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THE SLOVAK REPUBLIC

SELECTED ISSUES PAPER

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SLOVAK REPUBLIC

SELECTED ISSUES

December 22, 2015

Approved By
European Department

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SHOULD THE FISCAL RESPONSIBILITY ACT BE REFORMED?[1]

A. Introduction

1. To strengthen the credibility of budget goals, the Slovak Republic adopted a Fiscal Responsibility Act (FRA) in December 2011. The FRA came into effect on March 1, 2012. The FRA includes rules and procedures relating to three budget principles: discipline, accountability, and transparency. The FRA overlaps with and tightens the EU fiscal governance framework in some aspects (e.g., debt limits and correction mechanisms).

2. Since the inception of the FRA, public debt has moved rapidly into "red-flag" territory. Although sizeable fiscal adjustments were undertaken during this period, debt rose due to a prolonged period of weak growth following the 2009 crisis. The triggering of a spending freeze in 2014 appeared likely but was avoided thanks to an upward revision of nominal GDP subsequent to ESA 2010 implementation. Had the spending freeze taken effect, it would have implied pro-cyclical tightening despite the absence of market pressure.

3. Experience so far provides an opportunity to consider whether some aspects of the FRA would benefit from refinement. It is also noteworthy that since the introduction of the FRA, the EU fiscal governance framework has evolved substantially. The result is a rather complicated combination of fiscal rules and limits that could reasonably lead to questions about the need for a separate domestic framework.

4. The note is structured as follows. Section B provides a brief overview of the main features of the FRA. Section C investigates whether the FRA meets certain established international norms for these types of rules. Section D comments on the suitability of the particular debt brake levels established in the Act (as distinct from the presence of a debt brake at all). Section E analyzes some definitional aspects of the debt indicator. Section F discusses whether debt brakes should be defined on a net basis. Section G concludes and summarizes a few recommendations.

B. Main features of the Fiscal Responsibility Act

5. The FRA includes rules and procedures relating to three budget principles: discipline, accountability, and transparency.

[1] Prepared by A. Giustiniani.

Discipline

6. The FRA sets specific debt ceilings and defines a set of adjustment measures to be implemented when debt thresholds are breached (Art. 5, paras. 4 to 8) (see text table). In applying those measures, all the entities included in the general government are expected to align their respective budget proposals with the general government budget proposal presented by the government (Art. 5, para. 9).

7. The FRA debt brakes are set to decline over time. Until 2018, the FRA sets the initial debt limit at 50 percent of GDP with a "tolerance" band up to 55 percent of GDP at which point more serious corrective mechanisms kick in. Starting in 2018, the debt ceilings will be gradually reduced by one percentage point of GDP each year until 2027, when the first threshold will be equal to 40 percent of GDP.

The Fiscal Responsibility Act

Debt level 1/ (in percent of GDP)		Action
until 2017	from 2027 onwards	
50% - 53%	40% - 43%	The Ministry of Finance sends a letter to the Parliament explaining the reasons for breaching the debt threshold and indicating measures for its reduction.
53% - 55%	43% - 45%	The government submits to the Parliament a proposal of measures for debt reduction and the wages of government members are frozen to the previous fiscal year level.
55% - 57%	45% - 47%	The Ministry of Finance reduces current year state budget expenditure by 3 percent (with specified exemptions such as interest payments, EU funds, co-financing and EU budget contributions) while restrictions apply to the release of funds from the reserves of the government and the Prime Minister. If the debt level exceeds this threshold for consecutive years, the reduction happens only in the first year. In addition, the government must submit to the parliament a general government budget for the subsequent year that does not increase the nominal expenditure level (with previously mentioned specified exemptions); it applies to local governments as well.
57% - 60%	47% - 50%	The government should submit to the Parliament a balanced (or in surplus) general government budget; it applies also to local governments.
> 60%	> 50%	The government asks the parliament for a vote of confidence.

Source: Constitutional Act of December 8, 2011 on Fiscal Responsibility.
1/ Starting in 2018, the debt ceilings will be gradually reduced by one percentage point of GDP each year to reach 40-50 percent of GDP by 2027.

8. The FRA debt brakes are based on the Maastricht debt definition.[2] The adoption of such an objective yardstick determined by an external institution (i.e., Eurostat) offers the advantage of avoiding concerns about potential manipulation of the accounting treatment of government debt, including the classification perimeter (see below).

9. The FRA includes some escape clauses. The set of exceptional circumstances envisaged by the FRA include the following:

[2] Maastricht debt is defined as gross debt of consolidated general government. It covers government liabilities in the form of currency along with deposits, loans and securities other than shares. The Maastricht debt excludes certain financial instruments such as financial derivatives and other accounts payable (e.g., trade credits). Apart from the difference in the coverage of financial debt instruments, the main difference compared to the System of National Accounts debt definition is that debt instruments are reported at their nominal rather than market value. Consequently, the debt figures are not affected by market fluctuations.

- a major recession (a decline in GDP growth rates of at least 12 percentage points over two fiscal years; Art. 5 para. 11(a));
- a banking sector crisis (Art. 5, para. 11(b));
- a natural disaster, and
- commitments arising from international treaties exceeding three percent of GDP (Art. 5, para. 11(b)).

The materialization of any of these events would suspend for a period of three years the implementation of the sanctions triggered by breaching the debt brakes. Corrective measures are also suspended for two years in case of a change in government (Art. 5 para.10) or during a state of war (Art.5, para. 12).

10. The FRA strictly limits debt for local governments (municipalities and self-governing regions). Should the debt-to-current revenue ratio of a local government reach or exceed 60 percent, the infringing local government will pay to the Ministry of Finance a penalty corresponding to 5 percent of the debt in excess of that threshold. The only escape clause suspends the penalty payment for two years in the case of local elections.

Accountability

11. The FRA provides the legal basis for the independent Council for Budget Responsibility (CBR) (Art. 3). To ensure its independence, the CBR operates "under the aegis" of the National Bank of Slovakia (NBS), in terms of both budget funding and its premises.

12. The CBR mandate focuses on fiscal sustainability analysis and the assessment of compliance with fiscal transparency rules (Art. 4). The CBR also might carry out costing analysis but this is not an explicit task.

Transparency

13. To enhance transparency, the FRA provides for the creation of the Tax Revenue Forecast Committee and the Macroeconomic Forecasting Committee (Art. 8). Both committees act as advisory bodies to the Minister of Finance (Art. 8). They publish their forecasts twice a year and contribute to the budget preparation and monitoring process. The FRA also obliges the entities in the general government to prepare their budgets for at least three years.

C. Does the FRA provide a good fiscal rule?

14. In principle, a debt rule can be very effective in enforcing fiscal discipline. A debt ceiling is less subject to "creative" accounting that can plague a deficit objective (for instance, through off-budget spending) or to measurement errors as in the case of structural deficit rules, which depend on uncertain estimates of potential growth and the output gap.

15. Nonetheless, a debt ceiling has some disadvantages. The debt-to-GDP ratio is not under the full control of the fiscal authorities, as it depends on GDP growth and exchange rate changes (when some of the debt is denominated in foreign currency), although the inclusion of escape clauses may mitigate the problem. More importantly, it may heighten fiscal pro-cyclicality when debt is near the ceiling, and can hamper the quality of fiscal adjustment, especially if sanctions are rather punitive. As shown in the Appendix, under a debt rule, a growth shock may generate a more prolonged slowdown than under an expenditure rule or when automatic stabilizers are allowed to operate fully. The resulting wider and more persistent output gap may lead to more depressed inflation and higher real interest rates. The kicking-in of the debt brake may ignite perverse debt dynamics due to the impact of fiscal adjustment on real economic growth and inflation. In other words, a debt rule risks being self-defeating.

