A joint initiative of Ludwig-Maximilians University's Center for Economic Studies and the Ifo Institute for Economic Research

CESifo Area Conference

on

Macro, Money and International Finance

20-21 February 2009 CESifo Conference Centre, Munich

Credit Market Imperfections, Financial Market Regulation and Business Cycles in Eastern Europe

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Preliminary draft, please don't quote

30th January 2009

Abstract

Credit market imperfections give rise to boom-bust cycle episodes in emerging markets. In the present paper, we aim to provide a comprehensive analysis for Eastern Europe. We focus on documenting credit market imperfections, asymmetric financing opportunities across sectors, and business cycle fluctuations at the aggregate and sectoral level. The results will be discussed in the policy context of the re-regulation of the financial system. We will propose in an unconventional way to think about the early introduction of the Euro currency.

JEL Classification: F34, F36, G32, G38

Keywords: asymmetric financing opportunities, currency mismatch, sectoral business cycles

1 Motivation

The aim of this paper is to give an overview on credit market imperfections in Eastern Europe and to discuss their likely impact on business cycles. In the case of emerging markets, a growing literature has recently been discussing the effects of credit market imperfections on episodes of boom-bust cycles. In the presence of credit market imperfections it is argued, that firms (and banks) will find it optimal to denominate their debt in foreign currency in order to overcome credit constraints. The exchange rate, then, amplifies the business cycles, as the value of debt affects the ability of firms to borrow from the banking system (see Schneider and Tornell (2004)). Evidence on this mechanism, mostly from Latin America and Asia, has been provided in Tornell and Westermann (2002) and IMF (2005). More recently, some authors have raised the question whether some Eastern European countries might be next to experience boom-bust cycle episodes, in particular in the run-up to the Euro (see Eichengreen and Steiner (2008)). In the present paper, we aim to investigate whether this hypothesis can be sustained by looking at both, macroeconomic and firm level data. In both data sets we focus on the analysis of *sectoral* as well as *aggregate* data.

The first contribution of our analysis is to document the existence of credit market imperfections in Eastern Europe. Using a Worldbank survey data set on perceived credit constraints, we show for ten Central and Eastern European Countries (CEECs), namely Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, that partly severe credit constraints exist. However, these credit constraints are not uniform across sectors of the economy. In particular small, and non-export firms, as well as firms operating in sectors that are conventionally classified as non-tradable, such as construction and transportation, report that access to financial markets is a major obstacle to running their business. This finding can also be established in a more formal analysis of the determinants of credit constraints that controls for country effects, the age of the firms, and other control variables. This evidence on credit constraints is consistent with the observation that most Eastern European countries are characterized by a very high degree of foreign currency liabilities.[1] As over the past years, most countries in this setting have experienced a real appreciation as well as rapid expansions in domestic credit, the recent episode in Eastern Europe indeed appears reminiscent of the experiences that were observed in several emerging markets during lending booms that typically preceded twin banking and currency crisis.

[1] For a discussion of foreign currency liabilities and their implications for macroeconomic stability in Eastern Europe see also Yeyati (2006).

Following up on this hypothesis, the second contribution of our paper is to analyze the impact of credit market imperfections on business cycles in Eastern Europe. In this part, we focus on cycles at a sectoral rather than the aggregate level. Our main hypothesis is that the sectors producing non-tradable goods will display different cyclical patterns than the sector producing mostly tradable goods.[2] We split the exercise up into two parts: In the first part we document that sectoral cycles in Eastern Europe are much more volatile than in Western Europe and that - in countries experiencing a lending boom - there is a long-run trend towards non-tradable goods production. In the second part we employ recent time techniques to distinguish formally between common and idiosyncratic components of sectoral business cycles in Eastern Europe. While Johansen cointegration tests (Johansen, 1988, 1991) show that long run trends between sectors in the CEECs are less evident than in Western Europe, the common features tests (Engle and Kozicki, 1993; Cubadda, 1999) show that neither for Eastern nor for Western Europe convincing evidence of common cycles across sectors can be found. The results of the analysis of the business cycles at sectoral level are therefore consistent with the view that the domestic non-tradable sector is catching up during a lending boom to the tradable sector The latter is largely unaffected by domestic financial conditions due to its capability to raise financing on international capital markets.

Overall, we find that Eastern Europe is indeed a region where the settings for the experience of boom-bust cycles are given, although the degree to which this is an immediate concern varies across countries. Certainly there are also exceptions to the general path in each of the items described above and this will be discussed in the paper. Nevertheless, in many countries the Euroisation has already proceeded substantially, and credit constraints are observed at least in some sectors of the economy. We find these observations remarkable and will argue in an unconventional manner that they could alter the way in which policy makers think about an early introduction of the Euro in Eastern Europe. While the traditional Optimal Currency Area (OCA) literature would suggest to keep the exchange rate flexible to stabilize the business cycle, our analysis suggests that the exchange rate might just do the opposite: It might amplify country specific shocks.[3] In the final part of the paper we discuss these policy aspects of the empirical findings and link it to a recent literature on optimal monetary policy under fixed and flexible exchange rate regimes in the presence of credit market imperfections (see Lahiri et al. (2006)). In this section, we also point out that the most recent depreciation of nominal exchange rates in Eastern

[2] Note that the real exchange rate can be interpreted as the relative price between tradable and non-tradable goods. Recognizing this, Schneider and Tornell (2004) have modelled an internally consistent mechanism of boom-bust cycles in a two-sector model.

[3] A high correlation in aggregate business cycles between Eastern and Western Europe in this case would not be needed to recommend an early introduction of the Euro. See Fidrmuc and Korhonen (2006) for an overview of studies testing aggregate correlation of business cycles.

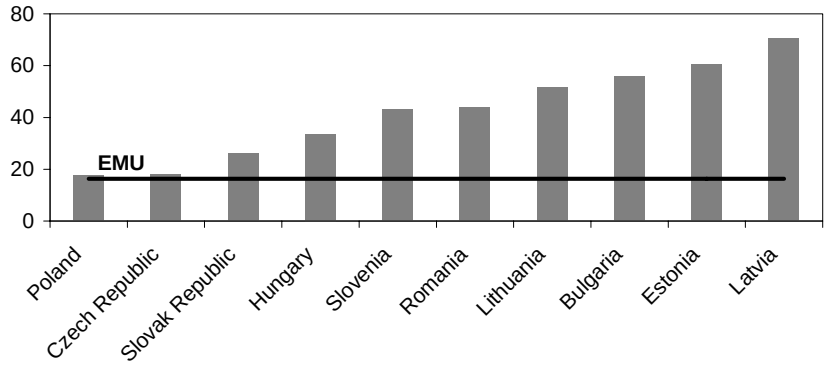
Europe with respect to the Euro might entail the risk of an increased debt burden of firms, that could further slow down the recovery from the present world wide economic slowdown that also affects Eastern Europe.

