 2001, while for Bulgaria and Latvia it has exceeded the level implied by fundamentals by more than $5pp$. The two tests also give similar results regarding the ranking of the countries, as Bulgaria and Baltic countries still appear to have the highest excessive growth rate of total lending. Moreover, for these countries, our results suggest that most of credit sub-components have grown too fast, which is not the case for the other countries. Notably, excessive credit growth seems to originate from loans denominated in domestic currency (which still represent a low proportion of total credit) in Croatia,³ and from credit to households in Hungary (where they represent 44.6% of total loans). That total lending has grown in line with its main determinants in Slovenia and Romania should not mask the fact that some sub-components of lending have recently developed fast in these countries. Our results indeed suggest that lending in foreign currency and in domestic currency have on average grown by $4.1pp$ and $4.2pp$ too fast per quarter in Slovenia and Romania respectively since 2001. These developments may however be interpreted as a catch-up effect to the extent that these two types of loans were still representing a very low percentage of total lending in Slovenia and Romania in 2004.

3.7 Robustness

[to be inserted]

³Data on which the estimations for the foreign / domestic currency is not corrected for indexed loans and therefore results are less informative.

4 Selected issues: exchange rate regimes and composition of credit

A key result from the disaggregated analysis is that credit growth in countries with relatively fixed exchange rate regimes is faster than what may be reasonably explained by the macroeconomic fundamentals considered and the gap to the equilibrium credit-to-GDP ratio. Bulgaria, Estonia and Lithuania all feature currency boards whereby the exchange rate is fixed to the euro.⁴ In addition to these countries with hard-pegs, both Croatia and Slovenia have followed tightly managed exchange rate regimes, and hence fluctuations of the real exchange rate have been limited, as shown in the top panel of Figure 7. In fact, despite pursuing a managed float, the fluctuations of the real exchange rate of both Croatia and Slovenia have been particularly limited. In contrast, countries which have typically exhibited more limited credit expansions have also seen greater flexibility of their real exchange rate, as shown in the bottom panel of Figure 7.

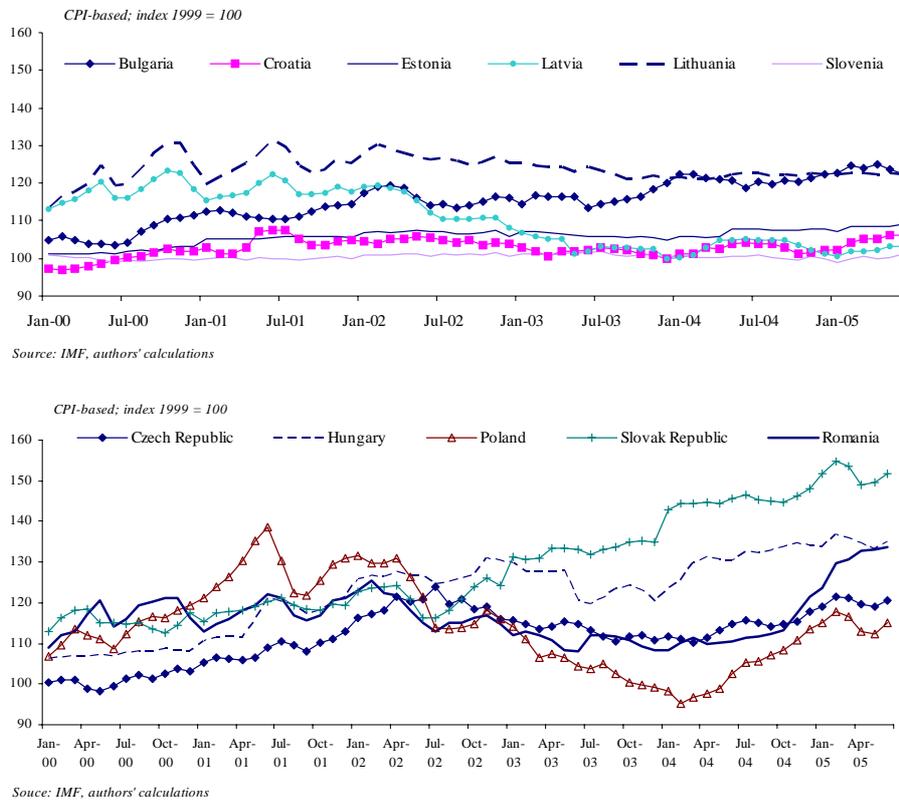


Figure 7: Real exchange rate developments (vs. euro)

This prompts the question of whether the exchange rate regime may have influenced credit developments. One possible mechanism through which the exchange rate regime may lead to higher credit growth is through

⁴The Lithuanian litas was pegged to the US dollar prior to 2002.

encouraging lending in foreign currency. As borrowing in foreign currency is usually associated with lower interest rates, perhaps borrowers in those countries are taking increasing amounts of debt denominated in foreign currency under the belief that there is no foreign exchange rate risk associated with such borrowing. Perhaps lenders in those countries are content with lending in foreign currency to non-foreign currency earners, and thus transforming the exchange rate risk into credit risk. This may be the case if lenders also share the view that countries with hard pegs such as the currency boards to the euro (Bulgaria, Estonia and Lithuania) do not in fact pose a significant exchange rate risk. Moreover, the regulations in some of these countries allow in fact that lending in euro may not be considered as foreign currency exposure when calculating the net open foreign position of banks.⁵ As shown in Figure 8, the share of loans in foreign currency is indeed very high in countries such as Estonia (80% of total loans).

Other countries like Croatia and, to a lesser extent, Latvia, Lithuania, Romania and Bulgaria have also relatively high shares of foreign loans in total loans. Moreover, in some cases there is a very large discrepancy between the share of loans in foreign currency and the corresponding share for deposits, which is possibly explained by the lack of a need to match open positions in foreign currency. According to this view, the presence of foreign banks would also play an important role as they would be in principle more comfortable extending loans in their own currency.

Overall, this scenario of fast credit growth driven by a perception of no exchange rate risk in the context of hard pegs seems plausible. However, it would imply that lending in foreign currency is not only accelerating but that is doing so at a faster pace than lending in domestic currency and hence increasing its share. As Figure 8 shows, this is only the case in Bulgaria among the countries that have been detected as experiencing “excessive” credit growth. In other prominent cases such as Estonia, Latvia or Lithuania no clear trend can be observed and in the case of Croatia the share has actually decreased in recent years. This suggests that, while lending in foreign currency in some cases may be proceeding at too fast a pace, this is not a distinctive feature of foreign currency lending only. Moreover, while Bulgaria, Estonia, Lithuania and, to a lesser extent, Croatia have been identified as cases where credit growth may be deemed to be “excessive” according to our tests, Slovenia stands out as a case of very limited exchange rate fluctuations yet contained credit growth thus far.