16. The FRA broadly complies with accepted criteria for a sound fiscal rule. Kopits and Symansky (1998) define eight conditions that a sound fiscal rule ought to satisfy.

Kopits-Symansky' s criteria	Fiscal Responsibility Act
(1) Well-defined	Met
(2) Transparent	Met
(3) Adequate with respect to its fiscal target	Met
(4) Internally consistent	Partially met
(5) Simple	Met
(6) Flexible	Partially met
(7) Enforceable	Met
(8) Efficient policy action	Partially met

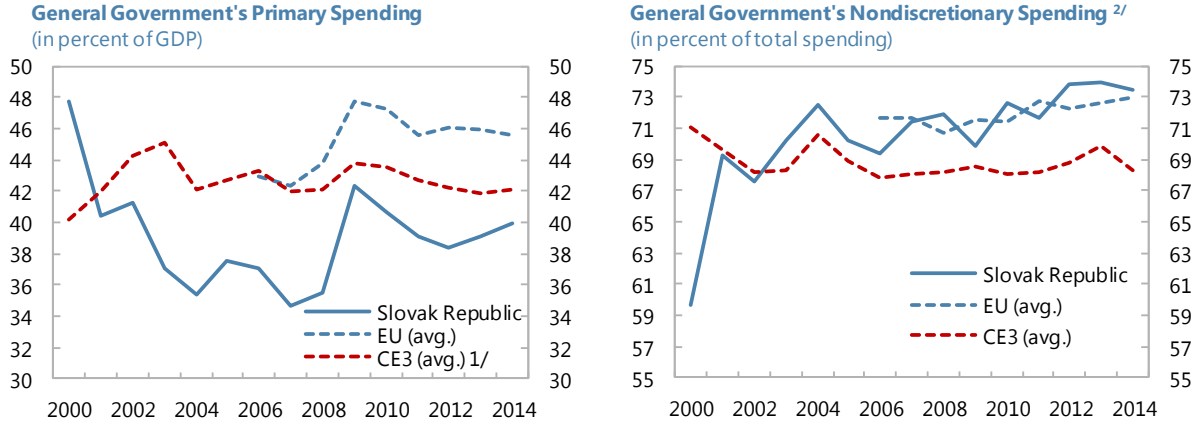
17. Nonetheless, a few features of the FRA may deserve further consideration.

- *Consistency*—The FRA does not provide for (or at least it is not supported by) a clear framework that links debt developments with the operational budget balance, including those of local authorities, except when government debt reaches the "red-flag" zone thereby triggering corrective measures.

- *Flexibility*—The escape clauses included in the FRA could benefit from some fine-tuning. On the one hand, the definition of a major recession might be excessively restrictive. The growth shock escape clause is essentially calibrated to the 2009 shock, which was exceptionally large with the growth rate dropping from 10.8 percent in 2007 to -5.5 percent in 2009. Yet, it might be more appropriate to calibrate the definition of major recession in terms of cumulative loss in the level of GDP rather than as the difference between growth rates. In addition, a protracted spell of below par growth together with a low level of inflation might prove quite challenging, as the post-2009 crisis has proved. During 2010–14, while the government deficit was reduced by almost 5 percentage points of GDP, the debt-to-GDP ratio climbed by almost 13 percentage points, largely due to denominator effects from the 2009 contraction followed by periods of low

growth and inflation.[3] Although fiscal multipliers in an open economy such as Slovakia are estimated to be relatively low, a negative fiscal impulse trigged by the FRA might turn out to be self-defeating, with dynamics from more depressed economic activity pushing up (and not down) the debt-to-GDP ratio in the short-run. Against this backdrop, Slovakia would need in practice to engineer a debt-to-GDP ratio well below the FRA thresholds (see below) in order to maintain space to respond to moderately large negative shock without running up against the debt brake limit. On the other hand, the escape clause in case of general elections or government re-shuffles, if this implies a new political program or manifesto, may provide too easy an escape.

- *Efficient policy action*—The FRA corrective measures have a clear bias toward expenditure cuts. However, public expenditure in Slovakia is relatively low compared to peers and its structure is rather rigid with compensation of employees, interest payments, social benefits, and subsidies accounting for over 70 percent of total outlays. Since cutting those spending categories may be challenging, savings may come from lower public investment, which would be at odds with Slovakia's crucial need to improve its transportation infrastructure.



Sources: Eurostat and IMF staff calculations.

1/ CE3 comprise the Czech Republic, Hungary and Poland.
2/ General government's nondiscretionary spending comprises compensation of employees, interest payments, social benefits, and subsidies.

Moreover, although the intensity of corrective measures is graduated, the stage at which a balanced (or in surplus) budget is called for might be quite harmful to economic growth, especially in circumstances of prolonged weak economic activity that, however, do not conform to the definition of "major recession," as discussed above.

[3] A small fraction of the increase (corresponding to about 3½ percentage points of GDP) was due to Slovakia's contributions to the European Financial Stability Fund and the European Stability Mechanism.

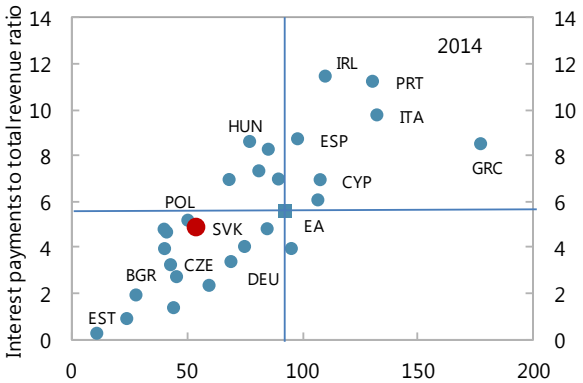
D. Are the FRA debt brakes reasonable?

18. Unfortunately, there is no clear-cut answer to this question. Debt may have a negative impact on economic activity through different channels: crowding out, market confidence, or reduced fiscal space to offset shocks. However, research shows that the relationship between debt and growth may be non-linear. In other words, there might be thresholds beyond which the negative effects of debt on the economy kick in.

19. Three considerations support the view that a debt level lower than 50 percent of GDP might be appropriate for a small open economy such as Slovakia.[4]

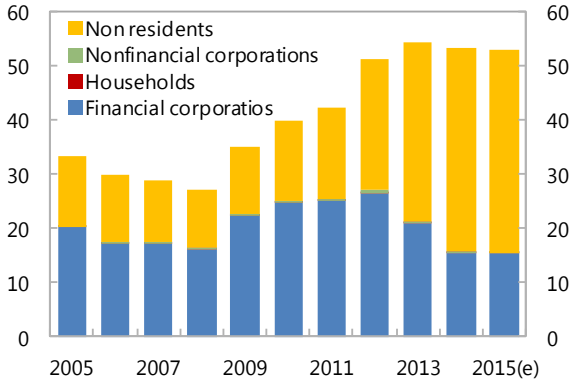
- First, Fall et al. (2015) estimate that a "reasonable" debt threshold ranges between 70 and 90 percent of GDP for high-income countries. However, in the case of euro area countries, given their institutional settings (lack of monetary independence, no debt pooling and no bailout clause), the threshold falls to 50–70 percent of GDP. For emerging markets, it is even lower at 30–50 percent of GDP as they are exposed to capital flow reversals. Slovakia, while a member of the euro area, still shares some features of an emerging market economy.
- Second, despite having one of the smaller debt-to-GDP ratios in the EU and the current low levels of interest rates, interest payments absorb about 5 percent of general government total revenue, which is in broadly in line with the EU average. In circumstances characterized by normal levels of interest rates, the sustainability of the current level of debt (around 53 percent of GDP) would depend on much lower government spending or higher taxation.

Debt and Interest Payments
(in percent)



Source: Eurostat.