2 Currency mismatch and lending booms in Eastern Europe

In the following sections, we aim to document, that macroeconomic variables, as well as firm-level evidence on financing opportunities in different sectors in the Eastern European economies are reminiscent of emerging market countries that have experienced boom-bust cycle episodes in the past two decades.

As a start, we consider the foreign currency denomination of debt. The data are taken from the Word Bank Regulation and Supervision Database (2007). Figure 1 shows that there is a wide range of foreign currency shares. Bulgaria and the Baltic countries, Lithuania, Estonia and Latvia, have shares of more than 50%, while Poland and the Czech Republic have rather low shares of less than 20%, a value that is typical for countries in the EMU. These are substantial amounts and are close to the values observed in Latin America and East Asia during the 1990ies.

Figure 1: Foreign currency-denominated liabilities in commercial banking systems

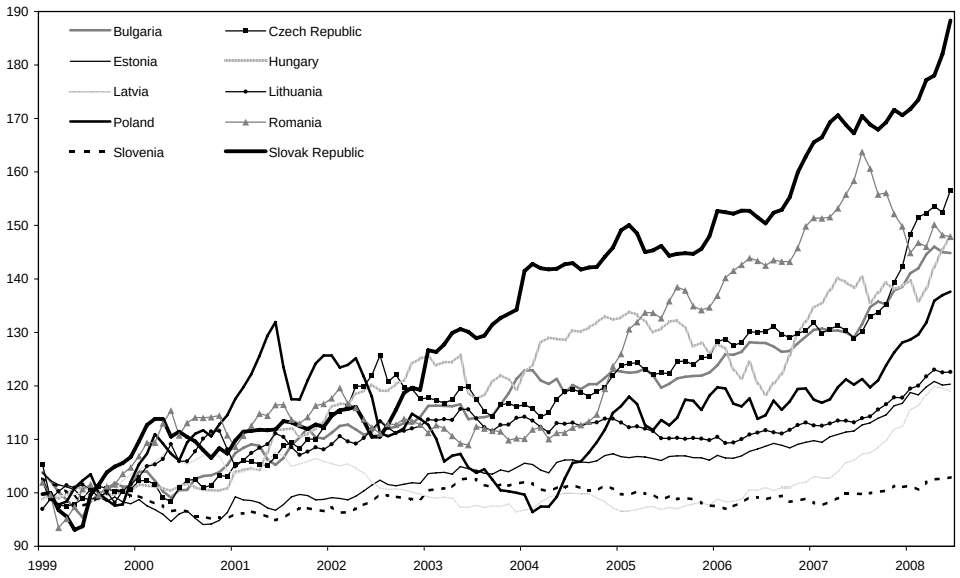


Note: The Figure shows the reponses to question 7.8 ("What percent of the commercial banking system's liabilities is foreign-currency denominated?") of part 7 (Liquidity & Diversification Requirements) of the 2007 Bank Regulation and Supervision Database. Data Report Tables of Financial Soundness Indicators (FSIs, 2005) are used for Estonia and the EMU average. The latter is based on available EU12 countries, excluding Ireland and Finland.
Source: Bank Regulation and Supervision Database 2007 provided by Barth et al. (2008) and Financial Soundness Indicators by the IMF (2008a).

As pointed out in Schneider and Tornell (2004) and Tornell and Westermann (2005), a high degree of foreign currency liabilities can lead to balance sheet effects in the aggregate, when firms, in particular

in the non-tradable sector, have revenues in domestic currency, while debt is denominated in foreign currency. This phenomena is often referred to as currency mismatch. In many emerging markets that were characterized by substantial degree of currency mismatch, a real appreciation has reduced the value of the debt, that was denominated in foreign currency, and has allowed firms to borrow more and more. Occasionally, when the currency depreciated again, the resulting lending booms have then ended in joint banking and currency crisis. The following graphs show that a similar pattern may indeed be emerging in Eastern Europe.

Figure 2: Real Effective Exchange Rate



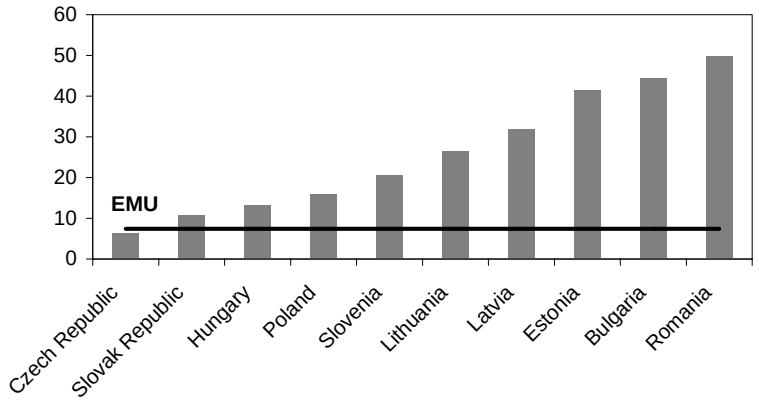
Note: Real effective exchanges rates are monthly average trade-weighted effective rates. Consumer prices are used as deflator for real values. An increase of the index indicates an appreciation of national currency (i.e. the inverse of the conventional definition.
Source: Eurostat (2009).

Figure 2 shows that almost all countries under consideration have experienced a real appreciation over the last decade. This trend is evident in all countries except for Slovenia, that recently joined the EMU and where the real exchange rate has been nearly constant over time. Clearly, this real appreciation is also related to the well known Balassa-Samuelson effect. In nominal terms, the evidence is less clear and often there are larger cyclical swings in either direction. However, over our sample period, all countries, except Latvia and Romania, have appreciated also in nominal terms. Furthermore, there are different exchange rate regimes.[4] In particular Lithuania, Estonia and Bulgaria have fixed their exchange rates after the initial phase of appreciation.

[4] See Table 11 in the appendix for an overview of the the present exchange rate regimes.

As Figure 3 shows, the real appreciation in the presence of a high degree of foreign currency liabilities is also associated with expansions of domestic credit in many East European economies. While most Eastern European countries display growth rates that are above the EMU average, the credit expansion has been particularly strong in economies with a high share of foreign currency liabilities. Average credit growth rates in Latvia and Estonia, for instance, exceed 40% on an annual basis. On the other hand, the Czech Republic and Poland have much more moderate credit growth rates that are closer to those within the EMU.

