



# Determinants of Foreign Currency Borrowing in the New Member States of the EU

Christoph B. Rosenberg

Marcel Tirpak

(work in progress)

National Bank of Poland; May 12, 2008



# Outline

- Introduction & Motivation
- Stylized facts
- Some hypotheses
- Empirical analysis
- Estimation results
- Conclusions



# Introduction & Motivation

- *Dollarization* (in fact, *euroization*, and *swissfrancization*) of liabilities has become a familiar feature of the catching-up process in the new member states of the European Union (NMS).
- Such borrowing has drawn warnings from the IMF and others regarding the build-up of vulnerabilities in the private sector.
- A full understanding of what drives FX borrowing and what explains striking differences between the NMS still remains elusive.
- Convergence-related demand for capital seems to play a key role. However, it remains unclear how this interacts with other factors such as individual country's monetary policy, effect of EU and ERM2 membership, regulatory policies, etc.



# Introduction & Motivation (continued)

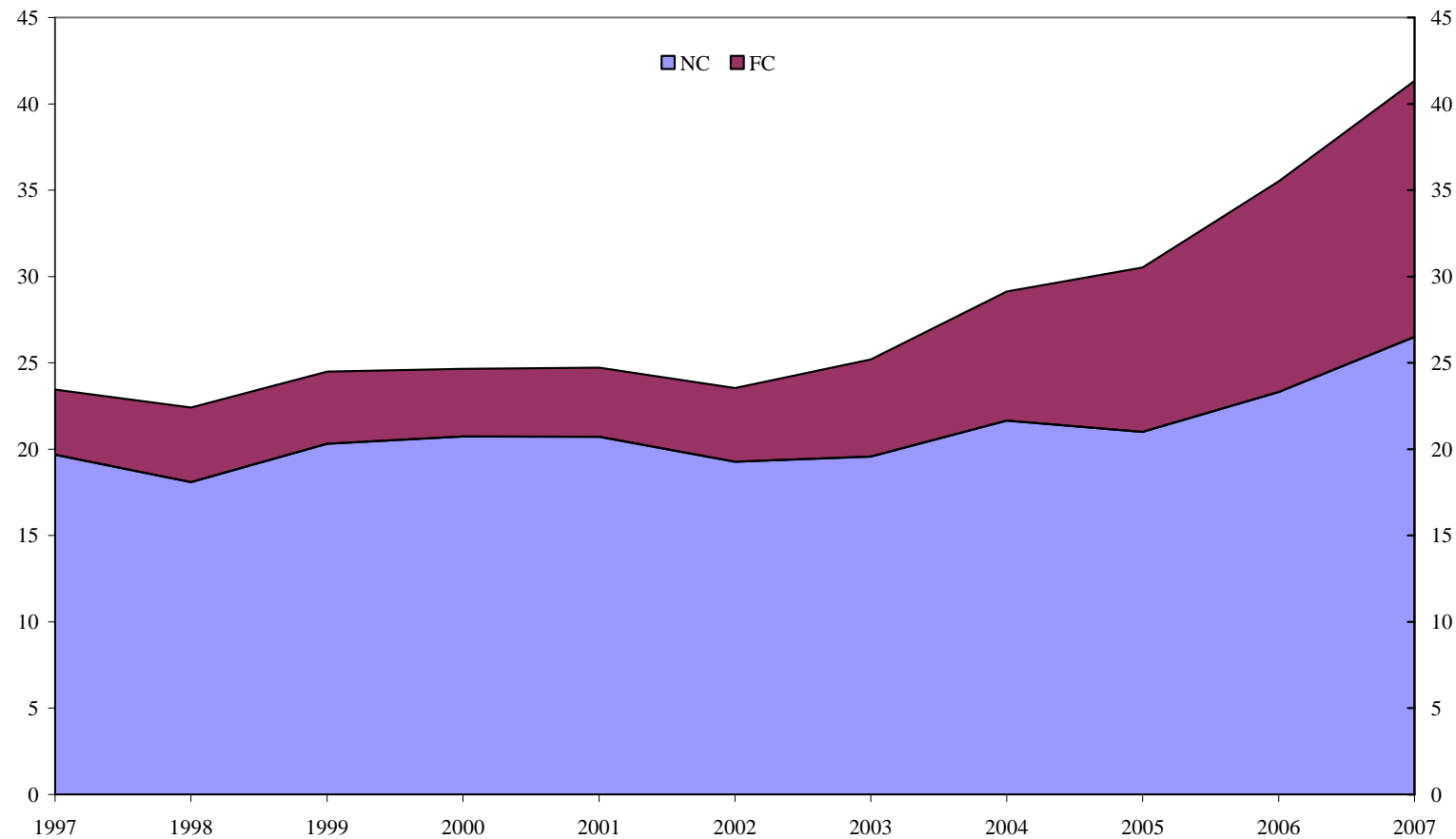
- A few recent studies investigate the determinants of FX borrowing in the NMS (e.g., Basso et al., 2007; Brown et al., 2008; and Brzoza-Brzezina et al., 2007).
- This paper intends to contribute to this literature by also testing the effects of selected policy-related variables on FX borrowing in the NMS.
- Using a newly compiled panel dataset of 9 new member states and Croatia, we focus on the change of currency composition in private sector's liabilities (i.e., between domestic and foreign currency) during 1999-2007.



# Stylized facts

Borrowing in the foreign currency has recently accelerated in the NMS,...

Chart 1. NMS: Credit to the private sector (percent of GDP)



Note: The indicator is calculated as total credit to the private sector divided by GDP for the NMS (excl. Slovenia).

All figures were previously transformed to euros.