General Goverment Debt: Holder Breakdown
(in percent of GDP)



Source: Eurostat.

- Third, the share of government debt held by non-residents has steadily increased in recent years, reaching about two-third of the outstanding stock, while domestic banks already hold a sizeable amount of government debt. This situation has increased the vulnerability of the general government debt to sudden stops by foreign investors.

20. However, reducing the debt thresholds over time might be too restrictive. As indicated above, to allow fiscal policy to play a counter-cyclical role, the authorities should target a debt ratio

[4] See, for example, Múčka (2015).

safely below the FRA debt brakes, perhaps in the 45–50 percent of GDP range based on the current debt thresholds. Lowering the debt band to 40–50 percent of GDP as currently required would erode already narrow fiscal space and imply that an even lower debt ratio should be targeted, despite the need for spending in areas such as infrastructure.

E. Is the definition of government debt appropriate?

21. The FRA uses the Maastricht definition of gross debt. As indicated above, the adoption of a debt metric determined by an external independent institution (i.e., Eurostat) avoids the risk of potential manipulation of the definition of government debt. It also links the domestic FRA to the fiscal rules enforced at the European level since the debt definition is the same as that used for the EU's Stability and Growth Pact (SGP) framework. However, the domestic debt ceiling is tighter than the one set at the European level (currently 50 vs. 60 percent of GDP). In addition, unlike the FRA, the SGP does not specify similarly automatic corrective measures in case of breach of the debt ceiling. Recent experience has highlighted two issues related to the definition of debt: the public sector entities included and the debt instruments covered.

Institutional coverage

22. The recent shift of the accounting standards from ESA 95 to ESA 2010 has broadened the general government sector. The National Motorway Company, the Emergency Oil Stock Agency, healthcare facilities (i.e., public hospitals), local public transportation companies, and Exim Banka have been reclassified and are now part of general government. The inclusion of these entities had only a small impact on the general government's debt-to-GDP ratio given the simultaneous upward revision of nominal GDP under ESA 2010. Nonetheless, this change raised the issue of insulating the operational definition of the debt brakes from statistical shocks from changes in the perimeter of the general government.

23. However, it is worth stressing that the general government's gross debt provides only a partial view of a country's fiscal risks and sustainability. To have a more comprehensive picture, it would be appropriate for the debt metric to include the financial liabilities of all public corporations and other institutions, for which the state may become responsible in a situation of financial distress.

24. Against this backdrop, two options might be considered:

- **The first option would be to adopt a comprehensive definition of the nonfinancial public sector**. The nonfinancial public sector comprises the general government sector plus nonfinancial public corporations. This option would have the advantage of providing fairly comprehensive coverage of the public sector's operations, excluding only the NBS. However, this approach would have the disadvantage of creating a discrepancy between the debt metric used in the domestic fiscal framework and the one adopted at the EU level, and potentially introducing an element of judgment that use of the Maastricht definition was meant to avoid.

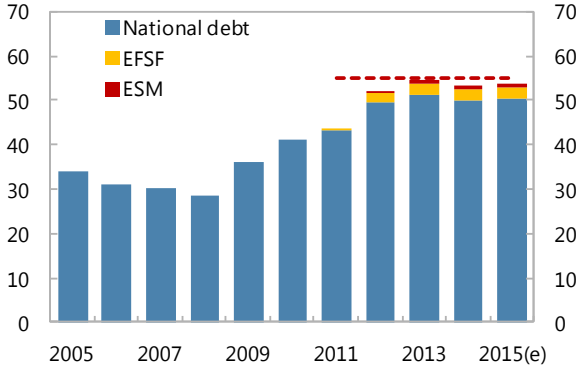
- **The second option would be to amend the FRA by introducing an explicit escape clause**. In the event that a revision of the general government perimeter by Eurostat leads to a breach of the debt brakes, the FRA might grant the government a period of one or two years to return to a debt-to-GDP ratio below the relevant FRA threshold.

Debt Instrument Coverage

25. To better assess the sustainability of public finances, data on a country government's liabilities should be comprehensive. In principle, this would imply that the government's future liabilities such as unfunded pension schemes and standardized state guarantees would need to be included. However, in practice, these types of liabilities are not always taken into account.

26. Slovakia's contributions to European firewalls have raised issues regarding debt coverage. As a euro area member, Slovakia contributed to operations undertaken by the European Financial Stability Fund (EFSF), and Eurostat has determined that country contributions to the EFSF must be recorded in the gross government debt of members participating in support operations, in proportion to their share guarantees given.[5] The EFSF is considered a mere accounting and treasury tool acting on the behalf of euro area member states. Consequently, the EFSF operations, together with Slovakia's contributions to the European Stability Mechanism (ESM), have added almost 3½ percentage points of GDP to Slovakia's gross general government debt. As a result, the FRA debt threshold of 55-percent-of-GDP was temporarily breached at the end of 2013. Only the upward GDP revision, resulting from ESA 2010 adoption, avoided a freeze of government spending the following year.

General Government Debt and EU Firewalls
(in percent of GDP)



Sources: Eurostat and IMF staff estimates.

F. Gross or net debt?

27. But governments do not just have liabilities: they also have assets that can be used to settle existing debts, thus raising the question of whether the debt limit should be expressed in gross or net terms. For instance, the government's liability arising from the EFSF lending is matched by credits vis-à-vis the euro area member states that have requested the activation of the mutual support mechanism. Consequently, the net position of a country participating in a support operation through the EFSF does not change. Similarly, other assets held by the government, such as cash holdings or bank deposits, or equity participations, could be considered, thus moving toward a net concept of government's financial position.

[5] Eurostat decision on "The statistical recording of operations undertaken by the European Financial Stability Facility," January 27, 2011 (http://ec.europa.eu/eurostat/en/web/products-press-releases/-/2-27012011-AP).

28. However, taking into account the government's asset position would complicate the picture. In principle, the gross debt indicator serves to monitor government contractual liabilities. Netting out government's assets would blur underlying debt developments owing to potentially sharp swings in asset prices, and could complicate an assessment of risks to the extent that assets are not fully liquid.

29. On the other hand, using a gross measure for debt brakes may unduly constrain debt management. In the case of Slovakia, since the gross debt-to-GDP ratio has been dangerously close to the 55 percent threshold, the Slovak debt management agency (ARDAL) has not been able to take full advantage of the current favorable market conditions to pre-fund future financing needs or beef up government's cash balances, which would mitigate roll-over risk.

30. Consideration might be given to an intermediate approach of netting out cash balances from the headline debt indicator. The government holds cash balances with the purpose of smoothing out possible lags between government cash inflows and outflows. In addition to this transaction motive, a government can hold cash balances for precautionary purposes. As mentioned above, pre-funding forthcoming financial needs might help mitigate rollover risk and provide some buffers should financial market conditions become too tight or more volatile. Sound guidelines for cash management would be needed to avoid wastage or idling of resources. Too low a level of cash balances undermines their function as a liquidity buffer. Too high a level increases the debt service burden. It would thus be prudent to establish clear guidelines regarding a cost-effective strategy for managing cash balances.

G. Conclusions

31. In light of experience gathered so far, FRA modifications should be considered. In principle, one could argue that amending the relatively new fiscal framework, especially soon after it has become binding for the first time, might undermine its credibility. On the other hand, since the inception of the FRA, the EU fiscal governance structure has been strengthened, thus raising the question of whether it is necessary to have a domestic fiscal framework on top of EU rules. Moreover, if elements of the FRA's design lead to sub-optimal results, such as excessive pro-cyclical adjustment or a reduction in spending on priorities such as infrastructure, this could also undermine support for the FRA. Against this backdrop, some aspects of the FRA might be refined over time while preserving fiscal discipline:

- Debt ratios for the FRA debt brakes might net out cash balance holdings to allow sensible pre-funding activity. Clear guidelines regarding a cost-effective cash management strategy should be established.

