NÁRODNÁ BANKA SLOVENSKA
EUROSYSTÉM

Did quantitative easing boost bank lending? Slovak experience.

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Monetary Policy Challenges from a Small Country Perspective
November 24, 2016

Slovak banking sector

Characteristics:

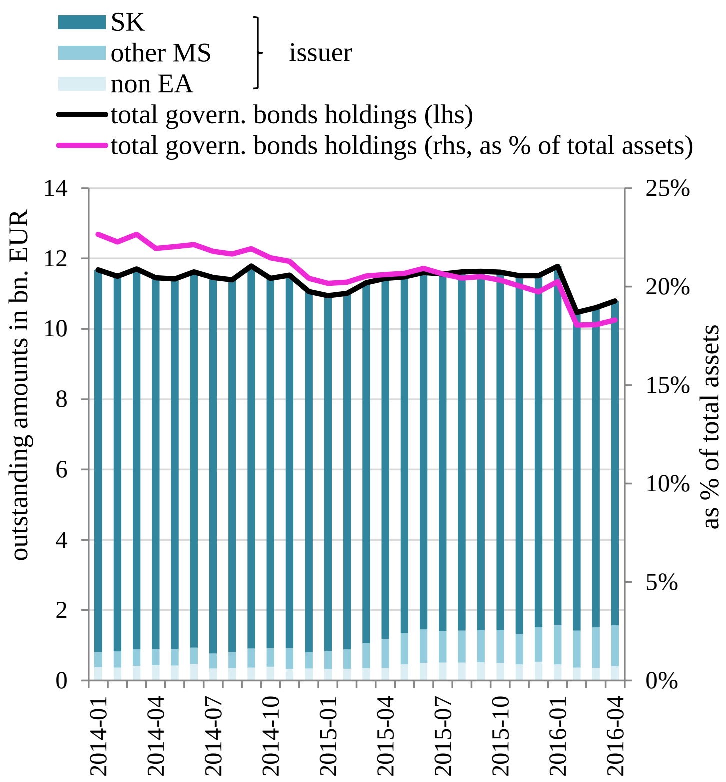
- **13 Slovak banks** and **13 branches** of foreign banks located in Slovakia;
- The **balance sheet size** of these 26 banks amount to above **€70 billion**;
- Slovak banks mostly hold **domestic government bonds** #1;
- Slovak banks’ domestic government holdings are **highest** among the euro area countries #2;
- Slovak banks retain bulk of the **government portfolio till maturity** #3.

Stylized fact #1

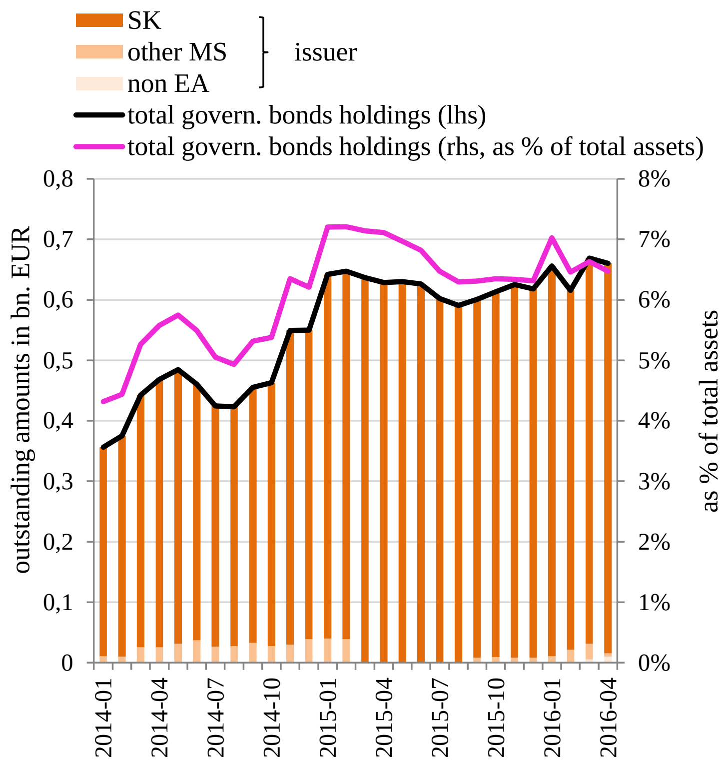
Slovak MFIs mostly hold **domestic government bonds** and these holdings are **much higher for Slovak banks** than for foreign branches