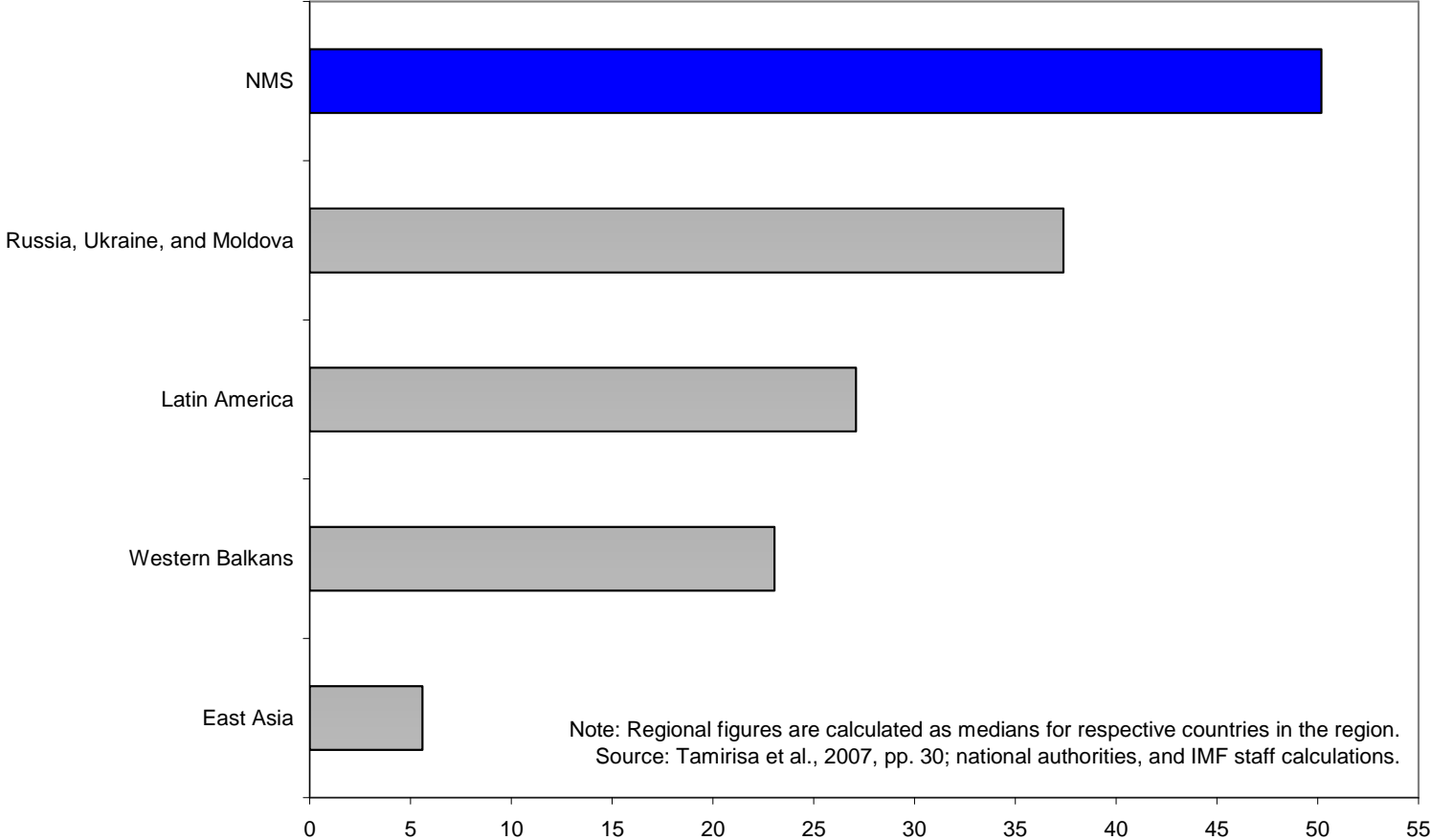
Source: National authorities, Eurostat, IMF staf calculations.



# Stylized facts (continued)

...to levels unseen in other emerging markets economies.

**Chart 2.** Emerging Markets Countries: Foreign exchange borrowing (2005, as % of total loans to the private sector)

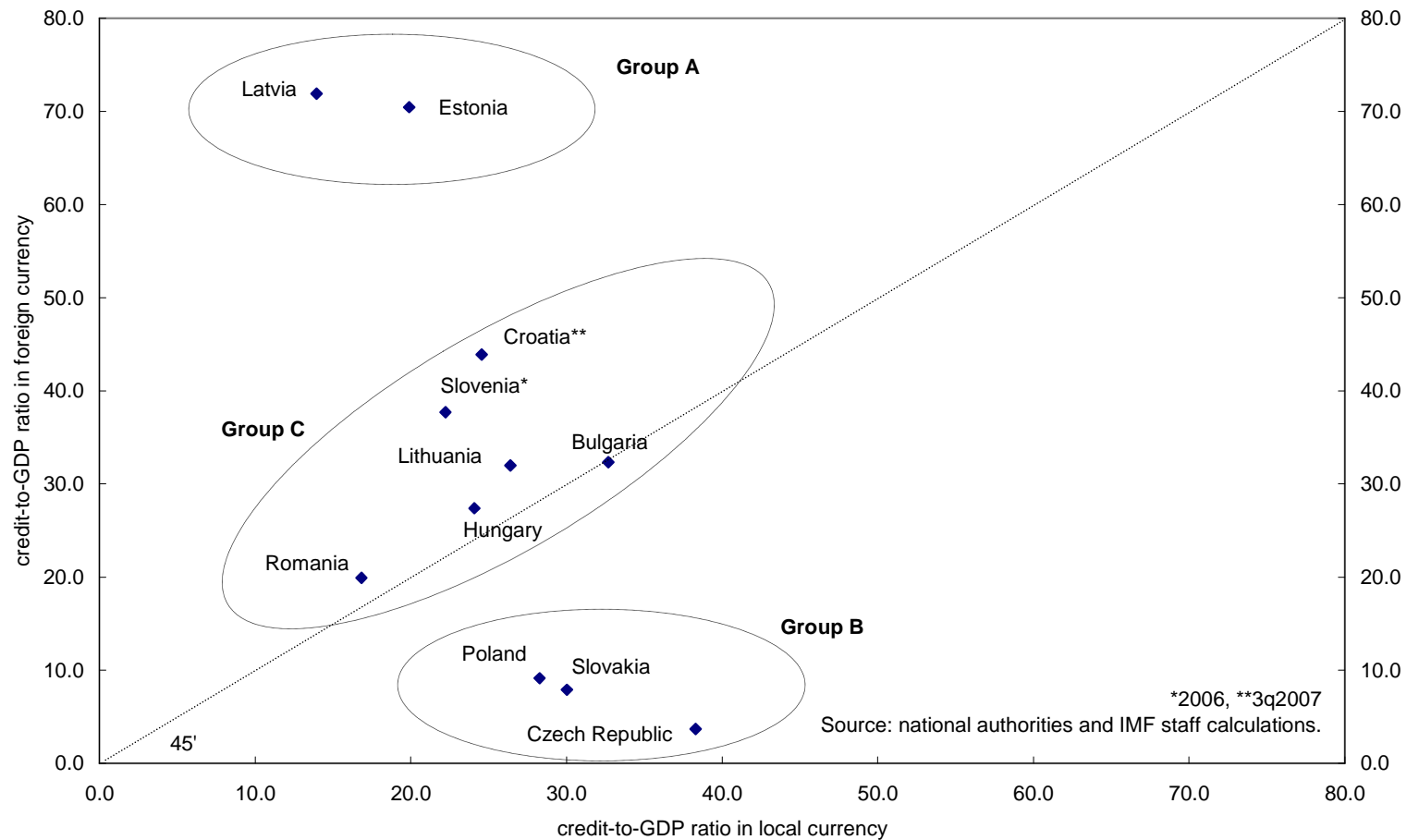




# Stylized facts (continued)

There are striking differences between the NMS.