Yet, even if foreign ownership were not to give rise to a bias towards foreign currency lending, the presence of foreign banks may help to explain the fast credit growth through different channels. For example, foreign banks may have access to additional sources of finance as they can typically tap the parent bank. Moreover, foreign banks are widely seen as bringing know-how. Empirical studies have shown that bank privatisation

⁵For example, in the case of Bulgaria the limits on open foreign exchange positions are such that each bank must maintain daily (i) a maximum ratio of up to 15% between its open position in any particular currency and the amount of its own funds, excluding the euro and (ii) a maximum ratio of up to 30% between its net open foreign currency position and the amount of its own funds, excluding the euro (IMF Annual Report on Exchange Arrangements and Exchange Restrictions 2004, p. 164).

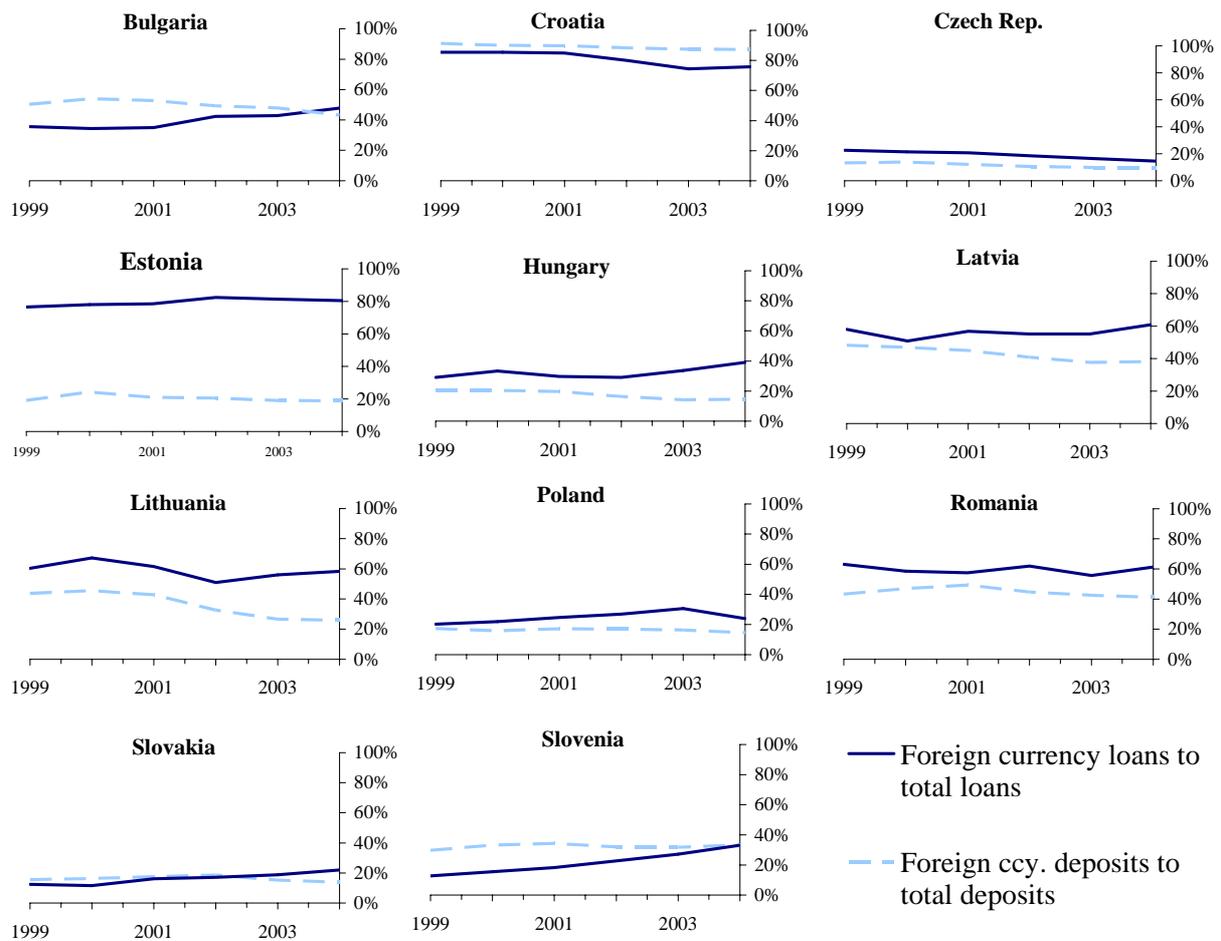
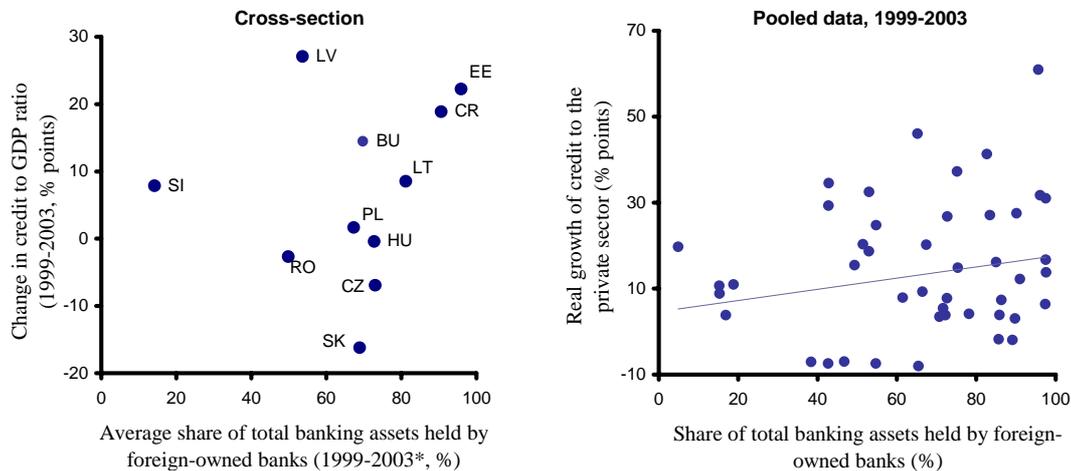


Figure 8: Foreign currency loans and deposits as a share of total loans and deposits

leads to efficiency gains especially in the case of privatisation to foreign strategic investors.⁶ A more efficient banking sector will increase financial intermediation. In fact, as shown in the right panel of Figure 9, there is some indication that foreign bank presence in these countries has been associated with higher credit growth.



Source: EBRD, authors' calculations. Note: * available years, time-span differs for some countries.