- Debt brake level should be kept at the current limits, rather than lowered over time, to avoid unduly eroding fiscal space. Policies should aim to maintain a safe margin below debt thresholds to allow fiscal policy to play a counter-cyclical role in the future during downturns.

- Adjustment measures should be more gradual and the bias toward spending cuts should be lessened or removed. The low level of public spending compared to peers implies that focusing on spending restraint could be difficult or undesirable.

- Escape clauses should be better calibrated. The escape clause for a negative growth shock might be made more realistic and a clause to address prolonged periods of sub-par growth might be considered. On the other hand, the suspension of the FRA in case of a new government (or a new manifesto) might be shortened, or the escape clause might be tightened or removed.

- Attention should be devoted to the share of total revenue absorbed by interest payments. As in the case of macroprudential policies, debt-to-income indicators should be complemented by the analysis of developments in debt-service-to-income ratios. In light of the relatively low level of public spending, the relatively high share of revenue absorbed by interest payments – despite a low debt ratio – points to the need to strengthen government revenues over time.

References

Fall, Falilou, Debra Bloch, Jean-Marc Fournier, and Peter Hoeller, 2015, "Prudent Debt Targets and Fiscal Frameworks," OECD Economic Policy Paper No. 15, July (Paris: Organization for Economic Co-operation and Development), available at http://www.oecd-ilibrary.org/economics/prudent-debt-targets-and-fiscal-frameworks_5jrxtjmmt9f7-en.

Koptis, George F., and Steven A. Symansky, 1998, "Fiscal Policy Rules," IMF Occasional Paper No. 162 (Washington, D.C.: International Monetary Fund), available at http://www.imf.org/external/pubs/cat/longres.aspx?sk=2608.

Múčka, Zuzana, 2015, "Is the Maastricht Debt Limit Safe Enough for Slovakia?," Working Paper No. 2 (Bratislava: Council for Budget Responsibility), available at http://www.rozpoctovarada.sk/download2/wp2_2015_fiscal_limits_01.pdf.

Price, Robert W., Dang Thai-Thanh, and Yvan Guillemette, 2014, "New Tax and Expenditure Elasticity Estimates for EU Budget Surveillance", OECD Economics Department Working Papers No. 1174, December 11 (Paris: Organization for Economic Co-operation and Development), available at http://dx.doi.org/10.1787/5jxrh8f24hf2-en.

Sorbe, Stéphane, 2012, "Portugal—Assessing the Risks Around the Speed of Fiscal Consolidation in an Uncertain Environment," OECD Economics Department Working Papers, No. 984, September 19 (Paris: Organization for Economic Co-operation and Development), available at http://dx.doi.org/10.1787/5k92smzp0b6h-en.

Annex. The Model[1]

In steady state, the Slovak economy is assumed to grow at a (given) constant rate ($\bar{g}$), while domestic inflation (π) is equal to the ECB's target ($\bar{\pi}$).

(1) $g = \bar{g}$

(2) $\bar{y}_t = \bar{y}_{t-1}(1 + \bar{g})$ (real potential output)

(3) $\pi = \bar{\pi}$

(4) $\bar{Y}_t = \bar{Y}_{t-1}(1 + \bar{g})(1 + \bar{\pi})$ (nominal potential output)

In the simulation, it is assumed that Slovakia' potential growth rate is equal to 3 percent while the inflation objective is set equal to 2 percent.

Slovakia's long-term nominal interest rate (i) is driven by the long-term nominal interest rate in Germany (i^{DEU}) augmented by a spread, which is assumed to depend on the debt dynamics in a non-linear way. This assumption captures the empirical evidence that spreads tend to increase rapidly when a country loses market confidence. In steady state, the debt-to-GDP ratio (d) is equal to the authorities' target/objective.

(5) $\bar{\imath} = i^{DEU} + e^{\phi \bar{d}}$

Germany's long-term nominal interest rate is set equal to 4.45 percent. This value is broadly in line with the ECB's long-term price stability objective and a real interest rate of 2.4 percent, which is consistent with Germany's long-term growth (Johansson and others, 2013). At this stage, Slovakia's steady-state debt-to-GDP ratio is assumed equal to 50 percent, slightly lower than the current level of 53 percent of GDP. The coefficient ϕ is calibrated to yield a steady-state spread for Slovakia's borrowing costs of 110 basis points over German interest rates ($\phi = 0.00191$). This value of the spread is higher than current market levels – which are exceptionally compressed reflecting the ECB's unprecedented monetary easing – but broadly in line with the 2004-14 average (about 100 basis points). Given these assumptions, the steady-state levels of Slovakia's nominal and real interest rate are equal to 5.55 percent and 3.48 percent, respectively. In the scenario analysis, it is assumed that the spread reacts with a lag to the debt-to-GDP ratio

(5') $i_t = 4.45 + e^{0.0019 \times d_{t-1}}$

The steady-state level of general government's total revenue is assumed to be a constant fraction (β) of nominal GDP, which is set equal to the current level of 38 percent.

[1] The model draws on Sorbe (2012).

(6) $\bar{\tau}_t = \frac{\bar{R}_t}{\bar{Y}_t} = \beta$

The long-run level of the general government's primary expenditure is determined by the debt-stabilization condition.

$$D_t = D_{t-1} - (R_t - E_t) + i_t D_{t-1}$$

$$D_t = (1 + i_t) D_{t-1} - (R_t - E_t)$$

$$\frac{D_t}{Y_t} = \frac{(1 + i_t)}{(1 + \pi_t)(1 + g_t)} \frac{D_{t-1}}{Y_{t-1}} - \frac{R_t}{Y_t} + \frac{E_t}{Y_t}$$

$$d_t = \frac{(1 + i_t)}{(1 + \pi_t)(1 + g_t)} d_{t-1} - \beta + e_t$$

In steady state, $d_t = d_{t-1} = \bar{d}$; $g_t = \bar{g}$; $\pi_t = \bar{\pi}$; and $i_t = \bar{\imath}$. Therefore, we have:

(7) $\bar{e} = \beta + \left[1 - \frac{(1+\bar{\imath})}{(1+\bar{\pi})(1+\bar{g})}\right] \bar{d} = \beta + \left[1 - \frac{(1+\bar{r})}{(1+\bar{g})}\right] \bar{d}$

with $\bar{e} \gtreqless \beta$ depending on whether $1 - \frac{(1+\bar{r})}{(1+\bar{g})} \gtreqless 0$, that is whether $\bar{g} \gtreqless \bar{r}$.

Given the previous assumptions, in the steady state the real interest rate is indeed higher than potential growth. Consequently, the general government has to run a small primary surplus (0.2 percent of GDP) in the long run, with steady-state primary expenditure at 37.8 percent of GDP. Nonetheless, the general government can sustain a net borrowing position of 2.4 percent of GDP.

Although these back-of-the-envelope results depend on a number of simplified assumptions, they highlight some tensions in the current fiscal governance framework of Slovakia. Unless total revenues are increased in a sustainable way, the current level of government spending (41 percent of GDP) may be inconsistent with the objective of keeping the debt-to-GDP ratio below a 50 percent threshold in a more normal interest-rate environment. Yet, the need to shore up domestic infrastructure and population aging are potential sources of expenditure pressure over the medium- to long-run. On the other hand, a medium-term objective of maintaining a structural deficit of 0.5 percent of GDP might be too tight for an economy such as Slovakia in more challenging macro-economic conditions than the current ones.

In the short-run, Slovakia's economic growth rate depends on its potential growth, changes in financial conditions, which are proxied by the changes in the real interest rate, the stance of fiscal policy, and a random productivity or external shock, which follows an autoregressive process.