**Chart 4.** Credit-to-GDP ratio in local currency vs foreign currency (in %, year 2007)

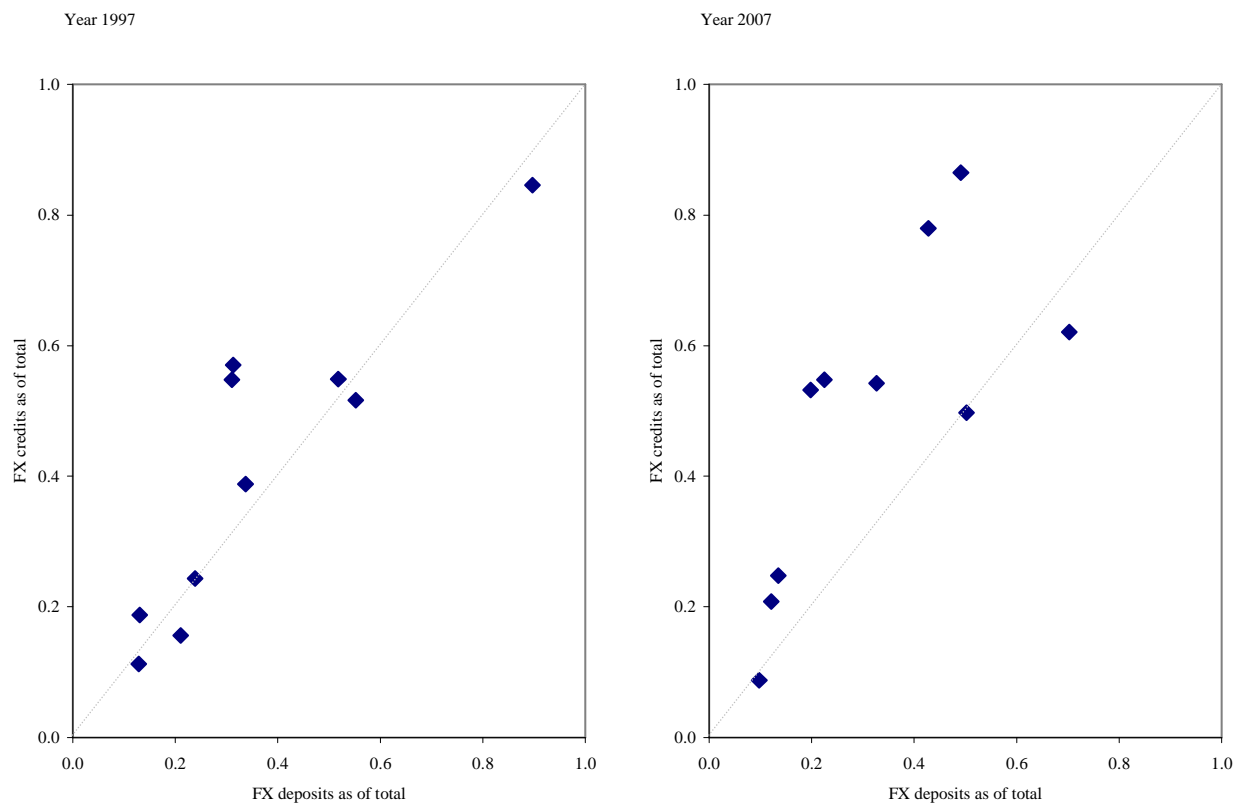




# Stylized facts (continued)

The gravity of financial dollarization has shifted in some countries, indicating a growing exchange rate risk's exposure of the private sector.

Chart 3. Financial dollarization in the NMS\*



\*Country sample: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.

Source: national authorities and IMF staff calculations.

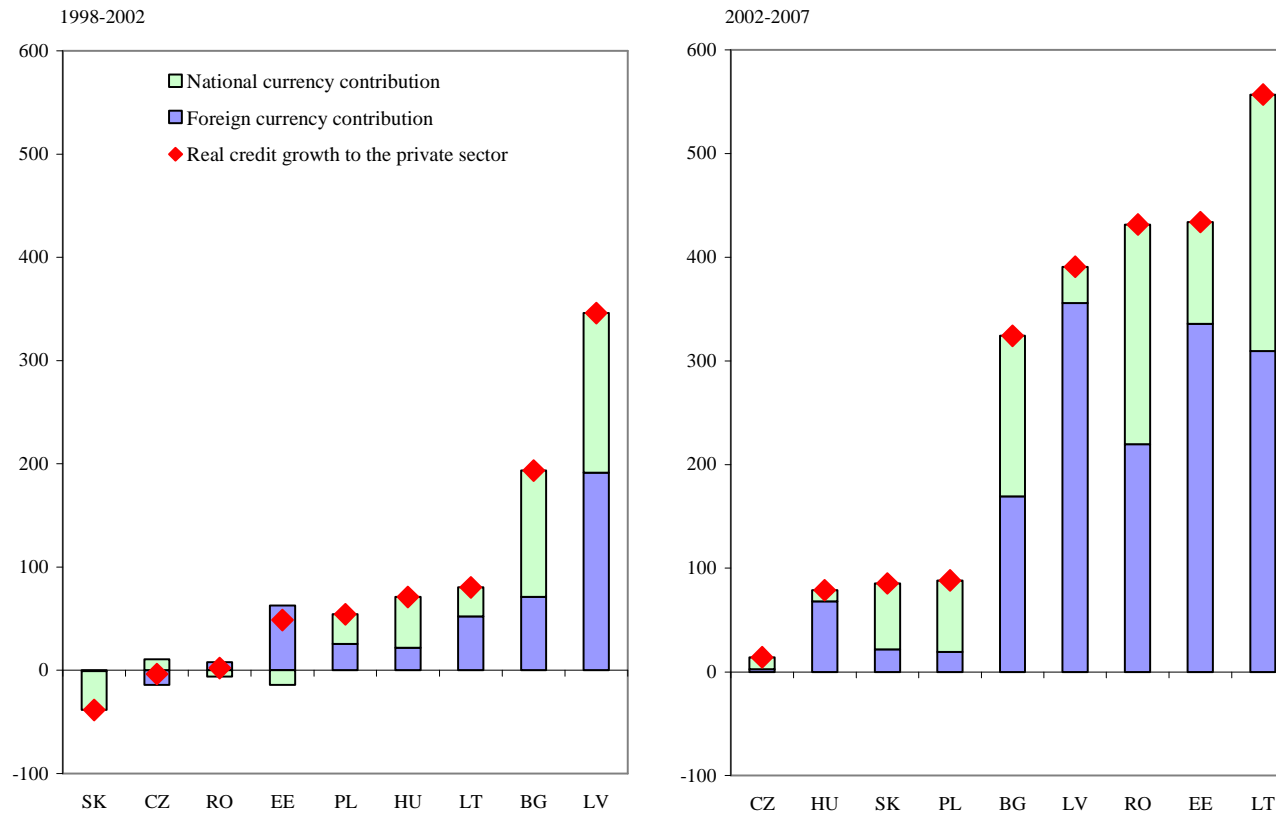




# Stylized facts (continued)

Overall credit growth and foreign exchange borrowing are closely related.

Chart 6. Contribution to real credit growth (percent)



Source: National authorities and IMF staff calculations.