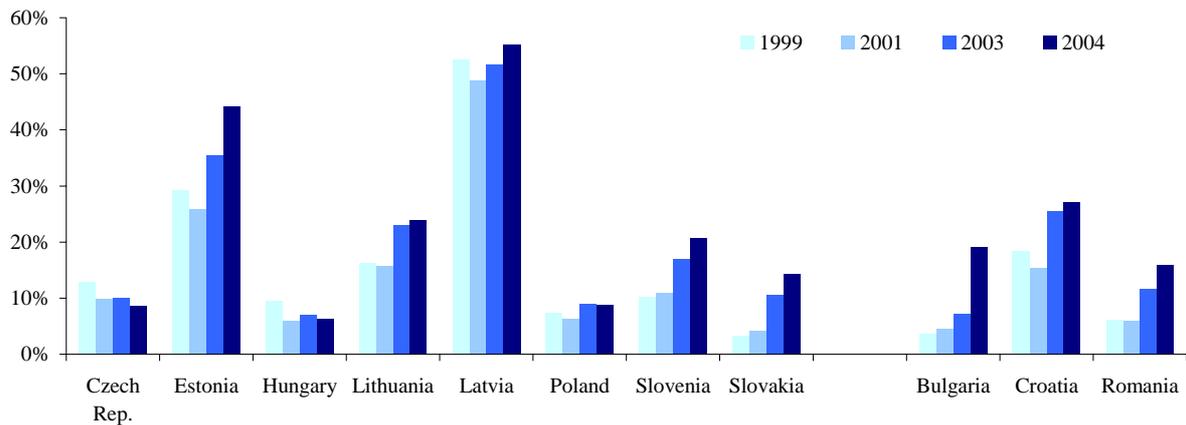
Figure 9: Credit growth and foreign ownership of the banking system

The left panel of Figure 9 shows how, with the exception of Slovenia, the average share of banking assets owned by foreign banks subsidiaries or branches has been above 50% for all countries in the region. It is also worth highlighting the relatively limited foreign bank penetration of the Slovenian banking system since, if confirmed that foreign bank entry is associated with a faster financial deepening, would help to explain why, among the CEECs with relatively fixed exchange rate regimes Slovenia stands out as having seen the slowest growth of credit. Regarding Croatia, the other CEEC with relatively fixed exchange rate that has not seen such a fast credit growth, it is worth noting that the Croatian National Bank too measures already in 2003 to curb credit growth. In particular, banks were made to hold CNB paper bearing low interest rates if their growth of assets exceeded 4% in a given quarter. While this measure was repealed as from 2004, banks were then made to hold liquid foreign exchange assets equal to at least 35% of their total foreign exchange liabilities.

Figure 9 also shows Estonia as having the largest foreign bank presence and one of the largest increases in financial deepening. In Estonia privatisation and consolidation took place in the mid-1990s and by 1998 there were only 5 private banks in the country, down from 42 banks in 1992. Foreign ownership in total

⁶See, for example, Clarke et al. (2005) overview paper in the special issue on bank privatization in developing countries (including emerging Europe) in the Journal of Banking and Finance.

assets reached 90% by 1998, which helps to explain the extraordinarily high figure shown in Figure 9 (Lepik and Tõrs, 2002). In Estonia, as in other countries of the region, one channel through which the presence of foreign banks appears to have contributed to the fast pace of financial deepening is through access to foreign sources of finance to fund the domestic credit expansion. Figure 10 shows the ratio of foreign liabilities to total banking assets for the countries in the region. It is notable how it is precisely in those countries for which our proposed methodologies suggest credit growth has been above what can be explained by economic fundamentals (Estonia, Bulgaria, Latvia, Lithuania and Croatia), that we see either sharp increases in this ratio and/or high levels. In this regard, Slovenia, Slovakia and Romania stand out from this analysis as possible cases where, while our methodologies did not detect abnormal developments yet, external funding may be currently fuelling an acceleration of credit growth. One possible explanation for these phenomena is that the perception of limited foreign exchange rate risk does not only affect borrowers but also the foreign bank subsidiaries which would be induced to expand their loan portfolios in local currencies to take advantage of an interest rate differential that is perceived to come with no or little exchange rate risk.



Source: EBRD, national central banks, IMF.

Figure 10: Foreign liabilities to total banking assets

In addition, foreign bank entry and a limited perception of foreign exchange rate risk could lead to “excessive” credit growth of both foreign and domestic currency lending through competitive pressures in the marketplace. Increased lending in foreign currencies could potentially lead to also a greater supply of domestic currency loans by banks which, perhaps more reliant on deposits or other domestic sources of funding, still strive to keep market share.

4.1 Credit composition

A second key result from our disaggregated tests on credit growth is that, for countries exhibiting “excessive” credit growth at the aggregate level, the result also typically applies to both credit to households and credit

to corporates. This is the case for both Bulgaria and Latvia, while data was not available for Lithuania. In Estonia, however, credit growth was only deemed to be “excessive” in the case of lending to households. That credit growth to corporates appears to be “excessive” is somewhat surprising to analysts of developments in the region, which often refer to the appearance of new products such as mortgages and the launch of consumer credit as key factors in explaining credit growth. In fact, credit growth in certain retail segments has grown spectacularly high. Moreover, this rapid credit growth has been indeed accompanied hand in hand by rising house prices (Papademos 2005). As shown in the left panel of Figure 11 for the case of Bulgaria, there has been a recent acceleration in the mortgages segment, which may have repercussions for real estate prices in the near future. The right panel of Figure 11 illustrates the close connection between house prices and the development of mortgage lending for Estonia.