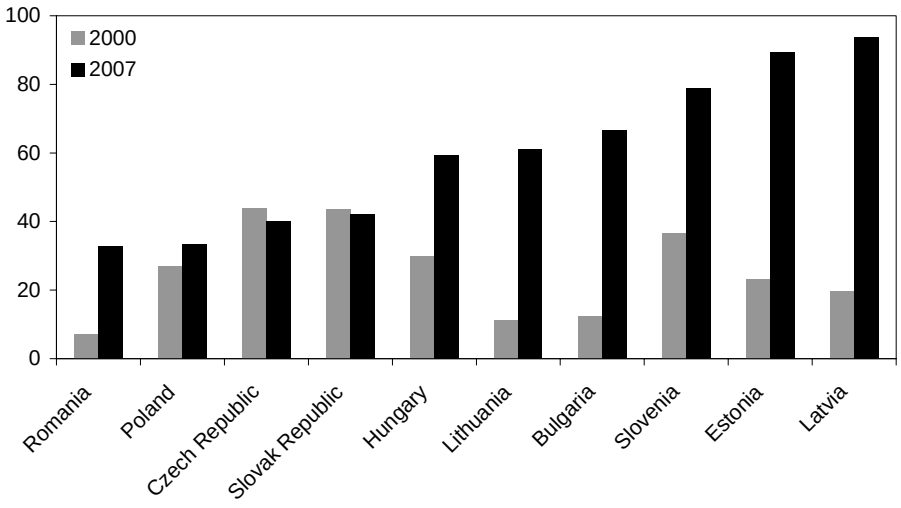
Figure 3: Annual average credit growth



Note: Mean of annual growth is calculated over the period 1995-2007 (for Slovenia only until 2006).
Source: IFS (IMF, 2008b), and own calculations.

A similar pattern can also be observed when expressing the credit expansions as a ratio of GDP (see Figure 4). Within the last seven years, Estonia and Latvia have increased their credit-to-GDP ratios from about 20% to more than 80%. Very substantial increases have also been observed in Romania, Hungary, Lithuania, Bulgaria, and Slovenia. While Poland was characterized by a much more moderate increase, the Czech and Slovak Republic have even decreased their credit to GDP ratios.

Figure 4: Domestic credit to GDP



Note: Ratio of total outstanding bank credit to private sector (including households and enterprises) to GDP, at the end of the year.
Source: EBRD (2008) survey of central banks, IFS (IMF, 2008b), and own calculations.

3 Asymmetric financing opportunities across sectors

In this section of the paper, we aim to document the asymmetry in financing opportunities across sectors that is consistent with the high degree of foreign currency liabilities documented above. If small or non-tradable sector firms denominate their debt in foreign currency to overcome credit constraints, these credit constraints might be also observable directly in micro-data.

For the micro-data analysis we use the Business Environment and Enterprise Productivity Survey (BEEPS), a firm-level survey database which is provided by the World Bank and EBRD (2005). This survey includes responses on the firm's perception of financial constraints. The sample includes 3900 interviewed firms in Central and Eastern European countries. While Poland, with 975 firms, has the largest number of observations, Latvia and Lithuania are with only 205 firms the most narrowly represented. In this database the classification of firms is possible according to several criteria, e.g. their size, location and/or export characteristics. Table 1 breaks down the data set along these dimensions. Considering the size criterion, Table 1 shows that only 346 firms in the total sample are classified as large, whereas 3554 firms are of either small or medium size.[5] Considering the export criterion the majority of firms are non-exporters (2845 firms) and about a quarter of the firms are exporters (1055 firms). Table 1 also shows the relationship between size and export characteristics. Large firms are by

[5] SME have between 2 to 249 full-time employees, while large size firms have 250-9999 full-time workers. Firms with more than 10.000 employees are not included in the survey. In the following tables small and medium businesses will be referred to as "small" for simplicity.

Table 1: Size Distributions of Firms

	Total firms	non-export firms	export firms
no. of firms	3900	2845	1055
small	3554	76%	24%
large	346	44%	56%

Note: Small (and middle) firms are characterized by 2 to 249 full-time employees, while large size firms have 250-9999 full-time workers. Firms with more than 10.000 employees are excluded from the survey. Export firms include both direct and indirect exporters.
Source: Business Environment and Enterprise Productivity Survey (World Bank and EBRD, 2005)

majority exporting firms (56%), while small and middle enterprises (SME) are typically non-exporters (76%).

The BEEPS asks the firms about their perceived financing restrictions. Table 2 shows that in our data set of 3900 firms, 774 firms, i.e. 19.8% of all firms consider the access to financial markets to be a major obstacle in running their business.[6] The percentage value varies across the type of firms. While small and medium firms (20.7%) and non-export firms (20.4%) have somewhat higher figures, the share of constrained large firms and constrained exporting firms is substantially lower (11.6% and 18.3%, respectively). Looking at individual countries the differences between large and small firms (see Table 2) can be confirmed for most countries. However, non-export firms are also more constrained in some countries, namely Czech Republic, Estonia, Romania, Slovak Republic and Slovenia.

In the following empirical exercise, we aim to document this finding more formally in a binary regression setup. We start with estimating the following regression to assess the existence of asymmetric financing opportunities across the sectors:

$$constraint_i = c + \beta \cdot F_i + \alpha_1 \cdot non\_gov + \alpha_2 \cdot age + \sum_{n=1}^{9} D_n + \varepsilon_t, \qquad \text{with} \quad i = 1, ..., 3900 \quad (1)$$

where $constraint_i$ is a dummy variable, which indicates, whether firm i considers the access to financial markets to be a major obstacle for running its business. F_i indicates various sector classifications including non-export firms, small firms and different non-tradable sectors. The dummy variable D_n captures country specific effects. The regression set up is close to a related study by Schiffer and Weder (2001).

[6] Among individual countries this number varies. In countries, where a high growth rate of domestic credit was shown in Figure 3, the percentages are substantially lower. The values range between 3.9% of all firms in Latvia up to 33.9% of all firms in Poland.

Table 2: Constrained Firms

	Total firms	Small and middle firms	Large firms	Non-export firms	Export firms
no. of firms	3900	3554	346	2845	1055
share of constrained firms	19.8%	20.7%	11.6%	20.4%	18.3%
share of constrained firms in:					
Bulgaria	16.0%	16.7%	10.0%	15.8%	16.7%
Czech Republic	17.2%	18.4%	3.7%	18.0%	14.5%
Estonia	5.9%	5.6%	9.5%	7.0%	3.2%
Hungary	23.8%	24.8%	12.2%	23.4%	24.4%
Lithuania	6.8%	7.0%	5.0%	5.7%	9.2%
Latvia	3.9%	3.8%	4.8%	3.7%	4.7%
Poland	33.9%	34.4%	27.5%	33.9%	34.0%
Romania	19.7%	20.9%	8.5%	21.0%	14.6%
Slovak Republic	7.7%	8.1%	4.5%	8.8%	5.5%
Slovenia	9.4%	10.3%	3.6%	12.4%	5.3%

Note: Firms are identified as constrained if they respond to consider the access to credit to be a "major obstacle" in running their business.
Source: Business Environment and Enterprise Productivity Survey (World Bank and EBRD, 2005).

In the original data set, firms can assess the $constraint$ in a range from 1 to 4, i.e. from "no obstacle" to "major obstacle". For the probit and logit analysis (eq. 1) we create a dummy variable that takes the value of 1 only for the extreme response "major obstacle".[7] non_gov and age are further control variables that capture the legal status (public or private) as well as the age of the firm.