# Some hypotheses

## Factors believed to contribute to FX borrowing:

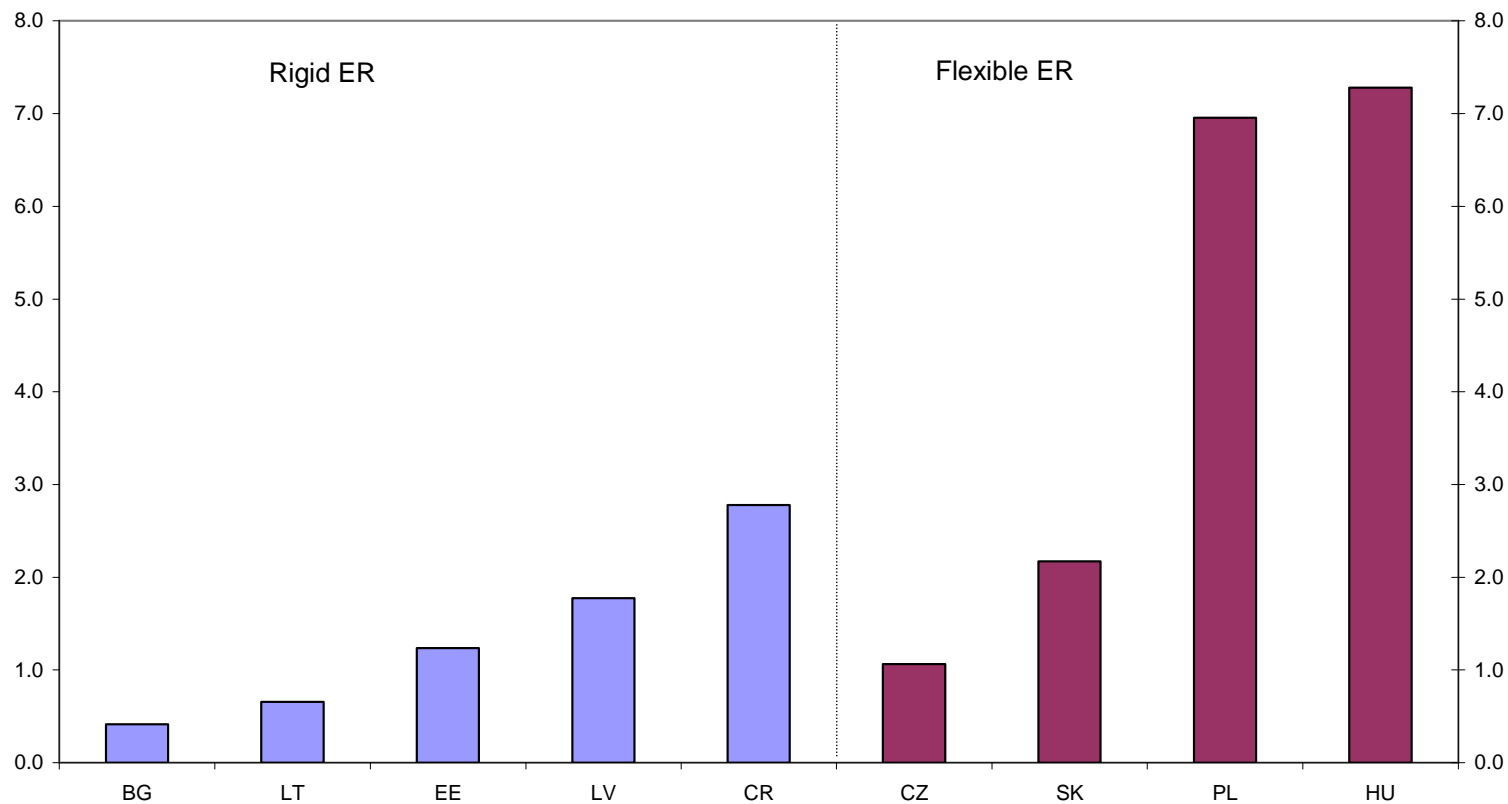
- Jeanne (2003): interest rate differential between domestic and foreign currency loans, reflecting the credibility of the currency regime.
- Backé and Wójcik (2007): fixed vs. flexible currency regimes.
- Basso et al. (2007): availability of foreign funding through the presence of foreign banks.
- Levy Yeyati (2006): imminent euro adoption.
- Countries' economic policies, especially FX regulation.



# Some hypotheses (continued)

In a country with rigid exchange rate regime, only a small increase of interest rate differential could induce a shift towards FX borrowing.

**Chart 8.** Interest rate differential vis-a-vis euro  
(in p.p., nominal interest rates, average 4q1998 - 4q2007)



\* 3-month money market rate, quarterly data. Data for BG, CR, LT, and SK are of shorter time span.

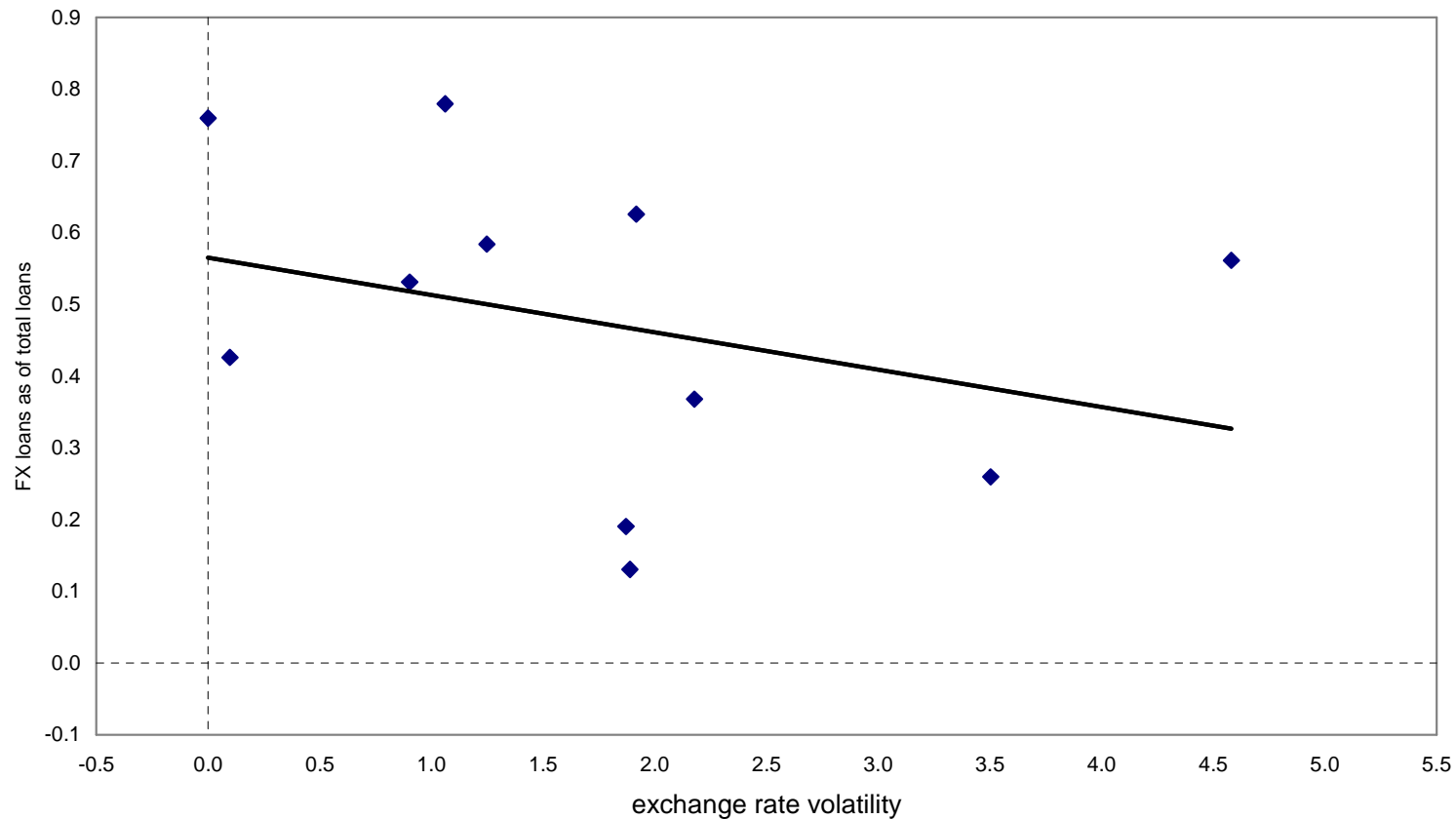
Source: Bloomberg and IMF staff calculations.