(8) $g_t = \bar{g} - \eta \Delta r_t - \mu_1 \Delta pb_t^s - \mu_2 \Delta pb_{t-1}^s + u_t \;\; ; \quad u_t = \rho u_{t-1} + \epsilon_t$

where: $\eta = 0.3$; $\mu_1 = 0.3$; $\mu_2 = 0.2$. In line with the literature according to which fiscal multipliers in an open economy are lower than one, it is assumed that fiscal policy, as measured by the changes in

the structural primary balance (pb^s), has an overall multiplier of 0.5. More than half of the impact (60 percent) takes place in the first year and the remaining part (40 percent) in the following year.

Inflation is anchored to the ECB's target in the long run and also depends on lagged inflation and the current and lagged levels of output gap (gap).

(9) $\pi_t = \omega\bar{\pi} + (1 - \omega)\pi_{t-1} + \theta gap_t$

where: $\omega = 0.36$; $\theta = 0.15$.

The general government's revenue and primary expenditure are affected by cyclically sensitive items (automatic stabilizers) and the authorities' discretionary policies, which for sake of simplicity are assumed to fall only on the expenditure side.

(10) $\tau_t = \beta + \delta gap_t$

(11) $e_t = \bar{e} - \gamma gap_t - \psi_t$

where δ and ψ are the aggregate revenue and expenditure elasticity with respect to the output gap, which based on recent estimates (Price and others, 2014), are set equal to 0.88 and 0.12, respectively.[2] The discretionary component of government primary expenditure is modeled taking into account two policy rules. The first policy rule is a simplified version of the FRA and assumes that if the debt-to-GDP ratio exceeds 55 percent at time t, primary expenditure at time t+1 is frozen at the nominal level recorded in the previous year. The second policy rule assumes that deviation between the actual and the steady-state level of primary expenditure is corrected in the subsequent budget although automatic stabilizers in that year are allowed to operate fully. Consequently, equation (11) becomes:

(11') $e_t = \bar{e} - 0.12gap_t - \propto (e_{t-1} - \bar{e})$

The following identities close the model:

(12) $b_t = \tau_t - e_t - i_t d_{t-1}$ general government's overall balance

(13) $d_t = d_{t-1} - b_t$

(14) $pb_t^s = \beta - \bar{e} + \psi_t$.

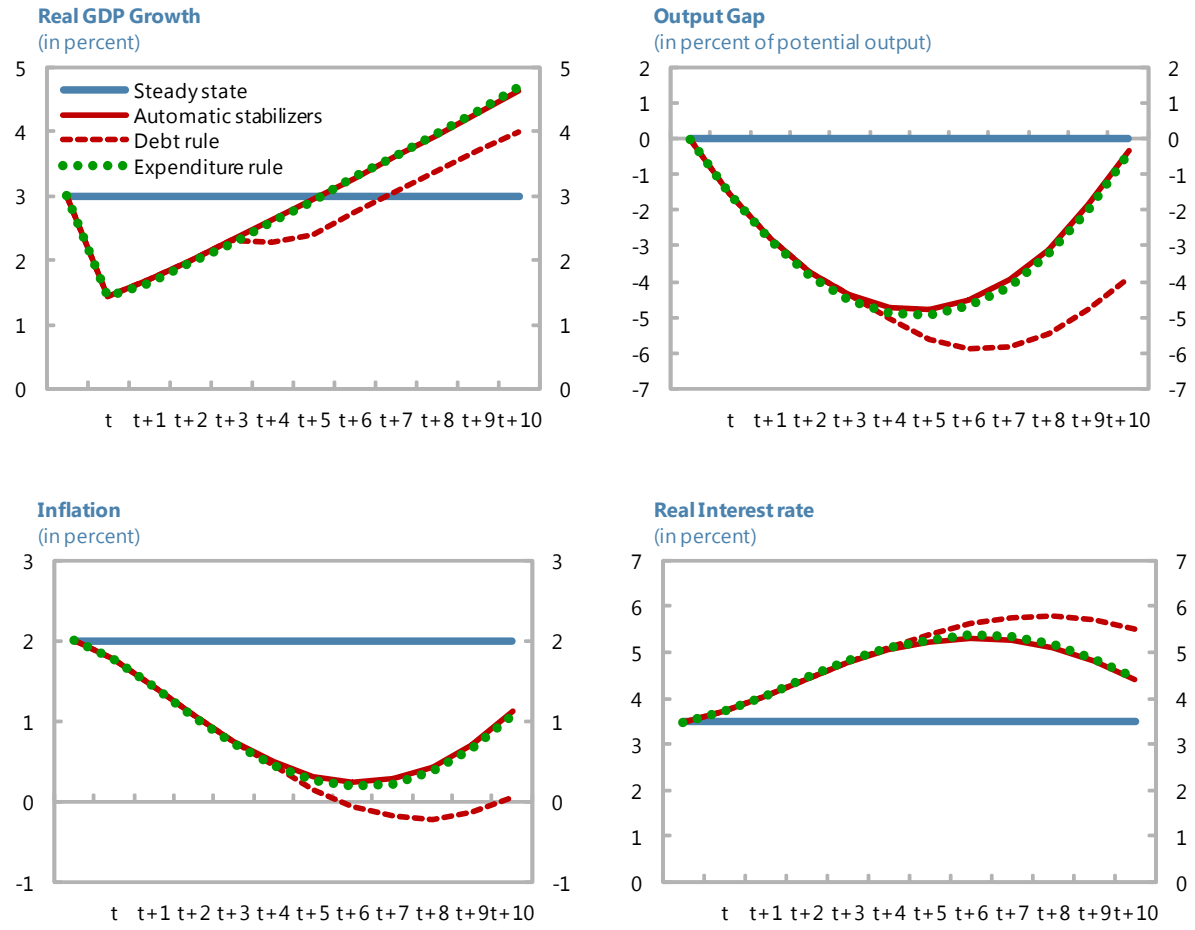
The simulation assumes that growth is affected by a negative shock of 1.5 percentage points, which is equivalent to less than half of the standard deviation of economic growth over the 1998–2014

[2] Slovakia's aggregate tax elasticity (tax-weighted average) is estimated at 1.11. However, the revenue items that are cyclically sensitive (income tax, corporate tax, indirect tax and social security contributions) represent about 80 percent of general government total revenue (hence $1.11 \times 0.8 = 0.88$). The elasticity of unemployment-related spending and social benefits relative to the output gap are estimated at -2.98 and -0.57, respectively. Taking into account that the shares of those two items in total current primary expenditure are 2.95 percent and 6.03 percent, respectively, an overall elasticity of -0.12 is derived.

period. The shock declines by one-fifth in each of the following years. It then reverts so as the output gap virtually closes after 10 periods/years.