The results for the baseline specification are reported in Table 3, where the first two columns display the results for the regression without control variables. We find that the non-export firms - consistent with the descriptive statistics reported above - have a higher value in their response to the finance question in the survey data set. The differences in the responses between export and non-export firms, however, are not statistically significant. This result is robust to different regression specification (probit or logit) and to the application of control variables that capture the age of the firms, or the legal status (non_gov). There is much stronger evidence for differences in the responses between large and small firms. In the regressions 5 - 8 (see Table 3), the point estimates are much larger, and the difference between large and small firms is statistically significant. Again, this result remains unaltered to changes in the estimation procedure, or when further control variables are added. The positive and significant coefficients for small firms show that the firm size is negatively correlated with financial constraints. While small firms are credit constrained, large firms, that have access to alternative financing sources (other than bank credit), experience credit constraints to much lesser extent. This finding is consistent

[7] In an alternative set-up, we classified moderate(3) and major(4) obstacles as constraint. Hence, we get a broader dummy. The results for this analysis are not presented but are similar to the ones in the paper.

with a large body of literature that reports similar findings for other regions and countries (see XXXXXX for a recent overview).

Furthermore, looking at the control variables, our analysis confirms the findings of Schiffer and Weder (2001) who find that the share of governmental ownership increases the general financing constraint, i.e. that private firms have better access to financing. The firm's date of foundation (age) has positive (negative) impact on the financial constraints, hence the obstacles for younger firms are larger.

Table 3: Financial asymmetries I

	"General constraint financing"							
	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
non-export	0.065	0.106	0.049	0.078				
	[0.054]	[0.095]	[0.055]	[0.097]				
small					0.343 ***	0.625 ***	0.349 ***	0.625 ***
					[0.095]	[0.177]	[0.101]	[0.186]
non gov			-0.064	-0.100			-0.129	-0.209
			[0.095]	[0.169]			[0.097]	[0.172]
age			0.003	0.005			0.001	0.003
			[0.001]	[0.002]			[0.001]	[0.002]
Mc Fadden R^2	0.069	0.069	0.070	0.070	0.072	0.072	0.073	0.073
obs	3900	3900	3894	3894	3900	3900	3894	3894

Note: Probit and logit regression results are shown, both excluding and including control variables. *,**,*** indicate significance at 10%, 5% or 1% level. Standard errors are given in parenthesis.
Source: Business Environment and Enterprise Productivity Survey (World Bank and EBRD, 2005), and own calculations.

In the next step of the exercise, we investigate the perceived credit constraints in various non-tradable sectors of the economy. The survey data include 2840 firms which operate in the sectors construction (8.6%), transport (7.1%), hotels (6.1%), wholesale (24.1%), real estate (11.5%), mining (0.4%) and manufacturing (42.2%).[8] While the degree to which sectors are tradable and non-tradable is difficult to measure, most studies consider the construction sector, transportation, hotels and restaurants, as well as wholesale trade and real estate as predominantly *non-tradable* sectors.

Table 4 provides evidence on the credit constraints in the potentially non-tradable sectors. We observe that the point estimate for the dummy variable for firms in the construction and transportation sector is positive, but insignificant, however (regressions 1 - 4). When interacting this dummy with the dummy "small" (regressions 5 - 8) and "non gov" (regressions 9 - 12), the coefficient becomes statistically significant. The hotels and restaurants' dummy has a negative sign (although again insignificant), which does not alter when interacting with the "small" and "non gov" dummies.

[8] We only consider firms in our analysis which operate to 100% in one of the aforementioned sectors. Furthermore, 158 firms state a sector labelled "others". These are skipped in our further analysis, as the sector's range is ambiguous.

Finally, the wholesale and real estate sectors, also display large negative coefficients. Furthermore, these results are statistically significant. Apparently these two sectors also experience easier access to domestic credit.

Overall, our results suggest that some, but not all, potential non-tradable sectors appear to be more credit constrained than the other sectors. In this aspect, our findings for Eastern Europe do not fully confirm those that were reported for emerging markets in Tornell and Westermann (2005) (also for a Worldbank Survey analysis). A possible explanation could be that the survey used for our study was taken in 2005, that constitutes in many countries the peak of a lending boom. Hence, the non-tradable sector firms were not substantially disadvantaged with respect to tradable sector firms, that are more likely to also have access to international capital markets.

Table 4: Sectoral financial asymmetries

	"General constraint financing"											
	Probit (1)	Logit (2)	Probit (3)	Logit (4)	Probit (5)	Logit (6)	Probit (7)	Logit (8)	Probit (9)	Logit (10)	Probit (11)	Logit (12)
N-sector **(construction=100)**	0.143 [0.095]	0.242 [0.163]	0.121 [0.095]	0.204 [0.165]								
N-sector and small					0.177 * [0.097]	0.302 * [0.167]	0.155 [0.098]	0.262 [0.169]				
N-sector, small and non gov									0.225 *** [0.099]	0.385 *** [0.169]	0.2 ** [0.100]	0.342 ** [0.171]
non gov			-0.068 [0.095]	-0.104 [0.169]			-0.070 [0.095]	-0.107 [0.169]				
age			0.003 * [0.001]	0.005 * [0.002]			0.003 * [0.001]	0.005 * [0.002]			0.002 [0.001]	0.004 [0.002]
Mc Fadden R^2	0.069	0.069	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.071	0.071
obs	3900	3900	3894	3894	3900	3900	3894	3894	3900	3900	3894	3894

	"General constraint financing"											
	Probit (1)	Logit (2)	Probit (3)	Logit (4)	Probit (5)	Logit (6)	Probit (7)	Logit (8)	Probit (9)	Logit (10)	Probit (11)	Logit (12)
N-sector **(transport=100)**	0.156 [0.105]	0.274 [0.181]	0.154 [0.105]	0.271 [0.182]								
N-sector and small					0.167 [0.111]	0.294 [0.192]	0.159 [0.111]	0.28 [0.192]				
N-sector, small and non gov									0.22 * [0.115]	0.383 * [0.196]	0.206 * [0.115]	0.359 * [0.197]
non gov			-0.058 [0.096]	-0.087 [0.169]			-0.067 [0.095]	-0.103 [0.169]				
age			0.003 * [0.001]	0.005 * [0.002]			0.003 * [0.001]	0.005 * [0.002]			0.002 [0.001]	0.004 [0.002]
Mc Fadden R^2	0.069	0.069	0.070	0.070	0.069	0.069	0.070	0.070	0.070	0.070	0.070	0.071
obs	3900	3900	3894	3894	3900	3900	3894	3894	3900	3900	3894	3894