# Some hypotheses (continued)

Actual variability of the exchange rate seems to be negatively related to the foreign exchange borrowing.

Chart 13. Exchange rate volatility and foreign currency loans



Note: For both indicators we use their average value over period 2000-2007. Exchange rate volatility is calculated as standard deviation of exchange rate vis-à-vis euro divided by its average over 12 months.

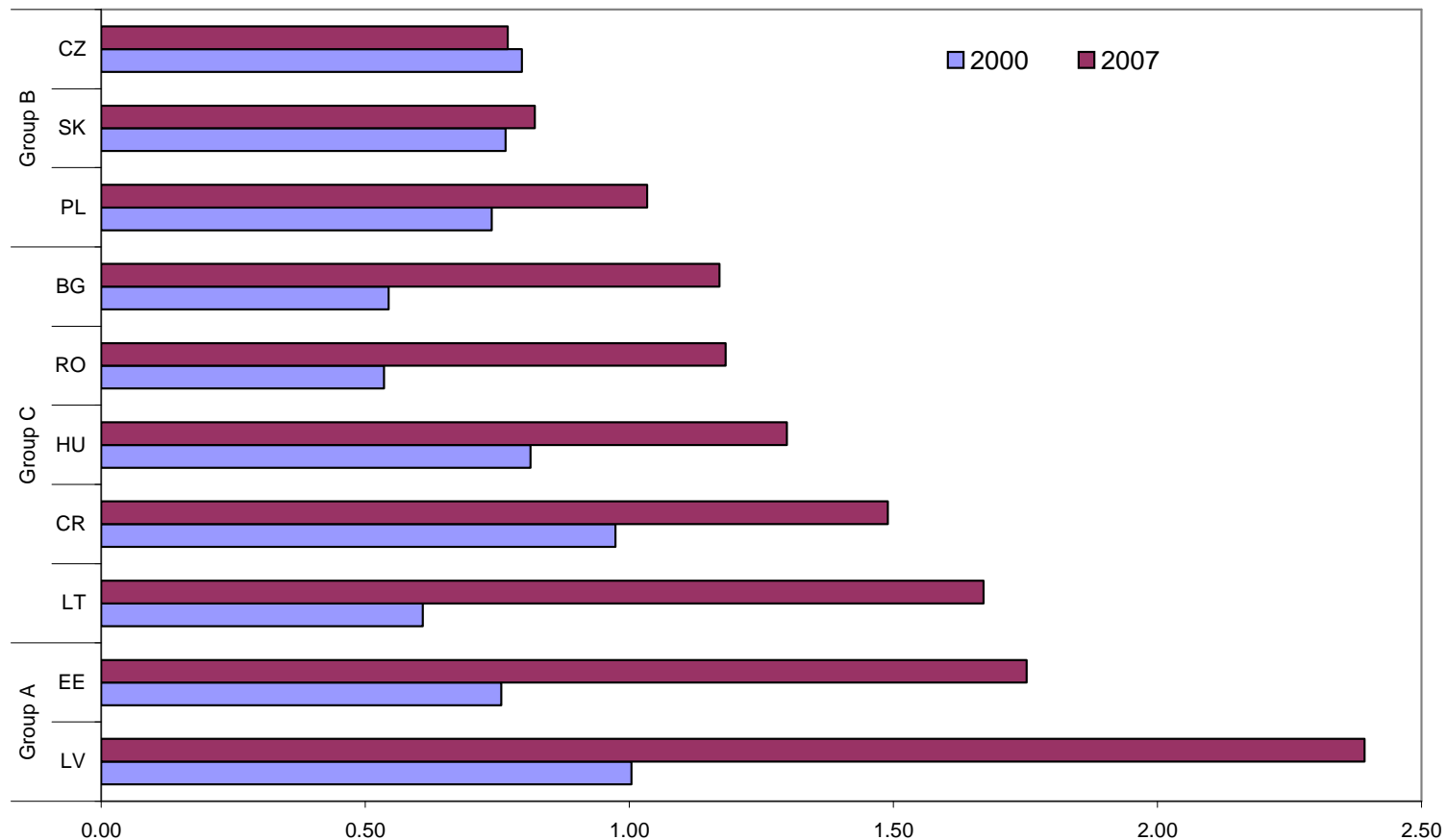
Source: national authorities, European Central Bank, and IMF staff calculations.



# Some hypotheses (continued)

As credit expands beyond the level of domestically available resources, banks attract capital from abroad.

Chart 9. Loan-to-deposit ratio in the NMS



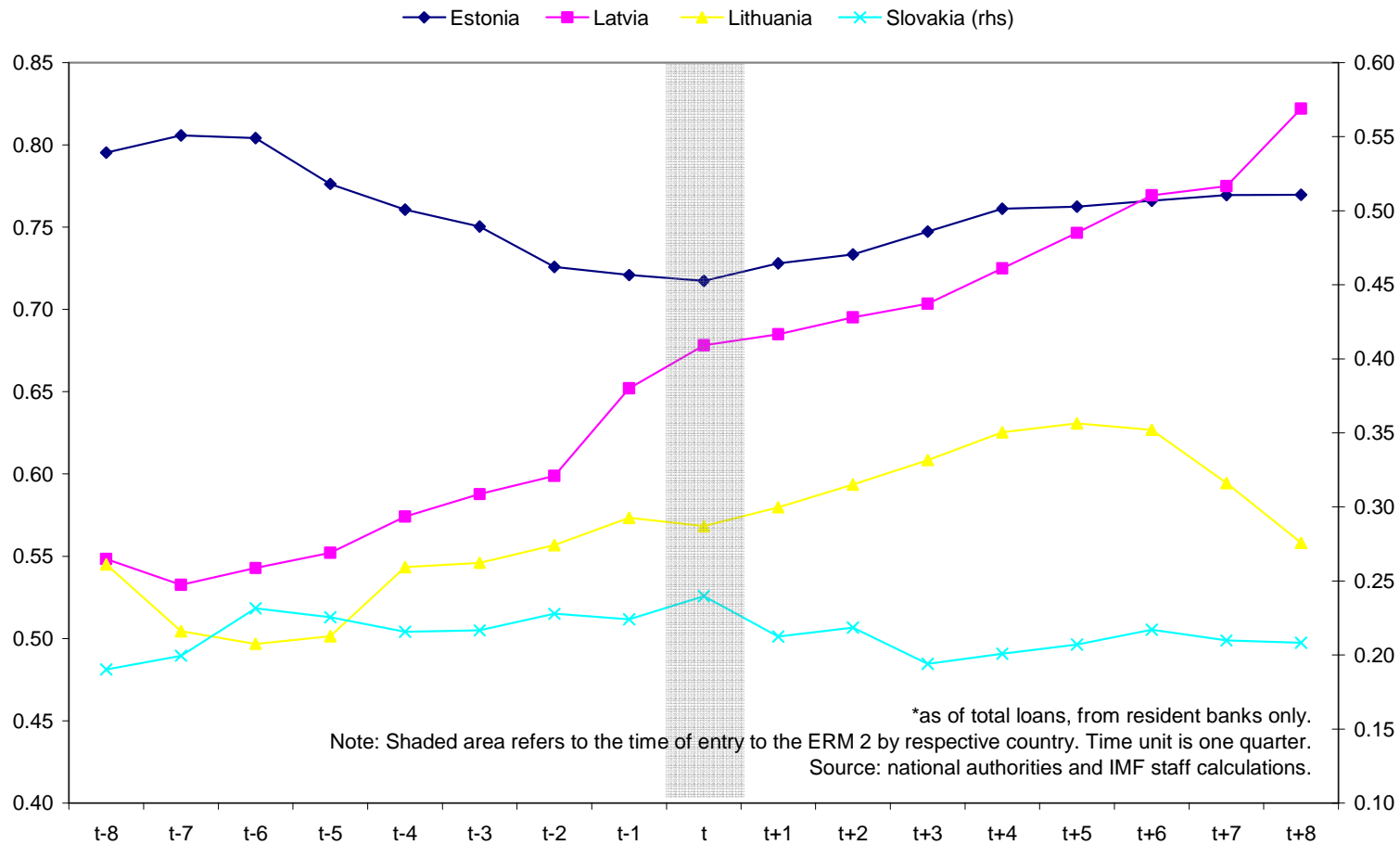
Source: national authorities and IMF staff calculations.