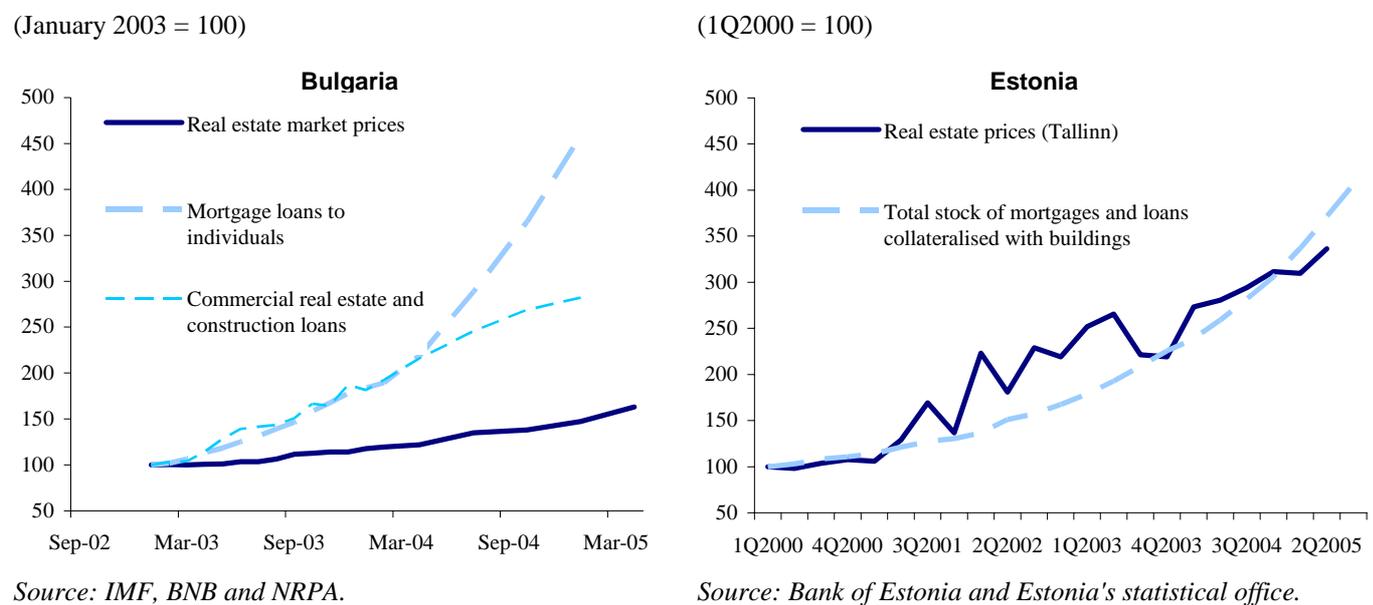
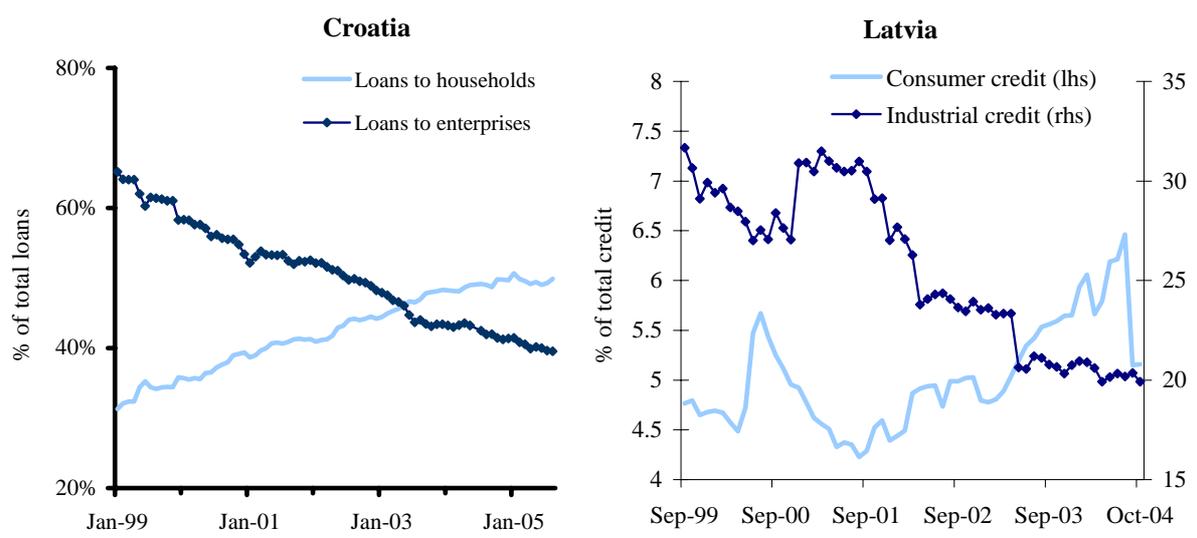


Figure 11: Mortgage loans and real estate prices in Bulgaria and Estonia

In the case of Estonia, where as we saw credit growth appears to be “excessive” in the case of lending to households but not to corporates, a number of policy measures help to explain the prominent growth of home mortgage loans. In particular, through a state-owned credit guarantee foundation, KredEx, Estonian families and young adults can get a guarantee of up to 24% of the value of the collateral provided they have own funds equivalent to 10% of the value of the property being purchased. Set up in 2000, the activity of KredEx as a provider of mortgage loan guarantees has increased significantly in recent years, also through the introduction in 2003 of a new KredEx service aimed at providing grunts for revamping Soviet housing. In addition, tax deductability of mortgage payments may have helped to increase demand for mortgage loans and housing, which has seen an increase in prices since mid-2003 far above the growth of wages.

However, while the mortgage and consumer credit markets have been undoubtedly developing fast in the region, interpreting the rates of growth of credit in these market segments needs to take account of the low starting levels.⁷ As shown in Figure 12, the case of Croatia provides a clear example of the trend of shifting from loans to enterprises to loans to households. Data for Latvia also shows how, while gaining ground at the expense of industrial credit, consumer credit is still limited.



Source: Hrvatska Narodna Banka, Latvijas Banka.

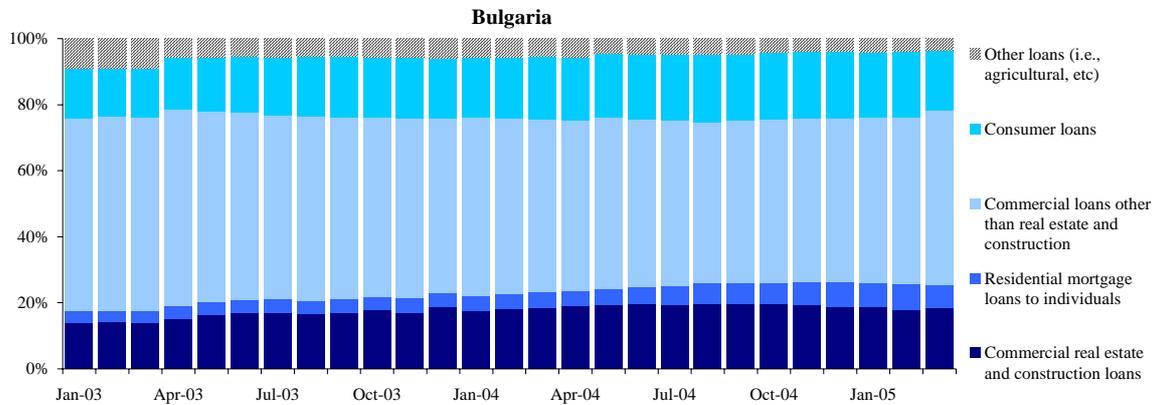
Figure 12: Evolution of credit composition

The relative stability of the composition of credit is highlighted in Figure ?? for Bulgaria, Estonia and Lithuania. The decline in the importance of lending to the manufacturing sector, as shown in Figure ?? has been relatively limited in the case of Lithuania. Moreover, while in some contexts this may often be interpreted as a worrying signal, as consumer lending may be crowding out what one could think of as more productive lending to industrial outfits, one should not lose sight of the overall economic transformation that these countries are experiencing, and of the shift away from secondary to tertiary activities. In addition, in some cases increased lending to households has made banks to be more diversified in their exposures compared to the early stages of transition when concentration of lending to a few borrowers dominated the asset side of bank's balance sheets. It is also important to note that, while there has been a significant increase in mortgages and lending for real estate purposes such loans still account for a relatively small share of the overall loan portfolio. For example, in Bulgaria, residential mortgages to individuals still account for less than 7 percent of the total stock of loans. The analysis, however, is made difficult by the lack of a consistent classification of