	"General constraint financing"											
	Probit (1)	Logit (2)	Probit (3)	Logit (4)	Probit (5)	Logit (6)	Probit (7)	Logit (8)	Probit (9)	Logit (10)	Probit (11)	Logit (12)
N-sector **(hotel=100)**	-0.102 [0.129]	-0.192 [0.239]	-0.107 [0.129]	-0.202 [0.240]								
N-sector and small					-0.091 [0.132]	-0.169 [0.245]	-0.107 [0.129]	-0.202 [0.240]				
N-sector, small and non gov									-0.087 [0.134]	-0.163 [0.251]	-0.097 [0.135]	-0.18 [0.251]
non gov			-0.067 [0.095]	-0.105 [0.169]			-0.067 [0.095]	-0.105 [0.169]				
age			0.003 * [0.001]	0.005 * [0.002]			0.003 * [0.001]	0.005 * [0.002]			0.002 * [0.001]	0.004 * [0.002]
Mc Fadden R^2	0.069	0.069	0.070	0.070	0.069	0.069	0.070	0.070	0.069	0.069	0.070	0.070
obs	3900	3900	3894	3894	3900	3900	3894	3894	3900	3900	3894	3894

	"General constraint financing"											
	Probit (1)	Logit (2)	Probit (3)	Logit (4)	Probit (5)	Logit (6)	Probit (7)	Logit (8)	Probit (9)	Logit (10)	Probit (11)	Logit (12)
N-sector **(wholesale=100)**	-0.202 *** [0.067]	-0.37 *** [0.121]	-0.212 *** [0.067]	-0.388 *** [0.122]								
N-sector and small					-0.166 *** [0.068]	-0.303 *** [0.123]	-0.177 *** [0.068]	-0.324 *** [0.123]				
N-sector, small and non gov									-0.164 *** [0.069]	-0.299 *** [0.125]	-0.179 *** [0.070]	-0.326 *** [0.126]
non gov			-0.061 [0.095]	-0.099 [0.169]			-0.059 [0.095]	-0.094 [0.169]				
age			0.003 ** [0.001]	0.006 ** [0.002]			0.003 ** [0.001]	0.006 ** [0.002]			0.003 * [0.001]	0.005 ** [0.002]
Mc Fadden R^2	0.071	0.071	0.072	0.073	0.071	0.071	0.072	0.072	0.070	0.070	0.071	0.072
obs	3900	3900	3894	3894	3900	3900	3894	3894	3900	3900	3894	3894

	"General constraint financing"											
	Probit (1)	Logit (2)	Probit (3)	Logit (4)	Probit (5)	Logit (6)	Probit (7)	Logit (8)	Probit (9)	Logit (10)	Probit (11)	Logit (12)
N-sector **(real estate=100)**	-0.399 *** [0.108]	-0.731 *** [0.207]	-0.412 *** [0.108]	-0.752 *** [0.208]								
N-sector and small					-0.368 *** [0.109]	-0.673 *** [0.208]	-0.38 *** [0.109]	-0.692 *** [0.208]				
N-sector, small and non gov									-0.416 *** [0.119]	-0.789 *** [0.232]	-0.429 *** [0.119]	-0.809 *** [0.232]
non gov			-0.099 [0.096]	-0.157 [0.170]			-0.092 [0.096]	-0.145 [0.170]				
age			0.003 ** [0.001]	0.006 ** [0.002]			0.003 ** [0.001]	0.006 * [0.002]			0.003 * [0.001]	0.005 * [0.002]
Mc Fadden R^2	0.073	0.072	0.074	0.074	0.072	0.072	0.073	0.073	0.072	0.072	0.073	0.073
obs	3900	3900	3894	3894	3900	3900	3894	3894	3900	3900	3894	3894

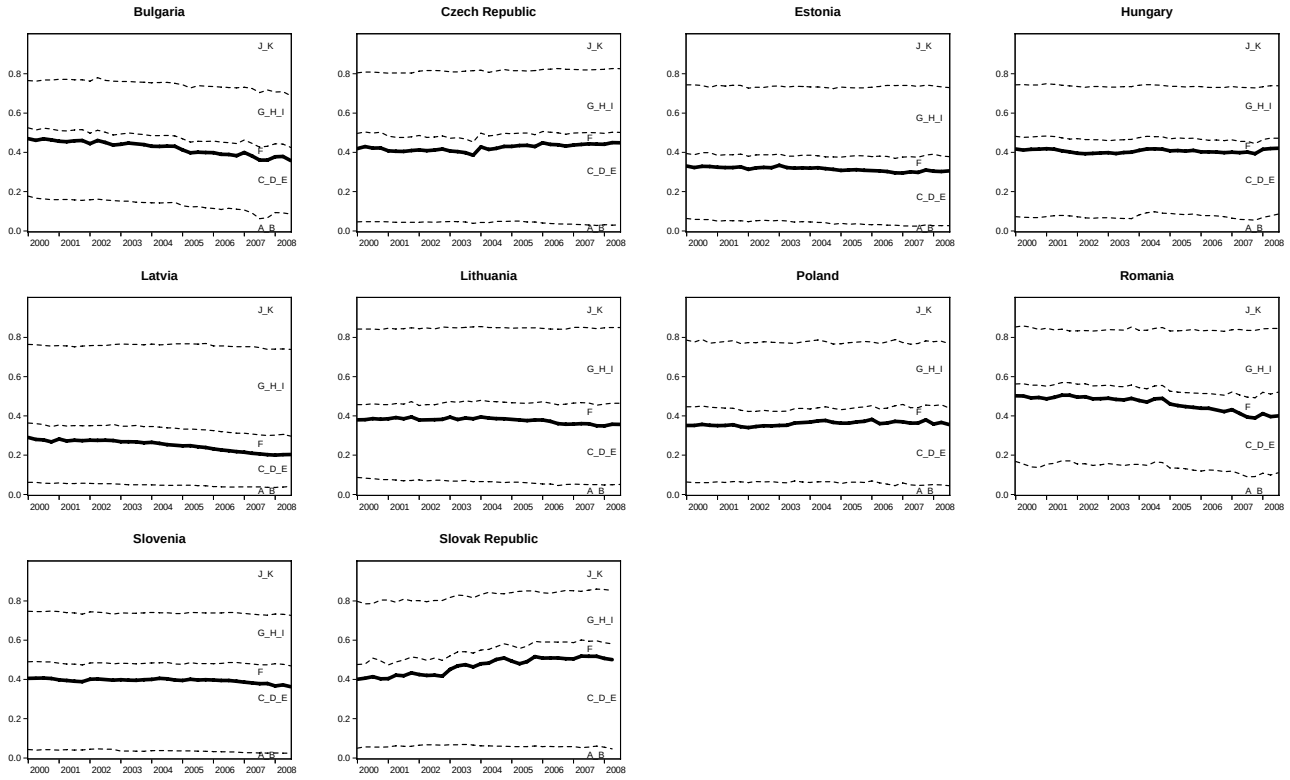
Note: Probit and logit regression results are shown, both excluding and including control variables. The firms are identified according to their sector affiliation. *,**,*** indicate significance at 10%, 5% or 1% level. Standard errors are given in parenthesis.

Source: Business Environment and Enterprise Productivity Survey (World Bank and EBRD, 2005), and own calculations.