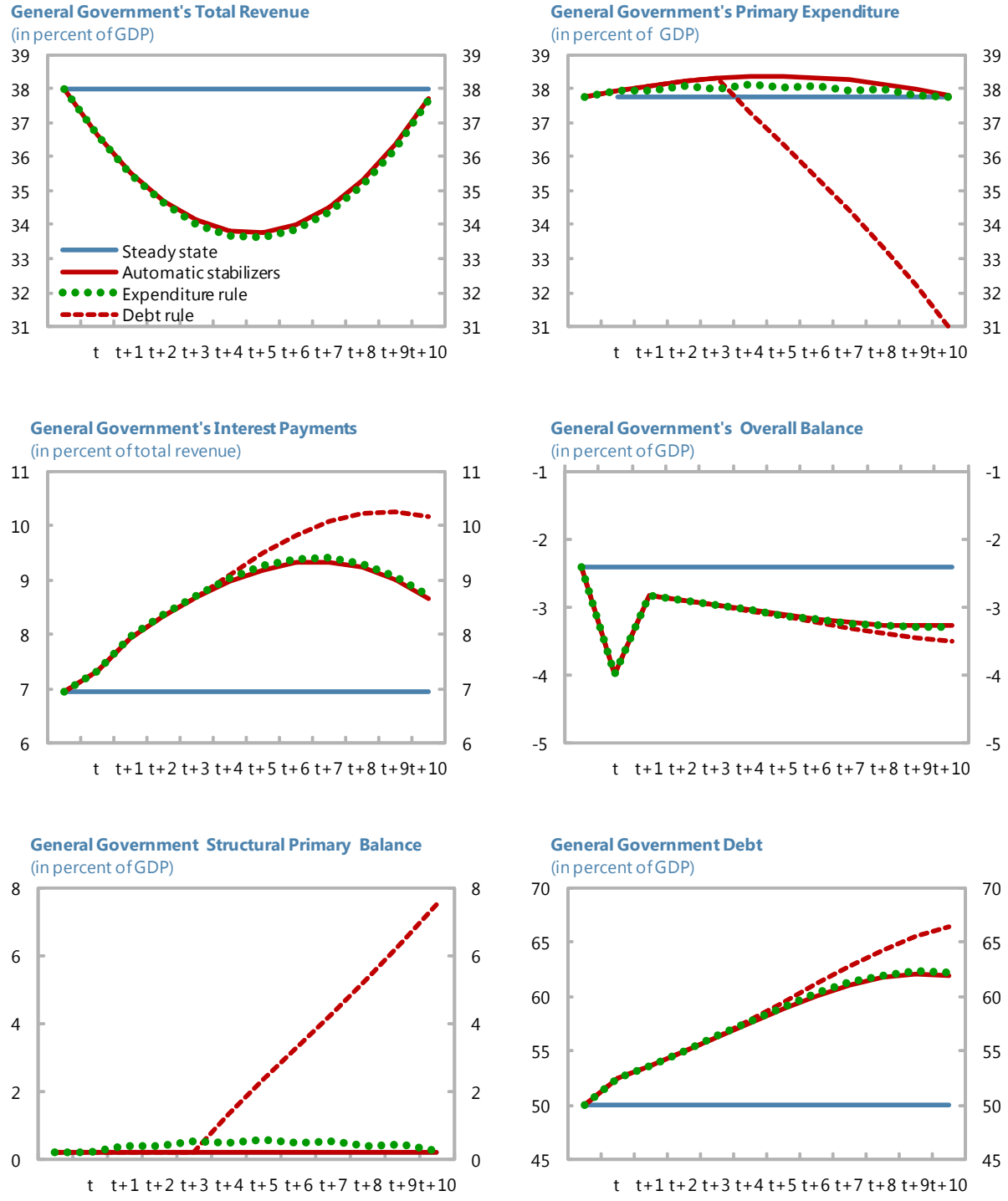
Under the debt rule, the economic slowdown is more prolonged than under the expenditure rule (or when automatic stabilizers are allowed to operate fully). The resulting wider and more persistent output gap leads to more depressed inflation and higher real interest rates (Figure 1A).

Figure 1. Slovak Republic: Shock Scenario–Macro Variables



The kicking-in of the debt brake ignites perverse debt dynamics. Despite curtailing primary expenditure, which generates growing structural primary balances, the debt-to-GDP continues to escalate steadily and interest payments absorb an increasing share of total revenue due to the perverse effect of fiscal adjustment on real economic growth and inflation. In other words, a debt rule risks being self-defeating.

Figure 2. Slovak Republic: Shock Scenario–Fiscal Variables



Under the expenditure rule (or the full operation of automatic stabilizers),[3] the fiscal adjustment is more contained as is the impact on the real economy. Nonetheless, the debt-to-GDP ratio climbs above 60 percent before starting to stabilize.

This simple scenario analysis shows that the authorities needs to keep debt-to-GDP ratio well below the FRA first threshold (50 percent of GDP) to allow automatic stabilizers to operate fully. For example, under the debt rule, to avoid the debt-to-GDP ratio reaching the 55-percent threshold, the steady-state level of debt has to be about 41 percent of GDP (about 44 percent of GDP under the expenditure rule).

[3] In this simple exercise, it is assumed that $\propto = 1$.

MACROPRUDENTIAL MEASURES FOR TACKLING EXCESSIVE CREDIT GROWTH: THE COUNTER-CYCLICAL BUFFER (CCB) AND BEYOND[1]

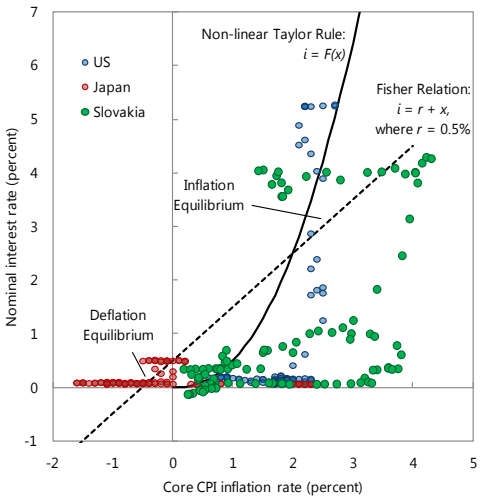
Already rapid household credit growth in Slovakia has picked up further amid accommodative monetary policy conditions and strong domestic demand. Despite a relatively low level of private debt, and (still) high system-wide resilience to potential shocks, fast credit expansion could result in financial imbalances. This paper reviews current credit conditions and household indebtedness, and explores the need for tightening the macroprudential stance. It proposes a set of additional supervisory measures that would build on steps taken by the National Bank of Slovakia (NBS) and guard against adverse impacts on financial stability and the housing market from rapid credit growth. In particular, fast credit growth relative to historical trends suggests that raising the counter-cyclical capital buffer (CCB) might be warranted in the near term. Macroprudential measures also could usefully be supported through fiscal and regulatory policies related to the housing sector.

A. Introduction

1. Since its accession to the EU in 2004, the Slovak Republic has experienced significant financial deepening. While lending to non-financial corporate has declined in the wake of the financial crisis, there has been a continued rapid expansion of bank lending for housing, which increased at an average rate of about 13 percent over the last five years and now represents almost 45 percent of total lending. Banks' exposure to the residential real estate sector is growing fast, with over 75 percent of household lending allocated to house purchases.

2. Already rapid household borrowing growth has accelerated in the context of accommodative monetary policy conditions and strong domestic demand. Staff analysis suggests supportive ECB monetary policy is broadly appropriate for Slovakia (see text charts), but falling interest margins have led banks to boost lending, especially mortgages but also riskier market segments such as consumer loans. Job creation and rising wages have spurred double-digit household lending growth. Borrowing rates, following the euro area-wide trend, have fallen substantially, and stood at 3.4 percent in 2014, about half the level observed five years ago. The current credit expansion is also front-running the incipient credit recovery in the euro area, reflecting favorable monetary dynamics (see Figures 6–8).[2]

Inflation and Interest Rates,
Jan. 2007-Sept. 2015 (Percent)



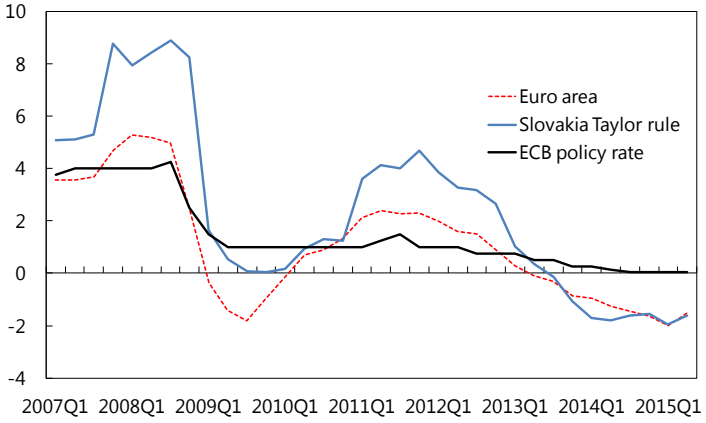
Source: Bloomberg, Haver Analytics, and IMF staff calculations.