MFIs government bonds holdings broken down by issuer
(lhs: outstanding amounts in bn. EUR, rhs: % of total assets)

Slovak banks



Branches of foreign banks located in Slovakia



Source: NBS.

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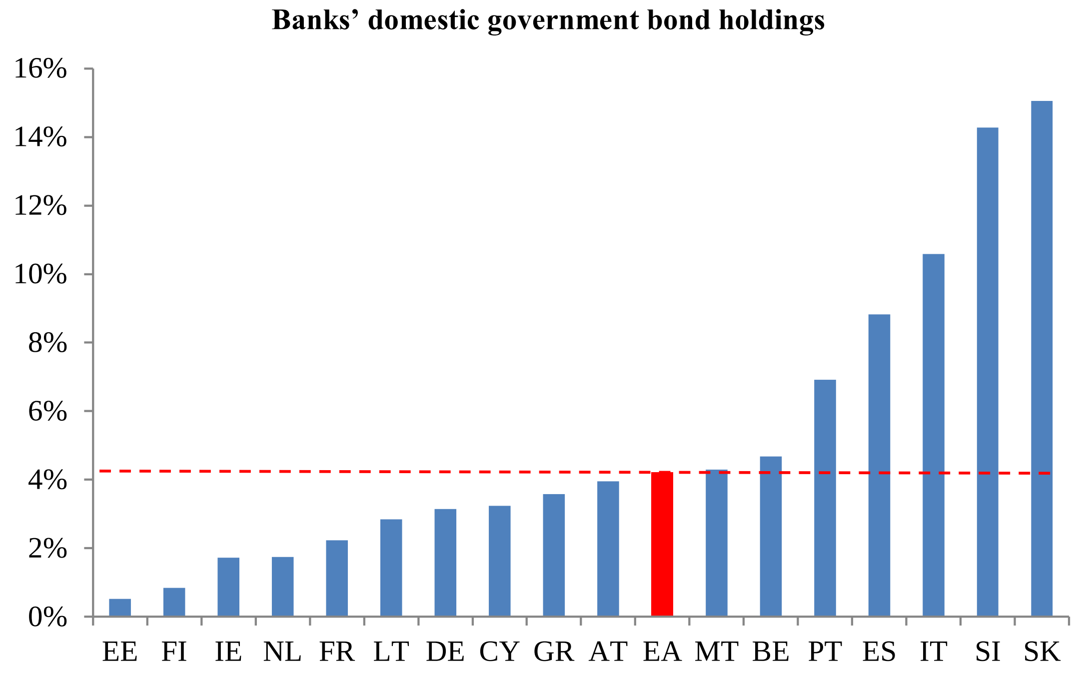
Note: NBS monthly report V86 contains data on issuer, maturity, ISIN code, type of portfolio (HTM, AFS, HFT) etc.

Stylized fact #2

International comparison:
Slovak banks' domestic government holdings are **highest** among the euro area countries