4 A Sectoral Analysis of Output

According to the boom-bust cycle mechanism described above, asymmetric financing opportunities across sectors lead to cyclical ups and down in the sectoral composition of output. During the boom period, the non-tradable sector grows faster and during the bust, it falls into a more severe and longer recession than the tradable sector. The aggregate GDP that is often used as the only indicator for economic policy, therefore masks a deeper pattern at the sectoral level. In this section, we compare the cyclical sectoral patterns of Eastern European countries to a selected Western European countries and show that cyclical fluctuations at the sectoral level are indeed different in Eastern Europe.

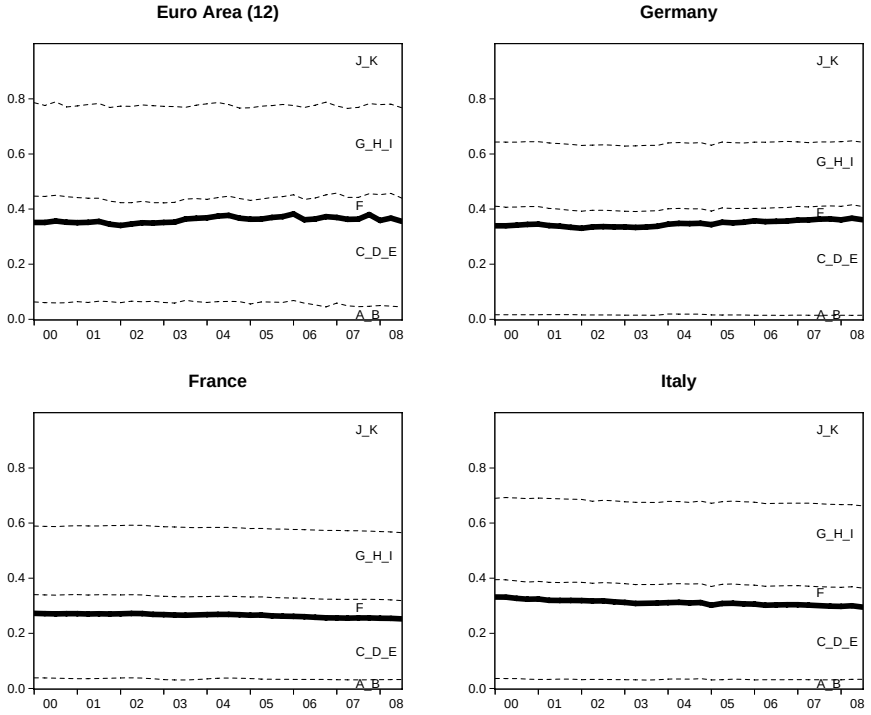
Figure 5: Shares of different sectors in total gross value added in CEEC



Note: Gross value added data for NACE aggregates at constant prices (2000=100), in national currency and seasonal adjusted are shown. The sectors are defined by the NACE-classification: agriculture, hunting, forestry and fishing (A_B), total industry (excl. construction) (C_D_E), construction (F), wholesale and retail trade; hotels and restaurants; transport, storage and communication (G_H_I) and financial intermediation; real estate, renting and business activities(J_K). The bold line indicates the share of tradable sectors' output.
Source: Eurostat (2008), and own calculations.

As a first pass, Figures 5 and 6 show that the composition of sectors in total gross value added data in the CEECs is more volatile than in Western Europe, where the relative share of sectors in total output is quite stable over time.

Figure 6: Shares of different in total gross value added EMU



Note: Gross value added data for NACE aggregates at constant prices (2000=100), in national currency and seasonal adjusted are shown. The sectors are defined by the NACE-classification: agriculture, hunting, forestry and fishing (A_B), total industry (excl. construction) (C_D_E), construction (F), wholesale and retail trade; hotels and restaurants; transport, storage and communication (G_H_I) and financial intermediation; real estate, renting and business activities(J_K). The bold line indicates the share of tradables output.
Source: Eurostat (2008), and own calculations.

The standard deviations of the growth rates of each sector's output (reported in Table 5) confirm this impression. For all sectors, the standard deviation in Eastern Europe is larger than in Western Europe. The highest volatility is observed in the construction and agricultural sector, while industrial production, and wholesale and retail trade rank among the sectors with quite low volatility.

In addition to the cyclical volatility of sectors, it is also interesting to observe the long-run trends of sectoral output. Among the set of 10 countries it is visible that countries that were found to have large increases in their credit-to-GDP ratios (see Figure 4), also have experienced increases in the share of non-tradables relative tradables output.[9] In particular, we observe substantial increases in tradables output in Czech and Slovak Republic - the only two countries, where the credit-to-GDP ratio has fallen. In all other countries the share of tradables output has either been stagnating or falling with respect to the non-tradables output. Again, our findings are consistent with the empirical results in the literature that were reported for twin-crisis countries (Krueger and Tornell, 1999) as well as for a large cross

[9] We defined tradables output as the sum of industrial production and agriculture. The bold line in Figures 5 and 6 indicates the share of tradable output relative to the non-tradable output.

Table 5: Sectoral volatility

sector	agriculture, hunting, forestry and fishing	total industry (excl. construction)	construction	wholesale and retail trade; hotels and restaurants; transport, storage and communication	financial inter-mediation; real estate, renting and business activities
Bulgaria	0.15960	0.10655	0.20874	0.09306	0.12160
Czech Republic	0.12447	0.06912	0.10065	0.04539	0.05345
Estonia	0.14284	0.06564	0.12969	0.05123	0.04171
Hungary	0.19661	0.03954	0.08743	0.02368	0.03494
Lithuania	0.09616	0.05540	0.14012	0.04586	0.03089
Latvia	0.08066	0.08478	0.14933	0.05843	0.07563
Poland	0.09523	0.04936	0.10687	0.02923	0.05018
Romania	0.14730	0.01954	0.10902	0.04853	0.05888
Slovenia	0.09662	0.03099	0.08308	0.02752	0.04253
Slovak Republic	0.13429	0.08585	0.23471	0.09684	0.12158
mean	0.12738	0.06068	0.13496	0.05198	0.06314
Euro Area	0.05128	0.02193	0.02667	0.01691	0.01072
Euro Area (12)	0.09523	0.04936	0.10687	0.02923	0.05018
Germany	0.10752	0.03236	0.05041	0.01963	0.01641
France	0.08670	0.01979	0.03209	0.02035	0.01357
mean	0.08518	0.03086	0.05401	0.02153	0.02272

Note: Standard deviations of sectoral growth rates are reported for each sector. "Mean" indicates the mean of the standard deviations over the set of countries.

section of emerging markets (see IMF (2005) and Tornell and Westermann (2005)).