# Some hypotheses (continued)

ERM2 membership – an anchor for the private sector’s expectations?

Chart 10. NMS: Share of foreign exchange loans\* and ERM 2 entry





# Empirical analysis

We estimate the following equation:

$$fxloans_{i,t} = \alpha + \beta_1 irdiff_{i,t} + \beta_2 loantodep_{i,t} + \beta_3 GDPpcap_i + X_{i,t} + \varepsilon_{i,t}$$

- In addition to previously discussed variables, we use GDP per capita (in year 2000) as a proxy for the overall economic and institutional development in a country.
- Additional variables as openness, remittances, country size, exchange rate volatility, binary variables for EU and ERM2 membership, and restrictions on foreign exchange lending are also included.
- We use quarterly data during 1999-2007 for nine new member states that have not yet adopted the euro plus Croatia.
- An alternative specification of the dependent variable also includes the private sector's borrowing from abroad (i.e., cross-border loans).



# Empirical analysis (continued)

- The model is estimated with GLS with country random effects.
- The relatively high correlation between the dependent variable and loan-to-deposit ratio might suggest some endogeneity problems.
- A panel regression with credit-to-GDP ratio as an instrument and various lags of loan-to-deposit ratio did not change the results significantly.
- In order to test for the robustness of the model, we restricted our country sample excluding outliers (CR, EE, LV). The results did not change either.





# Empirical analysis (continued)

Index of regulatory measures:

$$Index_{i,t} = \sum policy_{i,t}$$

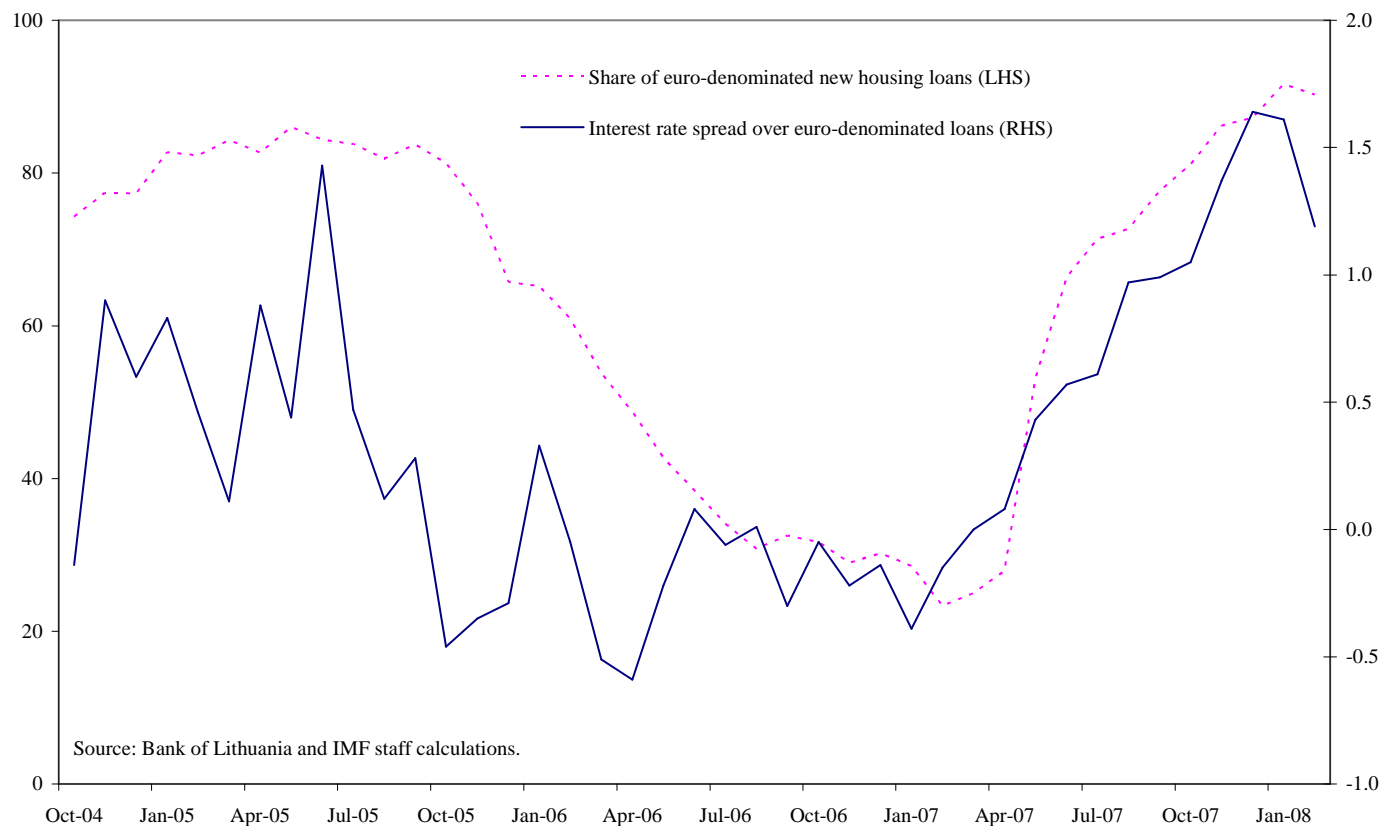
Policies to discourage foreign currency borrowing ( $policy_{i,t}$ )	Score
Monitoring FX risk	0.2
Disclosure FX risks to customers	0.4
Tightening eligibility criteria for FX borrowing	0.6
Higher risk weights/provisioning/reserve requirements depending on banks' FX exposure	0.8
Ceilings on banks' FX exposure	1.0



# Estimation results

In line with both, the literature and anecdotal evidence, we found that higher interest rate differential stimulates FX borrowing. See, for example Lithuania.