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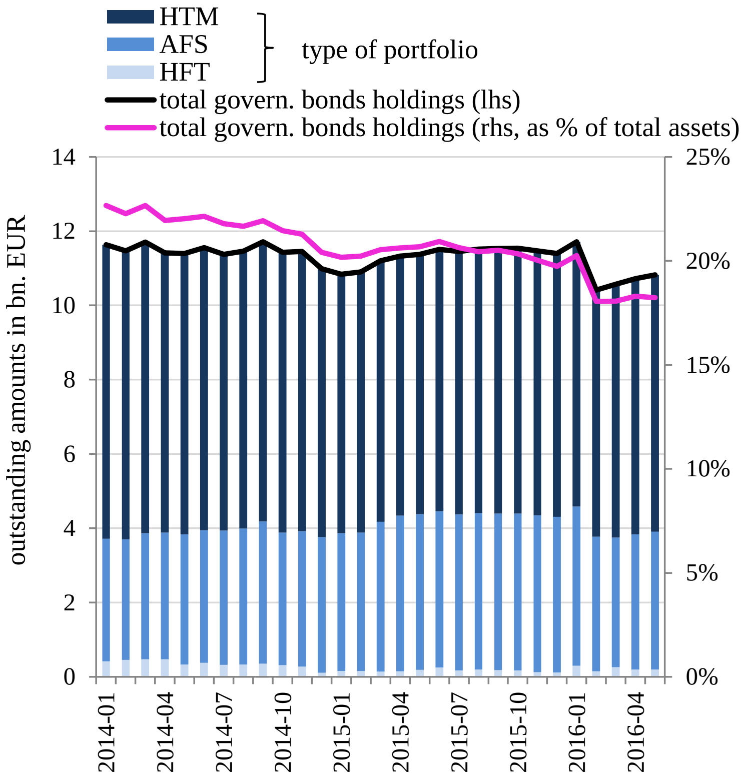
Note: Domestic government bond portfolio measured as percentage of total banks' assets. Average figures over the QE implementation period.

Stylized fact #3

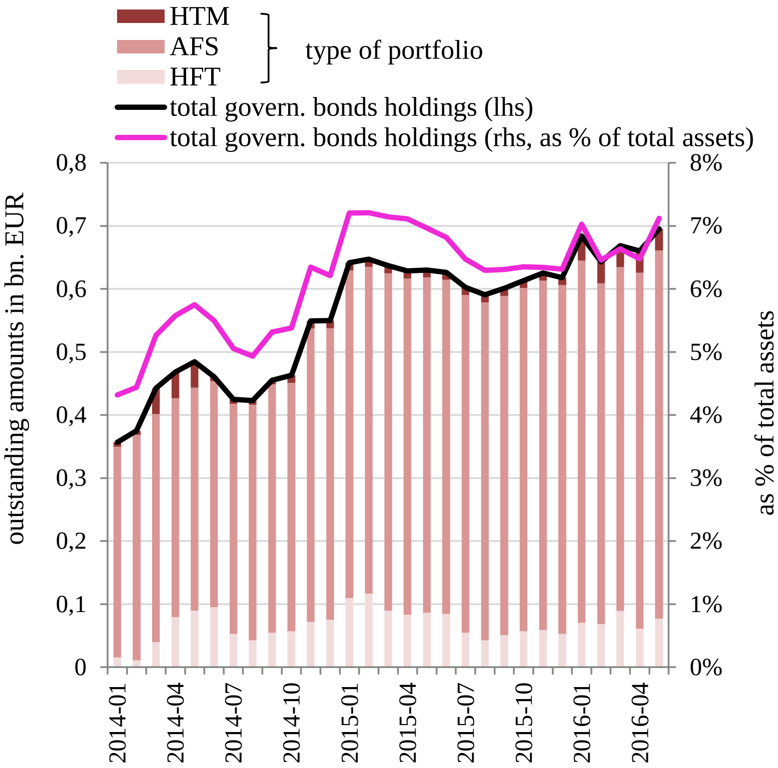
Slovak banks retain bulk of the **government portfolio till maturity**, while foreign branches keep it **available for sale**

MFIs government bonds holdings
(lhs: outstanding amounts in bn. EUR, rhs: % of total assets)

Slovak banks



Branches of foreign banks located in Slovakia



Source: NBS. Note: HTM stands for 'hold to maturity', AFS for 'available for sale' and HFT for 'hold for trade'.

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Note: NBS monthly report V86 contains data on issuer, maturity, ISIN code, type of portfolio (HTM, AFS, HFT) etc.