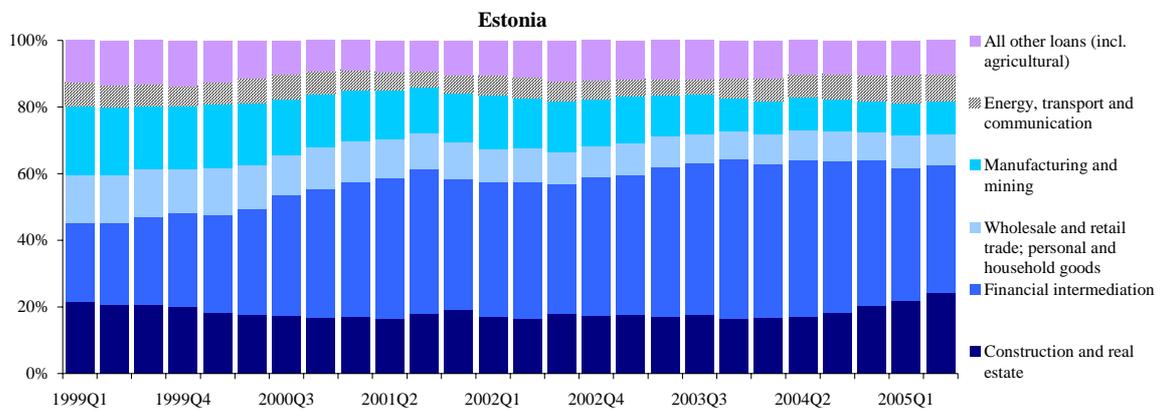
⁷The difficulty in interpreting growth rates given low starting levels of credit to the private sector in general, has recently prompted some researchers to shift their focus of analysis to credit flows, rather than stocks. See, for example, Arpa et al. (2005).

types of loans by economic activity across countries and, in some cases, changes in the classification used by the national authorities.

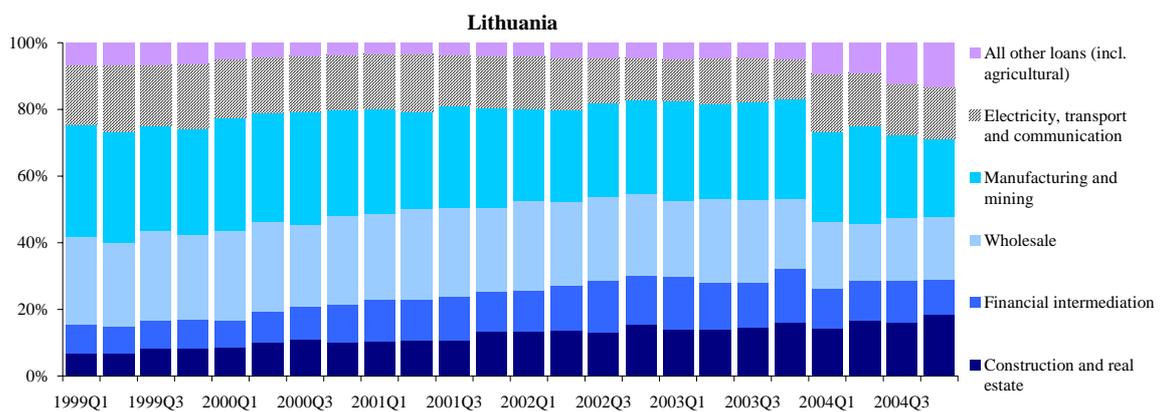
(percentage; note different time periods)



Source: Bulgarian National Bank.



Source: Eesti Panki.



Source: Lietuvos Bankas.

Loan portfolio by types of loans

Overall, the picture that emerges from a look at the loan portfolio by type of activity is one where there are no major changes in the shares of the respective loan types over time. This seems to suggest that the phenomenon of fast credit growth is indeed widespread across the economy, as our results from the error correction model on the basis of different loan types suggested.

5 Conclusions

The experience of many emerging market countries suggests that episodes of fast credit growth often, though by no means always, end in financial and currency crises. Given the high output costs of such crises policymakers in central and south eastern European countries have been paying increasing attention to developments of credit to the private sector in the region. Increased attention has also been followed by a number of policy measures aimed at slowing down the pace of credit growth. Curbing credit growth is not, however, without welfare costs as financial deepening is in principle associated with increased economic growth and efficiency. In this context, empirical work on the nature of the observed credit growth in the region can be a useful input for the policy-maker. This paper provides one such empirical study of credit growth in the region. Its main contribution is to suggest a methodology for assessing credit growth in the region while accounting for the catching up in incomes associated with the transition process that the region is undergoing.

A key result from this paper is that, even accounting for a rising trend in the equilibrium credit-to-GDP ratio, a number of countries in the region have experienced “excessive” credit growth in the sense that the observed credit growth is higher than what we would have expected given the evolution of macroeconomic variables. In particular, countries with fixed exchange rate regimes appear to have experienced credit growth well beyond what would have been expected according to our model. However, tests on disaggregated credit data by currency suggest that “excessive” credit growth is not limited to lending in foreign currency but is also a feature of lending in domestic currency. This somewhat puzzling result calls for further research on the mechanisms through which the exchange rate regime may impact credit developments in the region. While the results from this exercise necessarily depend on our narrow definition of “excessive” credit growth, they bring a new perspective to understand credit developments in the region.