Chart 12. Lithuania: Share of foreign currency loans and interest rate differential





# Estimation results (continued)

**Table 3.** Estimation results, 1Q 1999 -- 4Q 2007

Dependent variable: Share of foreign exchange loans in total loans to private sector

	A	B	C	D	E	F	G	H	I	J
Interest rate differential	0.00139***	0.00137***	0.00139***	0.00122**	0.00146***	0.00142***	0.00134***	0.00144***	0.00036	0.00062*
st. error	0.0003	0.0003	0.0003	0.0005	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004
Loan-to-deposit ratio	0.11736***	0.11683***	0.11644***	0.12751***	0.11740***	0.10159***	0.10940***	0.10208***	0.14071***	0.16138***
st. error	0.0126	0.0125	0.0125	0.0143	0.0127	0.0158	0.0168	0.0137	0.0135	0.0148
GDP per capita in 2000		-0.94223**	-0.60318	-0.93290**	-0.41110*	-0.96020**	-0.94703*	-1.01098**	-1.14875***	-0.98126**
st. error		0.4738	0.4303	0.4010	0.2486	0.4769	0.4962	0.5022	0.4261	0.4908
<hr/>										
GDP (PPS, 2000)			-0.11965**							
st. error			0.0497							
<hr/>										
Exchange rate volatility				0.00975***						
st. error				0.0030						
<hr/>										
Exchange rate regime					-0.26600***					
st. error					0.0569					
<hr/>										
EU membership						0.01296				
st. error						0.0083				
<hr/>										
ERM 2 membership							0.00852			
st. error							0.0129			
<hr/>										
Openness								0.05975*		
st. error								0.0335		
<hr/>										
Remittances									-2.13768***	
st. error									0.3560	
<hr/>										
Restrictions (lagged)										-0.01915***
st. error										0.0037
<hr/>										
Constant	0.35336***	0.75347***	1.91544***	0.72405***	0.66045***	0.77068***	0.76138***	0.72587***	0.85633***	0.74455***
st. error	0.0563	0.2087	0.5149	0.1773	0.1004	0.2103	0.2188	0.2218	0.1878	0.2161
<hr/>										
Adj. R sq.	0.34	0.45	0.71	0.40	0.73	0.43	0.44	0.47	0.54	0.47
Observations	318	318	318	294	318	318	318	309	280	318

Note: \*, \*\*, \*\*\* refers to significance at 10%, 5%, and 1% level respectively.

Source: Authors' calculations.



## Estimation results (continued)

- As expected, the loan-to-deposit ratio positively affects FX borrowing, while lower GDP per capita suggests higher level of dollarization in a country.
- The effect of the exchange rate is ambiguous in our model. Introducing a dummy for the currency regime (based on *de jure* regime -- nil for a rigid exchange rate regime) gives us the expected (i.e., negative) sign. But using actual past volatility has the opposite sign.
- Natural hedging opportunities proxied by openness (and export) increase liability dollarization. This does not hold for remittances.



# Estimation results (continued)

**Table 3.** Estimation results, 1Q 1999 -- 4Q 2007

Dependent variable: Share of foreign exchange loans in total loans to private sector

	A	B	C	D	E	F	G	H	I	J
Interest rate differential	0.00139***	0.00137***	0.00139***	0.00122**	0.00146***	0.00142***	0.00134***	0.00144***	0.00036	0.00062*
st. error	0.0003	0.0003	0.0003	0.0005	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004
Loan-to-deposit ratio	0.11736***	0.11683***	0.11644***	0.12751***	0.11740***	0.10159***	0.10940***	0.10208***	0.14071***	0.16138***
st. error	0.0126	0.0125	0.0125	0.0143	0.0127	0.0158	0.0168	0.0137	0.0135	0.0148
GDP per capita in 2000		-0.94223**	-0.60318	-0.93290**	-0.41110*	-0.96020**	-0.94703*	-1.01098**	-1.14875***	-0.98126**
st. error		0.4738	0.4303	0.4010	0.2486	0.4769	0.4962	0.5022	0.4261	0.4908
<hr/>										
GDP (PPS, 2000)			-0.11965**							
st. error			0.0497							
Exchange rate volatility				0.00975***						
st. error				0.0030						
Exchange rate regime					-0.26600***					
st. error					0.0569					
EU membership						0.01296				
st. error						0.0083				
ERM 2 membership							0.00852			
st. error							0.0129			
Openness								0.05975*		
st. error								0.0335		
Remittances									-2.13768***	
st. error									0.3560	
Restrictions (lagged)										-0.01915***
st. error										0.0037
<hr/>										
Constant	0.35336***	0.75347***	1.91544***	0.72405***	0.66045***	0.77068***	0.76138***	0.72587***	0.85633***	0.74455***
st. error	0.0563	0.2087	0.5149	0.1773	0.1004	0.2103	0.2188	0.2218	0.1878	0.2161
<hr/>										
Adj. R sq.	0.34	0.45	0.71	0.40	0.73	0.43	0.44	0.47	0.54	0.47
Observations	318	318	318	294	318	318	318	309	280	318

Note: \*, \*\*, \*\*\* refers to significance at 10%, 5%, and 1% level respectively.

Source: Authors' calculations.



## Estimation results (continued)

- The EU entry dummy is significant only if the dependent variable includes cross-border loans. This might suggest that EU membership boosts FX borrowing mainly by providing new funding sources from abroad.
- EU membership could work also through indirect channels – i.e., increasing borrowers confidence (e.g., in the credibility of the currency regime and eventual euro adoption).
- ERM2 participation has a positive sign, but is not statistically significant.
- The effect of regulatory policies depends on the specification of the dependent variable.



# Estimation results (continued)

Table 3. Estimation results, 1Q 1999 -- 4Q 2007

Dependent variable: Share of foreign exchange loans in total loans to private sector

	A	B	C	D	E	F	G	H	I	J
Interest rate differential	0.00139***	0.00137***	0.00139***	0.00122**	0.00146***	0.00142***	0.00134***	0.00144***	0.00036	0.00062*
st. error	0.0003	0.0003	0.0003	0.0005	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004
Loan-to-deposit ratio	0.11736***	0.11683***	0.11644***	0.12751***	0.11740***	0.10159***	0.10940***	0.10208***	0.14071***	0.16138***
st. error	0.0126	0.0125	0.0125	0.0143	0.0127	0.0158	0.0168	0.0137	0.0135	0.0148
GDP per capita in 2000		-0.94223**	-0.60318	-0.93290**	-0.41110*	-0.96020**	-0.94703*	-1.01098**	-1.14875***	-0.98126**
st. error		0.4738	0.4303	0.4010	0.2486	0.4769	0.4962	0.5022	0.4261	0.4908
<hr/>										
GDP (PPS, 2000)			-0.11965**							
st. error			0.0497							
Exchange rate volatility				0.00975***						
st. error				0.0030						
Exchange rate regime					-0.26600***					
st. error					0.0569					
EU membership						0.01296				
st. error						0.0083				
ERM 2 membership							0.00852			
st. error							0.0129			
Openness								0.05975*		
st. error								0.0335		
Remittances									-2.13768***	
st. error									0.3560	
Restrictions (lagged)										-0.01915***
st. error										0.0037
<hr/>										
Constant	0.35336***	0.75347***	1.91544***	0.72405***	0.66045***	0.77068***	0.76138***	0.72587***	0.85633***	0.74455***
st. error	0.0563	0.2087	0.5149	0.1773	0.1004	0.2103	0.2188	0.2218	0.1878	0.2161
Adj. R sq.	0.34	0.45	0.71	0.40	0.73	0.43	0.44	0.47	0.54	0.47
Observations	318	318	318	294	318	318	318	309	280	318

Note: \*, \*\*, \*\*\* refers to significance at 10%, 5%, and 1% level respectively.