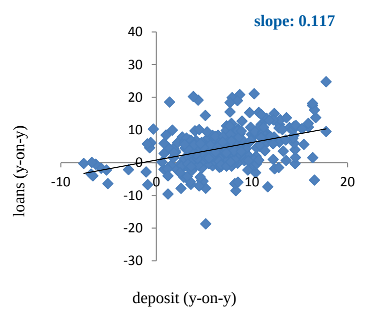
Some facts about QE

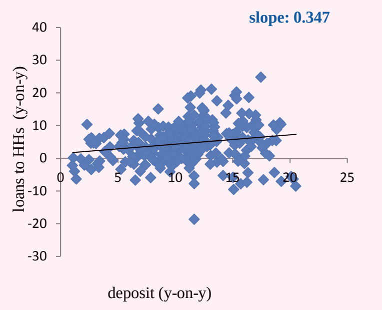
- This PSPP is coordinated by the ECB, but conducted in a **decentralised fashion** by respective national central bank;
- Since the start of the programme, the NBS has purchased in cumulative terms **€7.7 billion** of Slovak government bonds which compares to **7.8% of national GDP**;
- Vast majority of Slovak government debt is held by **non-residents (foreign banks)** and **Slovak banks** and minority by insurance corporations and pension funds;
- **Empirical evidence of BLC** found in Altavilla et al. (2015) for EA, Joyce and Spaltro (2014) for UK, Di Maggio et al. (2016) and Ippolito et al. (2016) for US
- **Self-reported evidence from Bank Lending Survey**: Slovak banks indicated they have used the funds arising from the PSPP to support their credit supply to households and non-financial corporations

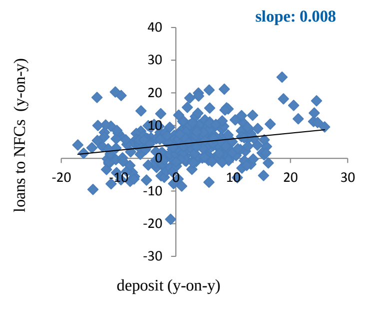
Relationship between loans and deposits
Top 4 banks in Slovakia