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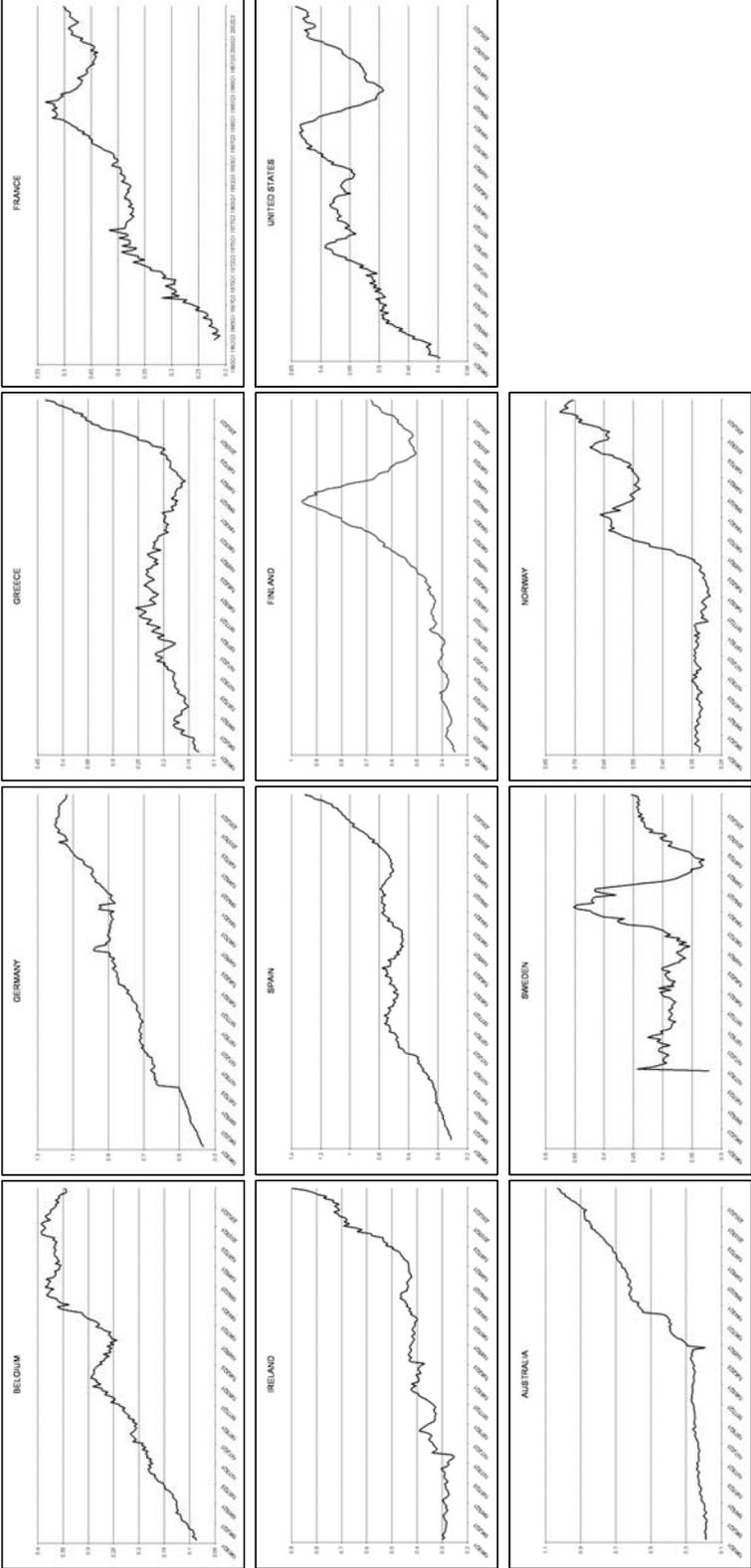
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7 Appendix

7.1 Credit-to-GDP ratio in the benchmark countries



Credit-to-GDP ratio in the benchmark countries

7.2 Results of the regressions

The variable names in the table refer to the following:

- LDV - Lagged dependant variable (logarithm);
- RIR - Real Interest rate (from Euribor);
- GDP - real yearly GDP (logarithm);
- λ - speed of adjustment to long-term path (ECM);
- time - time trend;
- time² - squared time trend;

The Dependant variables (DV) for the "short term " dynamic equations are:

- total lending - total outstanding loans of the monetary and financial sector (non-CB) to other (non-MFI) sectors, stock at end of period, *Source: ECB ?*
- loans to households - total outstanding loans of , stock at end of period, *Source: National Central Banks*
- loans to companies - total outstanding loans of , stock at end of period, *Source: National Central Banks*
Bulgaria - "loans to non-financial private corporations";
Croatia - "loans to enterprise";
Estonia - "loans to commercial undertakings";
Hungary - "loans to non-financial corporations";
Latvia - "loans to private enterprise";
Romania - "loans to non-financial corporations";
Slovenia - "loans to private enterprise and non-profit institutions";
- loans denominated in domestic currency - total outstanding loans of , stock at end of period, *Source: National Central Banks*
- loans denominated in foreign currencies - total outstanding loans of , stock at end of period, *Source: National Central Banks*
- short term loans - total outstanding loans of , stock at end of period, *Source: National Central Banks*;
Bulgaria (hh + private enterprise);
Hungary (non-financial corporations);

Latvia (resident financial institutions, non-financial corporations and households);
others - total loans;

- long term loans - total outstanding loans of , stock at end of period, *Source: National Central Banks*
Bulgaria (hh + private enterprise);
Hungary (non-financial corporations);
Latvia (resident financial institutions, non-financial corporations and households);
others - total loans.

All variables are taken from nominal series and deflated using country specific GDP deflator in order to obtain real credit values.

Outstanding loans of MFI sector (ex.CB) to non-MFIs
end of quarter, to yearly GDP

	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
time ²	0.0006 (14.58)*	0.0004 (5.76)*	0.0005 (11.79)*	0.0002 (13.22)*	0.0005 (16.24)*	0.0003 (5.73)*	0.0002 (2.45)**	-0.0000 (-0.97)
time	-0.0064 (-5.82)*	-0.0032 (-1.51)	-0.0042 (-3.42)*	-0.0001 (-0.23)	-0.0010 (-1.19)	-0.0070 (-3.95)*	-0.0110 (-4.24)*	0.0074 (7.28)*
RIR	0.26 (0.82)	0.77 (0.72)	1.02 (1.77)***	0.89 (3.61)*	-0.21 (-0.9)	-0.91 (-1.24)	-1.62 (-1.74)***	-0.26 (-0.9)
const	0.11 (15.06)*	0.37 (11.16)*	0.31 (16.84)*	0.21 (27.45)*	0.14 (25.71)*	0.17 (7.78)*	0.31 (10.59)*	0.40 (42.49)*
obs.	24	28	28	28	28	28	28	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 1: Estimation results specification: long term; variable: total lending;
path: trend square

Outstanding loans of MFI sector (ex.CB) to non-MFIs: total end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
const01	0.056 (5.35)*	0.022 (2.37)*	0.029 (4)*	0.020 (2.67)*	0.054 (6.73)*	0.040 (2.63)	-0.000 (-0.03)	0.004 (0.59)
GDP					0.541 (3.65)*			
RIR					-0.694 (-1.14)			
LDV					0.048 (0.55)			
λ					-0.190 (-3.56)*			
const					0.009 (1.2)			
R ²					0.35			
AR ²					0.31			
obs.					197			
Hausman_p.					0.99			
Numbers in brackets are t-statistic values. *, **, *** denote 1%, 5%, 10% significance.								

Table 2: Estimation results specification: short term; variable: total lending;
unrestricted variable: constant from 2001; long-term path: trend square.