[1] Prepared by A. Jobst.

[2] Non-financial corporate borrowing has only picked up recently (and still lags behind sales growth); year-on-year credit from banks to non-financial corporates only recently turned positive. Rising corporate leverage is less concerning as it largely reflects intercompany lending with foreign parents.

3. Rapid retail lending growth has not been reflected in aggregate house price developments so far. Changes in property prices merit close attention given the possible macroeconomic impact via wealth effects and residential construction activity, as well as interactions with bank balance sheets and credit supply. Since 2006, outstanding loans to households for house purchases have increased from below 10 percent of GDP to almost 25 percent at end-Q3 2015 (an average growth rate of 13.8 percent year-on-year), but remain far below the euro area average of about 38 percent of GDP.

Slovak Republic: ECB Policy Rate and Taylor Rule* (percent)

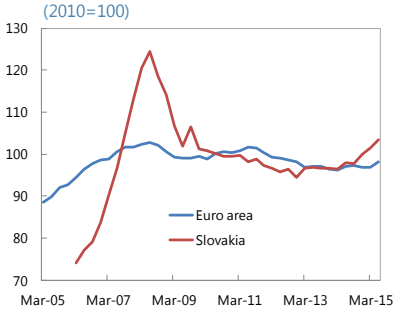


Sources: Eurostat, Haver, and IMF staff calculations. * natural rate set to zero and price stability target.

Despite lower interest rates, higher mortgage lending levels, and a rise in home sales (albeit from a low base given the limited secondary market turnover), the housing market is still far below its pre-crisis peak in 2008. House prices had increased by 77 percent in nominal terms between 2005 and 2008, with gains concentrated in the most active economic regions. After a significant post-crisis correction of about 17 percent, property prices continued to drift down, but stabilized in 2013, and in 2014 increased by about 3 percent year-on-year, in line with incomes and rents (see Figure 1). Similarly, construction activity remained broadly stable after a two-year contraction in 2009, but has picked up slightly during the second half of 2015. A large part of higher household lending reflects equity withdrawals via loan refinancing owing to higher home ownership rates, which might help explain the muted price impact of mortgage lending. Current valuation indicators (based on the price-to-income and price-to-rent ratios as well as deviations from long-term fundamentals) do not signal a return to unsustainable house price valuations (European Commission, 2014).

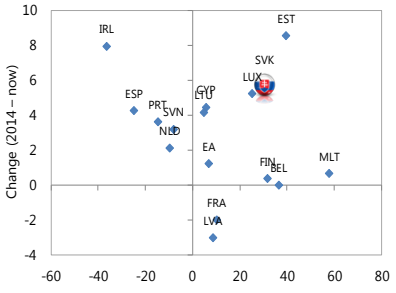
Figure 1. House Price Development

Housing Price Indices
(2010=100)



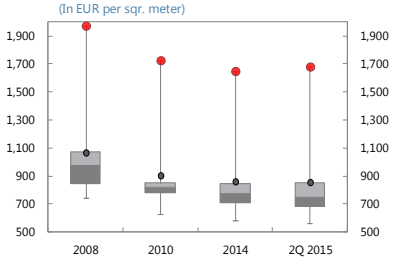
Source: Haver, Eurostat.

House Prices
(Percent change)



Source: Haver, Eurostat.

Slovak Republic: Regional Distribution of House Prices (since 2008)
(In EUR per sqr. meter)

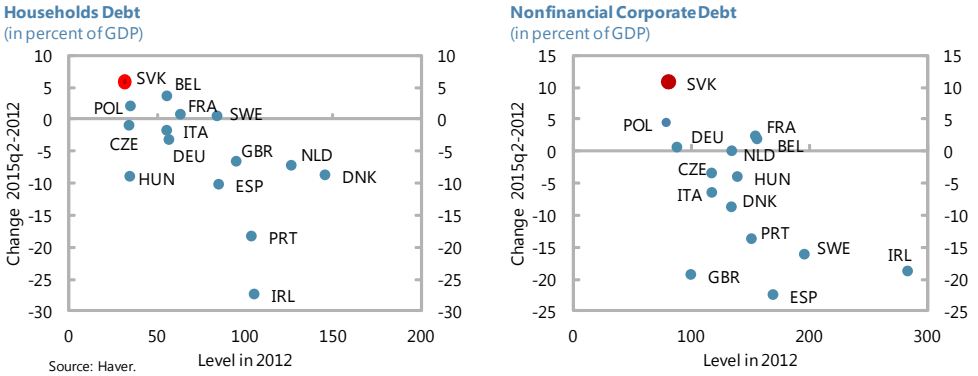


Source: NBS. Note: 1/ Boxplots include the mean (black dot), the 25th and 75th percentiles (grey box, with the change of shade indicating the median), and the maximum and minimum (whiskers). The separate marker shows the house price in the Bratislava region (red dot).

4. Despite (still) high system-wide resilience to potential shocks, fast credit expansion could sow financial stability risks, mainly due to potentially lower debt affordability. A rapid expansion of bank lending amid rising private sector leverage is generally considered one of the most relevant indicators of macro-financial vulnerability. Credit growth in excess of aggregate

demand has a positive and highly significant impact on the likelihood of financial crises (Behn and others, 2013; Schularick and Taylor, 2012). Improved financial conditions can raise expectations of higher asset prices in the future, triggering higher credit growth and rising household debt in excess of increases in gross disposable income. The recent increase in household debt (see Figure 2), albeit from a low base, is among the largest in the EU, weakening the resilience of both borrowers and lenders to future shocks, whether to the economy as a whole or to the housing market. However, higher debt affordability due to declining nominal borrowing rates and rising disposable income has limited vulnerabilities to potential demand shocks.

Figure 2. Household and Corporate Debt Levels



5. A number of macroprudential measures have been introduced recently. The NBS has issued a range of recommendations to banks, which began to take effect in late 2014 and are being implemented through 2015. These are described in greater detail below and include recommendations to banks regarding maximum loan-to-value (LTV) ratios, approaches for collateral valuation, assessment of customer repayment ability including if interest rates rise, and more general stress-testing.

6. The paper is structured as follows. Section B evaluates the impact of current credit expansion on financial stability and examines the effectiveness of existing macroprudential policy measures. Section C considers the use of the CCB as a supply-side complement to the current LTV ratio limit and recommendations on debt affordability, presents empirical findings to guide use of the CCB in Slovakia, and looks at cross-country comparisons. Section D concludes with several policy recommendations.

B. Macroprudential Measures in Slovakia

Overview of Current Macroprudential Measures

7. The financial crisis demonstrated that the impact of excessive risk-taking on financial stability is particularly relevant in property lending, which is prone to cyclical fluctuations. Looser lending standards during an upswing can cause asset prices to deviate from fundamental levels without a significant movement in inflation. As growth slows, borrowers' debt service capacity weakens, particularly those that are overleveraged, triggering a rise in loan defaults. The challenge

of macroprudential policy is to distinguish sustainable changes in output linked to a reduction in financial frictions from unsustainable credit-fueled growth triggered by temporary surges in demand. Appropriate housing loan regulation would constrain lenders and borrowers throughout the credit cycle, which can help lessen adverse price dynamic and enhance the stability of the financial system.