Total	Households	Non-financial corporations

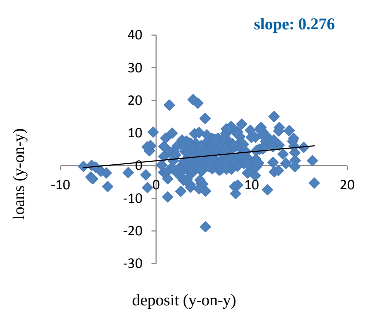
Whole period: 2009-01 to 2016-06

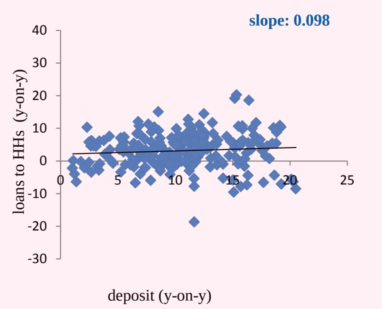


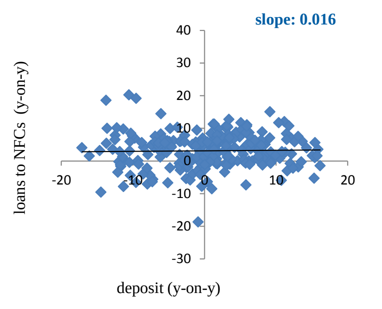




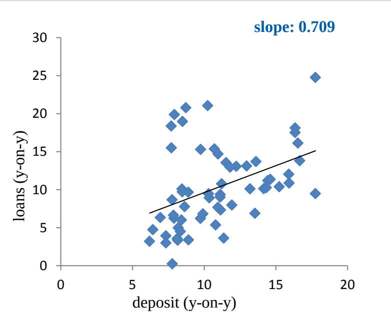
Before QE announcement

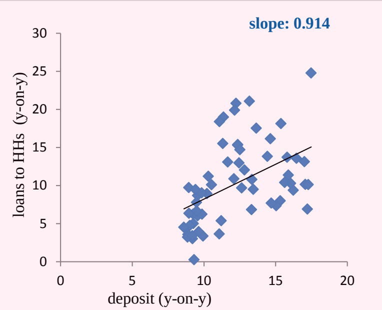


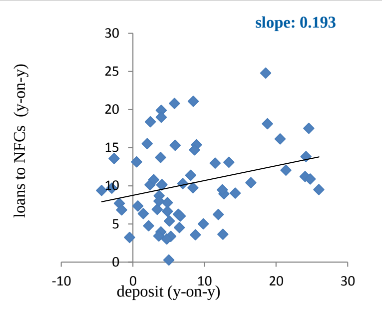




After QE announcement







Note: Top 4 banks cover almost 70% of the total banking sector in Slovakia.

Empirical approach

- **Methodology** originally proposed by Kashyap and Stein (1994)
- **Pooled Mean Group (PMG) estimation** (developed by Pesaran et al., 1999):
  - Panel data version of error-correction model;
  - LR coefficients to be **same** and ST coefficients and error variances **differ** across cross-sections;

Estimation equation:

$$\Delta l_{i,t} = \alpha_i + \phi_i \underbrace{\left(l_{i,t-1} - \theta x_{i,t-1}\right)}_{\text{Long-run relationship}} + \underbrace{\sum_{j=1}^{p-1} \gamma_{i,t}\, \Delta l_{i,t-j} + \sum_{j=0}^{q-1} \delta_{i,t}\, \Delta x_{i,t-j}}_{\text{Short-term dynamics}} + \varepsilon_{i,t}$$

Bank specific ER coefficient

Long-term coefficient

where l is annual lending growth for bank i in period t

x is a vector of individual bank variables: DR - changes in the deposit ratio (Dep/Total Assets)

CR - changes in the capital ratio (Cap/RWAs)

Data

The panel dataset:

- Individual bank-level data on **26 financial institutions** active in Slovak lending market **from January 2009 until mid-2016** (= 2340 obs.);
- Sample includes **13 Slovak banks** and **13 branches** of foreign banks located in Slovakia;
- The balance sheet size of these 26 banks amount to above €70 billion, with **deposits** accounting to more than **70%** of total liabilities and **loans** to around **65%** of total assets;
- Financial entities are on a **consolidated level** as we assume that lending decisions are taken on a group-level;
- Empirical studies for EA include **only 3 SIs** in Slovakia (do not have full representation of the Slovak banking sector)

Results #1: Existence of BLC

- There is a **positive** and **significant long-run** link between bank lending and changes in deposit ratio for non-financial private sector
- Long-run effect is almost **twice stronger for HH sector** than for NFCs

Table: Lending growth estimation results for full sample

Sectoral break-down	Lending growth			
	to households (HHs)	to non-financial corporations (NFCs)	to insurance corporation and pension funds (ICPFs)	total
Long run				
Change in Deposit ratio (DR)	0,441***	0,266**	-0,21	0,164*
	(0,113)	(0,113)	(0,303)	(0,098)
Error correction	-0,08***	-0,141***	-0,168***	-0,067***
	(0,013)	(0,042)	(0,046)	(0,022)
Model selection	ARDL (3,1)	ARDL (1,1)	ARDL (3,1)	ARDL (3,1)
RMSE	0,268	0,706	0,505	0,223

Note: RMSE is the root mean squared error. Standard errors are shown in parentheses and ***, ** and * denote significance at the 1%, 5% and 10% level.