Credit denominated in domestic currency, end of quarter, to yearly GDP								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
time ²	0.0002 (11.47)*	0.0003 (5.04)*	0.0002 (7.32)*	-0.0000 (-1.69)	-0.0000 (-0.31)	0.0001 (9.39)*	0.0001 (9.07)*	-0.0002 (-8.09)*
time	-0.0011 (-2.28)**	0.0003 (0.21)	-0.0058 (-5.96)*	0.0016 (2.28)**	0.0069 (1.31)	-0.0038 (-7.49)*	-0.0058 (-10.24)*	0.0090 (10.74)*
RIR	-0.02 (-0.19)	0.98 (1.05)	0.12 (0.39)	0.22 (0.73)	0.26 (0.33)	0.12 (0.56)	-0.17 (-1.24)	-0.42 (-1.55)
const	0.07 (16.93)*	0.28 (9.85)*	0.10 (10.82)*	0.12 (14.26)*	0.02 (0.81)	0.05 (8.74)*	0.09 (20.82)*	0.26 (30.73)*
obs.	24	28	28	28	28	28	28	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 3: estimation results specification: long term; variable: loans denominated in domestic currency; path: squared time trend

Outstanding loans of MFI sector (ex.CB) to non-MFIs: total end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
GDP					0.533 (3.01)*			
RIR					-0.672 (-1.16)			
LDV					-0.002 (-0.04)			
λ					-0.199 (-3.7)*			
constant	0.004 (0.24)	0.000 (0.01)	0.013 (0.76)	0.022 (2.09)**	0.038 (2.41)*	0.009 (0.66)	-0.032 (-1.8)***	0.024 (6.3)*
const01	0.065 (3.25)*	0.033 (3.3)*	0.027 (1.49)	0.008 (0.81)	0.029 (1.74)***	0.044 (2.21)	0.041 (1.8)***	-0.009 (-2.33)**
R ²					0.62			
AR ²					0.58			
obs.					197			

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 4: Estimation results specification: short term; variable: total lending; unrestricted variable: constant from 2001; long-term path: trend square.

Credit denominated in foreign currency,
end of quarter, to yearly GDP

	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
time ²	0.0004 (11.38)*	0.0001 (5.75)*	0.0004 (7.87)*	0.0000 (1.44)	-0.0000 (-0.22)	0.0001 (3.19)*	0.0002 (6.4)*	0.0001 (8.84)*
time	-0.0049 (-5.9)*	-0.0036 (-8.63)*	-0.0003 (-0.25)	0.0008 (1.42)	0.0071 (1.01)	-0.0011 (-1.08)	-0.0065 (-5.72)*	-0.0000 (-0.21)
RIR	0.21 (0.98)	-0.20 (-0.72)	0.66 (1.13)	0.56 (1.6)	-0.78 (-0.9)	-0.59 (-1.44)	-0.22 (-0.87)	-0.01 (-0.1)
const	0.04 (8.82)*	0.08 (9.84)*	0.20 (11.21)*	0.05 (4.67)*	0.06 (1.94)***	0.08 (6.16)*	0.12 (11.35)*	0.03 (7.49)*
obs.	24	28	28	28	28	28	28	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 5: estimation results specification: long term; variable: loans denominated in foreign currencies; path: squared time trend

Outstanding loans of MFI sector (ex.CB) to non-MFIs: domestic currency end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
const01	0.058 (4.14)*	0.033 (2.9)*	0.038 (2.62)*	0.006 (0.57)	0.051 (2.79)*	0.060 (3.82)	0.042 (2.07)**	0.004 (0.46)
GDP					0.662 (3.26)*			
RIR					-0.701 (-0.78)			
LDV					0.056 (0.85)			
λ					-0.234 (-3.92)*			
const					-0.003 (-0.37)			
R ²					0.31			
AR ²					0.26			
obs.					194			
Hausman_p.					0			

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Hausman_p. is the p-value in the Hausman test fixed effects versus random effects

Table 6: Estimation results specification: short term; variable: lending in domestic currency; unrestricted variable: constant from 2001; long-term path: trend square.

Short term (maturity ≤ 1 year) loans outstanding, end of quarter, to yearly GDP						
	Bulgaria	Estonia	Hungary	Latvia	Romania	Slovenia
time ²	0.0000 (0.92)	0.0000 (0.97)	-0.0000 (-1.14)	0.0000 (5.44)*	0.0000 (3.57)*	-0.0001 (-6.41)*
time	0.0001 (0.42)	-0.0012 (-1.09)	0.0003 (0.63)	-0.0017 (-4.57)*	-0.0030 (-4.67)*	0.0054 (10.21)*
RIR	-0.12 (-1.13)	-0.12 (-0.25)	0.32 (2.16)**	-0.20 (-1.49)	-0.04 (-0.24)	-0.03 (-0.16)
const	0.02 (10.8)*	0.05 (3.75)*	0.09 (18.54)*	0.05 (15.79)*	0.06 (12.43)*	0.08 (12.67)*
obs.	24	28	28	28	25	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 7: estimation results specification: long term; variable: short term loans ; path: squared time trend

Outstanding loans of MFI sector (ex.CB) to non-MFIs: domestic currency end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
GDP				0.538 (2.82)*				
RIR				-0.722 (-0.87)				
LDV				-0.073 (-1.28)				
λ				-0.257 (-6.28)*				
constant	0.013 (0.78)	0.006 (1.05)	-0.018 (-0.75)	0.001 (0.19)	0.060 (3.12)*	-0.054 (-3.35)	-0.074 (-3.64)*	0.030 (5.13)*
const01	0.053 (2.73)*	0.029 (2.72)*	0.060 (2.05)**	0.003 (0.51)	0.000 (0.03)	0.122 (5.41)	0.121 (3.99)*	-0.027 (-3.85)*
R ²				0.50				
AR ²				0.45				
obs.				194				

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Hausman_p. is the p-value in the Hausman test fixed effects versus random effects

Table 8: Estimation results specification: short term; variable: lending in domestic currency; unrestricted variable: constant from 2001; long-term path: trend square.

Long term (maturity > 1 year) loans outstanding, end of quarter, to yearly GDP						
	Bulgaria	Estonia	Hungary	Latvia	Romania	Slovenia
time ²	0.0005 (12.74)*	0.0006 (10.76)*	0.0000 (0.28)	0.0004 (15.23)*	0.0001 (8.74)*	0.0000 (0.85)
time	-0.0041 (-4.22)*	-0.0044 (-2.87)*	0.0021 (4.59)*	-0.0008 (-1.01)	-0.0037 (-8.2)*	0.0032 (3.57)*
RIR	0.22 (0.85)	0.92 (1.14)	0.47 (2.31)**	-0.04 (-0.27)	-0.03 (-0.36)	-0.38 (-1.17)
const	0.05 (9)*	0.24 (10.16)*	0.07 (12.85)*	0.08 (17.18)*	0.03 (9.43)*	0.19 (19.05)*
obs.	24	28	28	28	25	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 9: estimation results specification: long term; variable: long term loans ; path: squared time trend

Outstanding loans of MFI sector (ex.CB) to non-MFIs: foreign currency end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
const01	0.064 (3.76)*	0.009 (0.72)	0.025 (2.03)**	-0.001 (-0.09)	0.052 (3.48)*	0.020 (1.11)	0.021 (1.47)	0.041 (2.77)*
GDP					1.108 (3.43)*			
RIR					-1.189 (-1.22)			
LDV					0.033 (0.46)			
λ					-0.125 (-2.82)*			
const					0.008 (0.72)			
R ²					0.29			
AR ²					0.24			
obs.					196			
Hausman_p.					0.14			

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 10: Estimation results specification: short term; variable: lending in foreign currency; unrestricted variable: constant from 2001; long-term path: trend square.