For a more formal analysis of sectoral comovements we merge individual sectors either to non-tradable (N-sector) or to tradable sector (T-sector). The T-sector is the sum of agriculture, hunting, forestry and fishing and total industry (excl. construction). The N-sector is the sum of construction; wholesale and retail trade; hotels and restaurants; transport, storage and communication and financial intermediation; real estate, renting and business activities.[10]

The Johansen (1991) cointegration test results, which are reported in Table 6, indicate that common long run trends between the two sectors are rare in the CEECs. Looking at the AIC criterion (Table 6 panel b), we find that the sectoral output of the tradable and non-tradable sectors are not cointegrated in 8 out of 10 countries. The only two countries, where evidence of common trends among tradables and non-tradables sector exists are again Czech and Slovak Republic. These two countries where the credit to GDP ratio has not been increasing. Selecting the lag length in the Johansen-procedure by the SIC criterion we also find the sectors in Poland to be cointegrated (see Table 6 panel a). Substantially

[10] The NACE-classification is as follows: agriculture, hunting, forestry and fishing (A_B) and total industry (excl. construction) (C_D_E), construction (F), wholesale and retail trade; hotels and restaurants; transport, storage and communication (G_H_I) and financial intermediation; real estate, renting and business activities(J_K).

more evidence is found among the Western European countries. For the Euro Area as whole, as well as for each individual country, we find evidence in favor of common trends at least using either one of the two lag length criteria.

As a next step, we analyze whether the N- and T-sector have a common cyclical pattern, using the test for common serial correlation that was first developed by Engle and Kozicki (1993). The aim of this technique is to construct a linear combination of two time series that removes the AR(p) feature from both series. Interpreting the autoregressive component as the cycle, this can be referred to as a test for common cycles in sectoral output data. The subsequent estimations are based on two-stage least square (TSLS) as well as on general methods of moments (GMM) that was later proposed by Cubadda and Hecq (2001). The TSLS common cycle results are shown in Table 7 and 8. The previous cointegration results are taken into account by including the error correction terms in the list of instruments. We find that only the Lithuanian sectors show evidence of a common cycle. The null hypothesis of a common serial correlation feature cannot be rejected at the 5% level and the common cycle coefficient is statistically significant. For all other countries evidence on cyclical comovement does not exist, as either the null of a common cycle is rejected or the coefficient in the cofeature vector is insignificant.

Tables 9 and 10 show the results for the GMM estimates. We again reject the null hypothesis in all cases, and hence, we confirm that no common sectoral cycles are present in the data. [11] With respect to common cycles, Tables 8 and 10 show that our results do not differ between Eastern and Western Europe.[12]

[11] For Romania we can reject the null, but bear in mind that for Romania only 35 observations are available. The cofeature coefficient is not significant either.

[12] For Western Europe this confirms the previous finding of Cheung and Westermann (2003) who find only little evidence of common cycles across sectors in Germany.

Table 6: Cointegration Test Results

(a) SIC

		Trace Statistic	Maximum Eigenvalue Statistic		
Bulgaria	r=0	14.72	9.14	[5]	49
	r=1	5.57	5.57		
Czech Republic	r=0	35.42 * *	22.87 * *	[6]	44
	r=1	12.55 *	12.55 *		
Estonia	r=0	12.64	8.76	[6]	48
	r=1	3.89	3.89		
Hungary	r=0	15.46	10.25	[5]	49
	r=1	5.21	5.21		
Lithuania	r=0	16.80	12.55	[5]	49
	r=1	4.25	4.25		
Latvia	r=0	15.64	11.77	[5]	49
	r=1	3.87	3.87		
Poland	r=0	25.70 * *	23.23 * *	[4]	50
	r=1	2.47	2.47		
Romania	r=0	13.42	10.35	[8]	26
	r=1	3.07	3.07		
Slovenia	r=0	20.34 *	15.07	[5]	49
	r=1	5.27	5.27		
Slovak Republic	r=0	35.35 * *	29.83 * *	[1]	53
	r=1	5.52	5.52		
Euro Area	r=0	23.90 *	18.01 *	[5]	49
	r=1	5.89	5.89		
Euro Area (12)	r=0	25.54 * *	19.79 * *	[5]	49
	r=1	5.76	5.76		
Germany	r=0	32.37 * *	28.59 * *	[3]	51
	r=1	3.78	3.78		
France	r=0	22.99 *	17.04 *	[6]	48
	r=1	5.95	5.95		
Italy	r=0	15.18	10.77	[4]	50
	r=1	4.41	4.41		

(b) AIC

		Trace Statistic	Maximum Eigenvalue Statistic		
Bulgaria	r=0	14.72	9.14	[5]	48
	r=1	5.57	5.57		
Czech Republic	r=0	35.42 * *	22.87 * *	[6]	43
	r=1	12.55 *	12.55 *		
Estonia	r=0	12.64	8.76	[6]	47
	r=1	3.89	3.89		
Hungary	r=0	15.46	10.25	[5]	48
	r=1	5.21	5.21		
Lithuania	r=0	16.80	12.55	[5]	48
	r=1	4.25	4.25		
Latvia	r=0	15.64	11.77	[5]	48
	r=1	3.87	3.87		
Poland	r=0	12.36	9.54	[6]	47
	r=1	2.82	2.82		
Romania	r=0	13.42	10.35	[8]	25
	r=1	3.07	3.07		
Slovenia	r=0	20.34 *	15.07	[5]	48
	r=1	5.27	5.27		
Slovak Republic	r=0	22.23 *	12.84	[5]	48
	r=1	9.39 *	9.39 *		
Euro Area	r=0	21.78 *	15.78 *	[7]	46
	r=1	6.00	6.00		
Euro Area (12)	r=0	22.04 *	16.68 *	[7]	46
	r=1	5.36	5.36		
Germany	r=0	12.64	10.75	[5]	48
	r=1	1.89	1.89		
France	r=0	24.77 *	18.98 *	[8]	45
	r=1	5.78	5.78		
Italy	r=0	35.50 * *	27.58 * *	[8]	45
	r=1	7.92	7.92		

Note: Johansen cointegration test results are shown. Panel (a) refers to a lag order based on SIC while the lag structure in panel (b) is determined by AIC. Trace and Maximum Eigenvalue statistics are reported for both cases. * indicates significance at 5% based on Osterwald-Lenum (1992) critical values, while ** indicates significance based on critical values by Cheung and Lai (1993).

Table 7: TSLS Common cycle Results for CEECs

	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Latvia	Poland	Romania	Slovenia	Slovak Republic
CF- coefficient	-0.37	-0.09	0.45 *	-0.26 *	0.66 *	-0.10	**0.13**	-0.10	**-0.42**	**0.00**
F-statistic	8.20 *	8.65 *	6.14 *	4.10 *	1.26	1.93	**3.77** *	0.65	**3.66** *	**1.73**

Note: The Common Feature coefficient and the F-statistic of the TSLS estimation are reported. The optimal lag length is determined by SIC. * indicates significance either of the coefficient or the F-statistic. The bold cases indicate that an error correction term was included when computing the common feature test statistic.