Source: Authors' calculations.



# Estimation results (continued)

Table 4. Estimation results, 1Q 1999 -- 4Q 2007

Dependent variable: Share of foreign exchange loans in total loans to private sector (incl. cross-border loans)

Country sample -- Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.

	A	B	C	D	E	F	G	H	I	J
Interest rate differential	0.00136***	0.00134***	0.00136***	0.00134***	0.00144***	0.00141***	0.00129***	0.00183***	0.00035	0.00110***
st. error	0.0003	0.0003	0.0003	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Loan-to-deposit ratio	0.06760***	0.06703***	0.06669***	0.09079***	0.06789***	0.04268***	0.05371***	0.04798***	0.09969***	0.08218***
st. error	0.0123	0.0123	0.0122	0.0140	0.0126	0.0153	0.0162	0.0125	0.0127	0.0148
GDP per capita in 2000		-0.85126*	-0.57142	-0.81994**	-0.41457*	-0.88024**	-0.85951*	-1.00306**	-1.06471***	-0.86345*
st. error		0.4383	0.4019	0.3576	0.2162	0.4407	0.4624	0.4635	0.4008	0.4433
<hr/>										
GDP (PPS, 2000)			-0.09874**							
st. error			0.0464							
<hr/>										
Exchange rate volatility				0.00988***						
st. error				0.0028						
<hr/>										
Exchange rate regime					-0.21842***					
st. error					0.0495					
<hr/>										
EU membership						0.02028***				
st. error						0.0077				
<hr/>										
ERM 2 membership							0.01498			
st. error							0.0121			
<hr/>										
Openness								0.15103***		
st. error								0.0305		
<hr/>										
Remittances									-2.27595***	
st. error									0.3343	
<hr/>										
Restrictions (lagged)										-0.00666*
st. error										0.0037
<hr/>										
Constant	0.48416***	0.84572***	1.80458***	0.79384***	0.76864***	0.87365***	0.85975***	0.74849***	0.94544***	0.84214***
st. error	0.0514	0.1931	0.4809	0.1583	0.0876	0.1944	0.2039	0.2047	0.1767	0.1953
<hr/>										
Adj. R sq.	0.27	0.41	0.65	0.36	0.66	0.38	0.40	0.46	0.54	0.42
Observations	309	309	309	285	309	309	309	308	280	309

Note: \*, \*\*, \*\*\* refers to significance at 10%, 5%, and 1% level respectively.

Source: Authors' calculations.





# Conclusions

- *Dollarization* is a byproduct of convergence.
- EU membership boosts foreign exchange borrowing through multiple channels:
  - it offers better access to foreign funds in a fully liberalized environment of capital flows,
  - it provides natural hedging opportunities, through increasing trade openness,
  - it may boost private sector's confidence in exchange rate stability and imminent euro adoption.



# Conclusions (continued)

- Regulatory measures have limited effectiveness due to opportunities to borrow directly from abroad (i.e., for corporations).
- Policy focus:
  - close cooperation between supervisors in home and host countries,
  - increase trade openness,
  - enhance national savings,
  - euro adoption.



Questions, Suggestions?

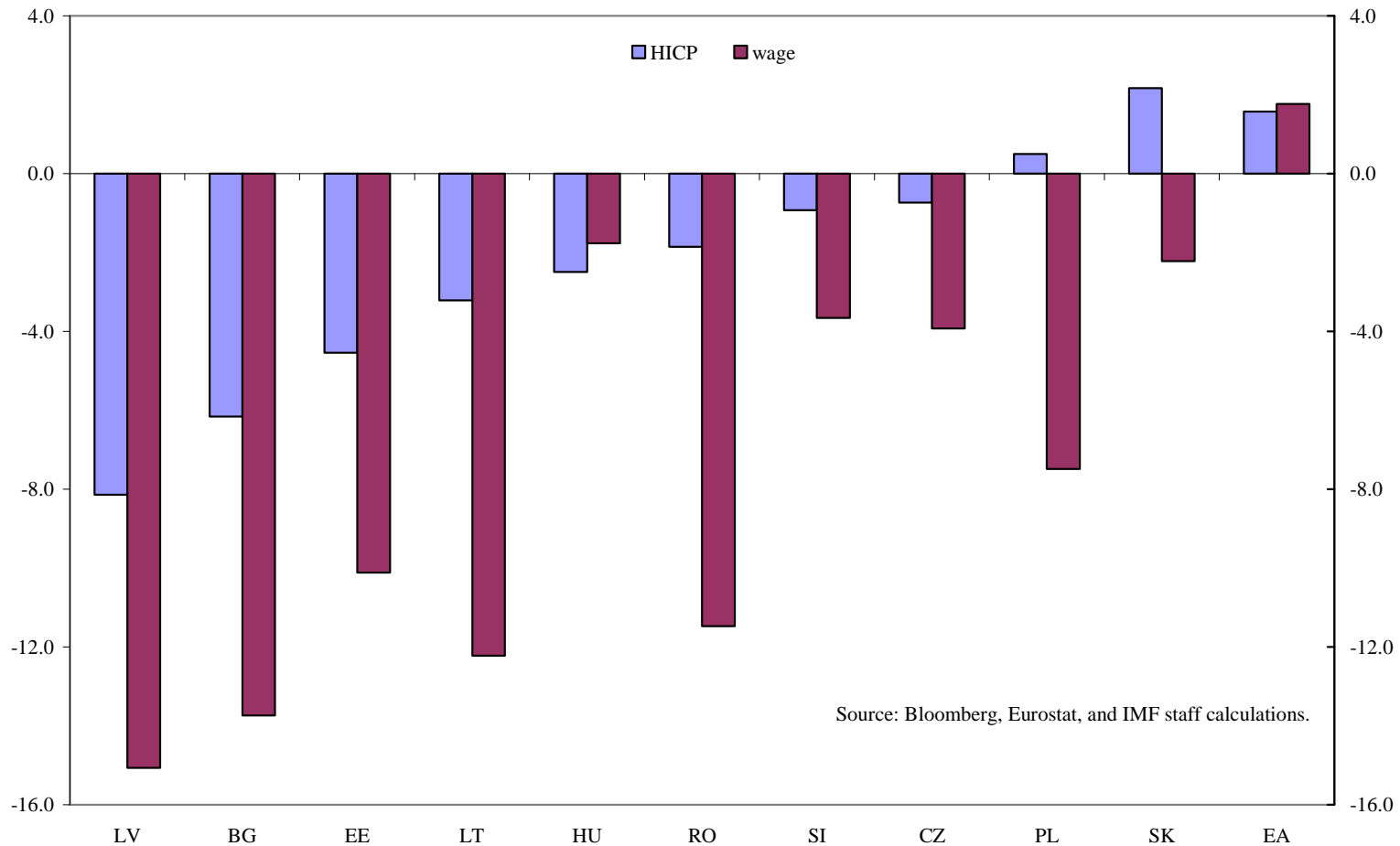
Thank you



# Stylized facts (extra)

FX borrowing is fueled by the presence of highly negative interest rates.

Chart 7. Eurozone nominal interest rate (3M money market rate) deflated by domestic inflation and wage growth (in %, 2007Q4)



Source: Bloomberg, Eurostat, and IMF staff calculations.