Results #2: Existence of BLC, even if we control for policy rate cut

- **Question: Did policy rate deduction cause boost in lending?**
- **Results remain valid** if we include short-term interest rates
- **Magnitudes** of long-run link stay **robust**

Table: Lending growth estimation results if we control for policy rate cut

Sectoral break-down	Lending growth			
	to households (HHs)	to non-financial corporations (NFCs)	to insurance corporation and pension funds (ICPFs)	total
Long run				
Change in Deposit ratio (DR)	0,556***	0,214*	-0,216	0,229**
	(0,093)	(0,095)	(0,251)	(0,098)
Error correction	-0,089***	-0,173***	-0,264***	-0,111***
	(0,025)	(0,048)	(0,037)	(0,038)
Short-term dynamics				
ΔComposite lending rate	-0,099***	0,033	-0,017	-0,106***
	(0,024)	(0,107)	(0,064)	(0,017)
Model selection	ARDL (3,3)	ARDL (1,1)	ARDL (3,1)	ARDL (3,1)
RMSE	0,351	0,725	0,496	0,240

Note: The two dummy variables included in estimation are (i) QE dummy which has 0 before the QE implementation phase and 1 after, and (ii) legislation dummy which has value 0 before March 2016 and 1 till the end of sample.

Results #3: Existence of BLC, even we include micro-pru variables

- If we include **capital ratio** (capital T1 and T2 over risk weighted assets), there is a long-run relationship **only for household sector and total loans**;
- Changes in capital ratio have a statistically **significant and negative impact** on lending growth

Table: Lending growth estimation results if we include micro-prudential variable

Sectoral break-down	Lending growth			
	to households (HHs)	to non-financial corporations (NFCs)	to insurance corporation and pension funds (ICPFs)	total
Long run				
Change in Deposit ratio (DR)	0,508***	0,125	-0,072	0,157*
	(0,127)	(0,086)	(0,246)	(0,082)
Change in Capital ratio (CR)	-0,141***	0,182	-0,183*	-0,159***
	(0,026)	(0,110)	(0,070)	(0,024)
Error correction	-0,081***	-0,131***	-0,303***	-0,18***
	(0,019)	(0,042)	(0,058)	(0,059)
Short-term dynamics				
$\triangle$Composite lending rate	-0,104***	0,037	0,049	-0,095***
	(0,024)	(0,101)	(0,158)	(0,022)
Model selection	ARDL (3,1,1)	ARDL (3,3,3)	ARDL (3,1,1)	ARDL (4,4,4)
RMSE	0,252	0,294	0,498	0,260

Note: The two dummy variables included in estimation are (i) QE dummy which has 0 before the QE implementation phase and 1 after, and (ii) legislation dummy which has value 0 before March 2016 and 1 till the end of sample.

Results #4: Impact of QE on lending

- **Question: Did quantitative easing boost bank lending?**
- There is a **significant positive long-run link** if we include individual banks sales of SK government bonds (proxy for QE purchases) **only for the household sector**

Table: Lending growth estimation results if we include proxy for QE purchases

Sectoral break-down	Lending growth			
	to households (HHs)	to non-financial corporations (NFCs)	to insurance corporation and pension funds (ICPFs)	total
Long run				
Change in Deposit ratio (DR)	0,446***	0,042***	0,022***	0,046***
	(0,065)	(0,013)	(0,032)	(0,005)
Change in SK govies	0,031***	-0,011	0,084	0,002
	(0,007)	(0,008)	(0,053)	(0,001)
Error correction	-0,151*	-0,262***	0,266***	-0,129
	(0,079)	(0,097)	(0,080)	(0,092)
Short-term dynamics				
ΔComposite lending rate	-0,005	-0,061	0,048	-0,211**
	(0,092)	(0,162)	(0,048)	(0,080)
Model selection	ARDL (2,1,1,1)	ARDL (2,2,2,2)	ARDL (3,1,1,1)	ARDL (2,2,2,2)
RMSE	0,160	0,165	0,559	0,140

Note: The two dummy variables included in estimation are (i) QE dummy which has 0 before the QE implementation phase and 1 after, and (ii) legislation dummy which has value 0 before March 2016 and 1 till the end of sample.

Our findings

- We establish and confirm a **traditional relationship between bank lending and deposit growth**;
- We find the long-run relationship to be **twice as strong in household sector** than in the sector of non-financial corporations;
- Even if we **control for the policy rate cut**, the long-run relationship still exists;
- We document some, although **limited evidence that households in Slovakia do benefit from the ECB asset purchase program**;
- This is an **early assessment** of the local impact of the programme.

Thank you