Outstanding loans of commercial banks to household sector
end of quarter, to yearly GDP

	Bulgaria	Croatia	Estonia	Hungary	Latvia	Romania	Slovenia
time ²	0.0002 (10.78)*	0.0002 (7.25)*	0.0002 (14.12)*	0.0003 (16.19)*	0.0000 (0.46)	0.0001 (6.32)*	-0.0001 (-3.67)*
time	-0.0035 (-6.03)*	0.0013 (1.7)	-0.0033 (-6.8)*	-0.0026 (-6.26)*	0.0016 (0.41)	-0.0024 (-5.36)*	0.0038 (5.11)*
RIR	0.01 (0.08)	0.27 (0.77)	-0.03 (-0.15)	0.09 (0.74)	-0.24 (-0.52)	0.00 (0.1)	-0.47 (-1.27)
const	0.03 (9.29)*	0.10 (9.66)*	0.06 (9.48)*	0.04 (11.6)*	0.01 (0.63)	0.01 (7.04)*	0.09 (8.42)*
obs.	24	28	28	28	28	25	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 11: estimation results specification: long term; variable: household loans; path: squared time trend

Outstanding loans of MFI sector (ex.CB) to non-MFIs: foreign currency end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
GDP				1.108 (3.01)*				
RIR				-1.008 (-1.17)				
LDV				-0.071 (-0.98)				
λ				-0.158 (-4.1)*				
constant	-0.022 (-1.23)	-0.035 (-1.39)	0.032 (3.36)*	0.037 (1.93)**	0.034 (2.29)**	0.026 (2.66)	-0.048 (-1.67)***	0.061 (5.66)*
const01	0.105 (4.24)*	0.057 (2.16)**	0.007 (0.65)	-0.027 (-1.19)	0.035 (2.11)**	0.008 (0.45)	0.083 (2.54)*	-0.004 (-0.32)
R ²				0.55				
AR ²				0.50				
obs.				196				

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 12: Estimation results specification: short term; variable: lending in foreign currency; unrestricted variable: constant from 2001; long-term path: trend square.

Outstanding loans of commercial banks to companies
end of quarter, to yearly GDP

	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
time ²	0.0003 (7.63)*	0.0002 (4.33)*	0.0002 (9.2)*	-0.0000 (-0.58)	-0.0001 (-0.52)	0.0004 (7.22)*	0.0000 (4.5)*	0.0000 (2.59)**
time	-0.0002 (-0.24)	-0.0057 (-4.33)*	-0.0081 (-11.22)*	0.0024 (3.37)*	0.0108 (1.37)	-0.0078 (-5.29)*	-0.0017 (-6.4)*	0.0031 (5.56)*
RIR	0.34 (1.21)	0.37 (0.46)	0.19 (0.63)	0.79 (2.65)**	-0.30 (-0.27)	-0.72 (-1.11)	-0.10 (-1.07)	0.12 (0.49)
const	0.06 (7.94)*	0.26 (10.53)*	0.22 (23.13)*	0.17 (19.2)*	0.08 (1.88)***	0.16 (8.21)*	0.04 (14.4)*	0.17 (21.97)*
obs.	24	28	28	28	28	28	25	28

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 13: estimation results specification: long term; variable: loans to companies; path: squared time trend

Short term (maturity ≤ 1 year) loans outstanding end of quarter, real								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
const01	0.034 (2.17)**	0.021 (0.82)	0.003 (0.24)	0.048 (2.73)*	0.014 (0.77)	0.011 (0.89)
GDP					1.036 (2.53)*			
RIR					-2.259 (-1.2)			
LDV					-0.149 (-1.31)			
λ					-0.328 (-4.27)*			
const					-0.013 (-1.02)			
R ²					0.19			
AR ²					0.13			
obs.					143			
Hausman_p.					0.00			

Numbers in brackets are t-statistic values.
*, **, *** denote 1%, 5%, 10% significance.

Table 14: Estimation results specification: short term; variable: short term loans (≤ 1 year); unrestricted variable: constant from 2001; long-term path: trend square.

Lag order of short term equation 1 (total lending, table 2)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-2	-2	-2	-2	-2	-2	-1	-1
RIR	-2	-2	-2	-2	-2	-2	-2	-1
λ					-3			

Table 15: Orders of lags of variables used in the estimating equations - results Table 2

Lag order of short term equation 2 (lending in domestic currency, tables 4)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-2	-2	-2	-2	-1	-2	-1	-1
RIR	-1	-2	-2	-2	-1	-1	-2	-1
λ					-4			

Table 16: Orders of lags of variables used in the estimating equations - results Table 4

Lag order of short term equation 3 (lending in foreign currency, tables 6)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-1	-2	-1	-1	-1	-1	-1	-1
RIR	-2	-1	-2	-2	-1	-1	-1	-1
λ					-4			

Table 17: Orders of lags of variables used in the estimating equations - results Table 6

Lag order of short term equation 4 (short term lending, tables 8)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-2	..	-2	-2	-1	..	-1	-1
RIR	-2	..	-1	-2	-2	..	-1	-1
λ					-4			

Table 18: Orders of lags of variables used in the estimating equations - results Table 8

Lag order of short term equation 5 (long term lending, tables 10)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-2	..	-1	-2	-2	..	-1	-1
RIR	-2	..	-2	-2	-2	..	-2	-1
λ					-4			

Table 19: Orders of lags of variables used in the estimating equations - results Table 10

Lag order of short term equation 6 (lending to households, tables 12)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-1	-2	-2	-2	-1	..	-1	-1
RIR	-1	-2	-2	-1	-2	..	-1	-1
λ					-4			

Table 20: Orders of lags of variables used in the estimating equations - results Table 12

Lag order of short term equation 7 (lending to corporate, tables 14)								
	Bulgaria	Croatia	Estonia	Hungary	Latvia	Lithuania	Romania	Slovenia
LDV					-1			
GDP	-1	-2	-1	-2	-2	-2	-1	-1
RIR	-2	-2	-2	-2	-2	-2	-2	-1
λ					-4			

Table 21: Orders of lags of variables used in the estimating equations - results Table 14