Table 8: TSLS Common cycle Results for EMU

	Euro Area	Euro Area (12)	Germany	France	Italy
CF- coefficient	**0.45** *	**0.47** *	**0.07**	**0.50** *	0.48 *
F-statistic	**8.09** *	**4.61** *	**4.20** *	**16.98** *	7.01 *

Note: The Common Feature coefficient and the F-statistic of the TSLS estimation are reported. The optimal lag length is determined by SIC. * indicates significance either of the coefficient or the F-statistic. The bold cases indicate that an error correction term was included when computing the common feature test statistic. While Euro Area (12) only applies to the original set of EMU countries, Euro Area includes all current EMU countries.

Table 9: GMM Common cycle Results for CEECs

	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Latvia	Poland	Romania	Slovenia	Slovak Republic
χ^2 -statistic	13.005	10.295	18.493	21.705	5.973	24.773	11.190	0.163	22.434	4.254
p-value	0.000	0.001	0.000	0.000	0.015	0.000	0.001	0.686	0.000	0.039
coefeature coefficent	0.396	0.226	-2.036	0.486	-1.324	-0.998	-0.657	0.154	0.399	-0.699
T-statistic	-1.632	-1.252	5.155	-2.745	3.815	1.854	1.911	-0.757	-0.913	0.972

Note: The χ^2 statistics with the corresponding p-values are reported. Furthermore, the coefficient in the co-feature vector and the corresponding T-statistic are presented. The optimal lag length is determined by SIC.

Table 10: GMM Common cycle Results for EMU

	Euro Area	Euro Area (12)	Germany	France	Italy
χ^2 -statistic	19.408	10.894	19.887	32.949	13.793
p-value	0.000	0.001	0.000	0.000	0.000
coefeature coefficent	-1.461	-1.426	-0.332	-1.900	-1.513
T-statistic	4.900	6.113	1.489	4.850	4.093

Note: The χ^2 statistics with the corresponding p-values are reported. Furthermore, the coefficient in the co-feature vector and the corresponding T-statistic are presented. The optimal lag length is determined by SIC. While Euro Area (12) only applies to the original set of EMU countries, Euro Area includes all current EMU countries.

5 Policy implications and scope for financial regulation

The aim of the present paper was to document credit market imperfections in Eastern Europe and to point out the likely impact on business cycles, both at the aggregate and at the sectoral level.

The results reported in this paper, furthermore, help to identify the appropriate conceptual framework in which EMU aspirant countries in Eastern Europe might want think about the question of whether or not to join the European Monetary Union (EMU). Most of the literature focusses on the traditional optimal currency area framework by Robert Mundell (1961). The OCA model (in his earlier version) would suggest that in the case of asymmetric business cycles, the flexibility of the exchange rate is needed to smooth asymmetric shocks across countries. A common monetary policy would constitute a loss in the perspective of a individual country as it reduces the set of instruments needed for stabilization.

This view is not correct, however, in the presence of strong credit market imperfections. In a boom-bust cycle model (such as Schneider and Tornell (2004)), the exchange rate will amplify, rather than smooth business cycle fluctuations. The credit market imperfections that give rise to the second type of model, include contract enforceability problems that lead to asymmetric financing opportunities across sectors and currency mismatch, as well as expected implicit bailout guarantees. Lahiri et al. (2006) have recently shown that the distinction between countries with and without severe credit market imperfections also alters the optimal monetary policy under both fixed and flexible exchange rates.

The preliminary evidence suggests that there is no uniform answer to the question whether Eastern European countries should be considered as emerging market economies with credit market imperfections that have led to boom-bust cycles and financial crisis in the past. Although most countries show remarkable similarities, others are more closed, and thus, the traditional OCA literature seems appropriate. In particular countries, where the share of foreign currency liabilities is high, might want to think about an early adoption of the Euro to safeguard against a possible depreciation of the currency. The most recent appreciation that has taken place since the end of 2008 may already be a first test for highly euroized countries.

The argument for an early Euro adoption presented in this paper is related to a literature that documents that exchange rate stability in general is good for output growth (see de Grauwe and Schnabl, 2008; Schnabl, 2007).[13] Note, however, that simply fixing the nominal exchange rate, as some countries have

[13] Furthermore, Razin and Rubinstein (2006) provide direct evidence of the effect of dollarization on growth. While their main argument of the paper is to point out that exchange rate regimes affect growth via different channels, they also

already done, is not likely to be a sufficient step to safeguard against the mechanism described above. Many countries that experienced twin banking and currency crisis had maintained a fixed exchange rate until just before the crisis occurred.

Finally, the results give rise to questions in the context of the discussion on financial regulation and the appropriate response to the current worldwide financial crisis which also affects, at least indirectly, Eastern Europe (For a discussion see Maechler et al. (2007); Tamirisa and Igan (2008)). Should the degree of foreign currency liabilities be regulated? Should the "excessive" lending be stopped or at least slowed down by speed controls in lending? From a long term perspective the answer is not obvious. First, the strong expansions of credit are not inappropriate when an economy recovers from a situation of severe underinvestment. Our results from the firm level data set suggest that there still exist substantial credit constraints, which constitute a major concern for at least a subset of firms in the economy. Secondly, the occasional crisis that have occurred in many regions, in particular in Asia and Latin America, have been associated with a higher long run per capita growth (Rancière et al., 2008). Thus, there is a trade off. A direct prevention of boom-bust cycles via capital controls, or regulations on foreign currency lending might be successful in stabilizing the business cycle. But this stabilization is at the expense of a low long term trend. Each country will need to decide based on its preferences, which of the two positions to choose.

show that after controlling for the effects of crisis dollarization does not have independent influences on growth.

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A Appendix

Table 11: Current exchange rate regimes

	Current Exchange Rate Regimes	Possible Date of Euro Adoption
Bulgaria	euro-based currency boards	no target date for adoption
Czech Republic	managed floating with the euro as reference currency	no target date for adoption, but first version of the National Euro Changeover Plan was adopted on 11 April 2007.
Estonia	ERM II (currency board with fixed peg to euro)	National Euro Adoption Plan (6th updated version) was adopted on 29 November 2007.
Hungary	float in combination with inflation targeting	National Changeover Plan in July 2008 (1st ed.) without target date for adoption
Latvia	ERM II (exchange rate fluctuation band of +/-1%)	specific target date is dropped in September 2007 (update of the National Euro Changeover Plan)
Lithuania	ERM II (currency board with fixed peg to euro)	no specific target date for the adoption, National Changeover Plan was updated in April 2007.
Poland	free float with inflation targeting	accession plan to ERM II by mid 2009, anticipated euro adoption for 2012
Romania	managed float with the euro as reference currency	target date is set for January 2014, preferred changeover via 'big bang' scenario.
Slovak Republic	member of EMU (since January 2009)	-
Slovenia	member of EMU (since January 2007)	-

Note: As of January 2009. Several countries have withdrawn preliminary target dates.
Source: Commission of the European Communities (2008); ECB (2008) and national central banks.