8. There is little indication that the recent acceleration in housing-related borrowing has led to acute financial imbalances. Even though overall bank lending growth reached 7.5 percent year-on-year in October 2015, impairment levels in the banking sector have remained broadly flat (some caution is warranted, however, since this partly reflects growth of total loans in the denominator, and it would take some time to assess the performance of new loans). Banks remain well-capitalized, with Tier 1 capital at 16 percent and moderate leverage of 7.8 percent. Provisioning has lagged somewhat, lowering the coverage ratio, but the accumulated loan loss provisions toward non-performing loans (NPLs) remain high. The loan-to-deposit ratio is a little above 90 percent, and liquid assets are high at 30 percent of total assets, but the rapid expansion of credit in a deposit-funded banking sector has amplified asset-liability mismatches (see Figure 11).

9. Timely adoption of macroprudential measures can help contain balance sheet risks. The prolonged decline in interest rates (see Figures 8–9) increases general debt affordability but can also reduce future debt service capacity as household leverage increases (see Figures 9–10).[3] Moreover, credit supply might not adjust in time to a potential deterioration of borrower quality as some banks increase lending in order to maintain profitability amid falling margins; this could lead to a loosening of credit standards when greater caution would be warranted. Some evidence of less prudent lending (NBS, 2015a) in terms of customer repayment ability and assumed asset recovery (through the LTV ratio) warrants timely measures to mitigate emerging risks, and should not be deferred until corrective action might be required.[4]

10. Recent data indicate that price pressures in the housing market are starting to build, and these could be magnified by lagged adjustments in housing supply. As mentioned above, after a long period of decline or stagnation, house prices have recently started to rise. And while construction activity has also picked up, protracted regulatory procedures in residential construction could slow the responsiveness of housing supply, which might amplify house price volatility.[5] For example, Slovakia consistently ranks below the EU average in dealing with construction permits according to the *Word Bank Doing Business* survey.

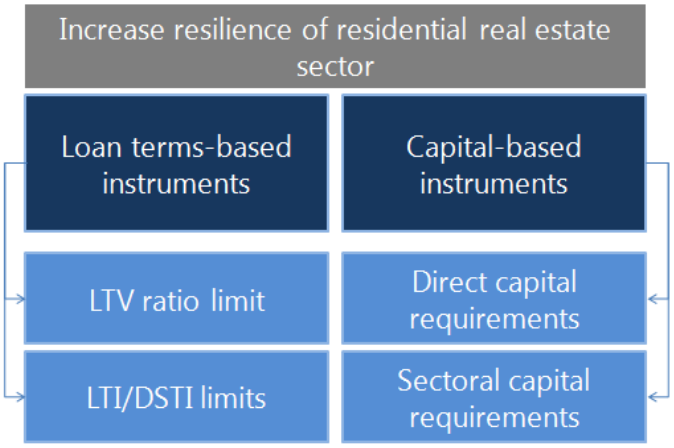
[3] For an extensive analysis of mortgage lending in Slovakia, see http://www.nbs.sk/en/financial-market-supervision/analysis-reports-and-publications-in-the-field-of-financial-market/review-of-mortgage-banking-and-housing-loans/2015.

[4] A prudent LTV ratio should be the outcome of a well-managed credit decision process in each lender; unfortunately, experience shows such prudence cannot be relied on and that a policy overlay which would inhibit the emergence of imprudent lending is desirable.

[5] A small change in the housing stock is estimated to have a significant impact on house prices (OECD, 2009).

11. Overall household indebtedness is limited, but risks may be greater among some borrowers. Despite the rise in mostly housing-related borrowing, the debt service burden of households remains moderate. Total household debt-to-GDP was around 37 percent in 2015, close to levels of regional peers, and well below the levels of most euro area countries. The annual change in indebtedness has been stable at about 6 percent per year. However, Ampudia and others (2014) show that a relatively high share of indebted households (above 30 percent) have a negative financing margin (measured as residual income after taxes, debt repayments and estimated normal living costs).

12. Current macroprudential policies have focused on demand-side measures. The NBS has at its disposal a number of instruments that can be used to curb excessive credit growth and leverage to meet its financial stability objective,[6] such as: (i) varying additional capital requirements, depending on the sector of lending or cyclical conditions, and (ii) measures that affect the terms and conditions of individual credits, such as limits on LTV/loan-to-income (LTI) ratios (see Box 1),[7] which also have the advantage of allowing the targeting of particular sectors. In October 2014, the NBS (2014) issued guidance on maximum limits on the LTV ratio and customer repayment ability ("debt affordability").[8],[9] It recommended that no real estate-secured loans should have an LTV above 100 percent and no more than a limited and declining share of loans in a given quarter should have LTVs above 90 percent (initially 25 percent of loans in a quarter could exceed 90 percent before falling to 10 percent of loans by January 2017). The NBS also issued



[6] The NBS is the national competent authority (NCA) for the implementation of macroprudential policy in Slovakia reflecting its statutory mandate in relation to the overall stability of the financial system. This includes the mandate for the implementation of certain macroprudential tools in the Capital Requirements Regulation (CRR) and Capital Requirements Directive IV (CRD-IV) as per Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 [2013] OJ L 321/6 and Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC [2013] OJ L 176/338.

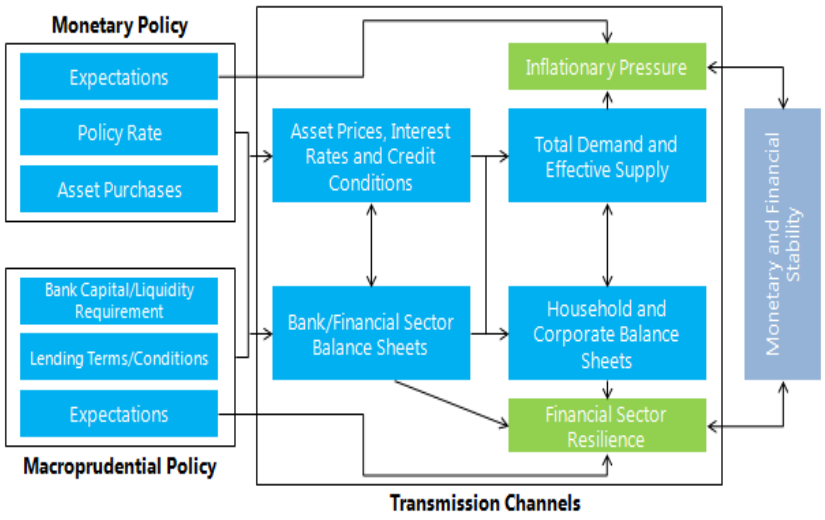
[7] The EU Mortgage Credit Directive also recommends the use of limits on LTV and LTI ratios based on the historical experience of a sharp increase in the losses of defaulted loans at high originating LTV ratios in stressed economies during the recent financial crisis. See Directive 2014/17/EU on credit agreements for consumers relating to residential immovable property and amending Directives 2008/48/EC and 2013/36/EU and Regulation (EU) No 1093/2010 [2014] OJ L 60/34.

[8] A summary of the NBS' retail lending recommendations can be found at: http://www.nbs.sk/_img/Documents/_Dohlad/Makropolitika/Recommendation_Retail_Lending_summary_EN.pdf.

[9] The NBS previously also introduced a counter-cyclical capital buffer (as part of EU-wide macroprudential requirements under CRD-IV) but set it to zero percent.

guidance to banks on income verification and internal borrower repayment assessment, and introduced a maximum maturity of consumer loans. These demand-side measures were aimed at improving the credit quality of lending. Going forward, the aim of the NBS is to have these rules implemented in national legislation to ensure that they apply to both bank and non-bank institutions.

Figure 3. Selected Channels of Monetary and Macroprudential Policy Interaction



Sources: Bank of England and author.

Assessment of Macroprudential Measures

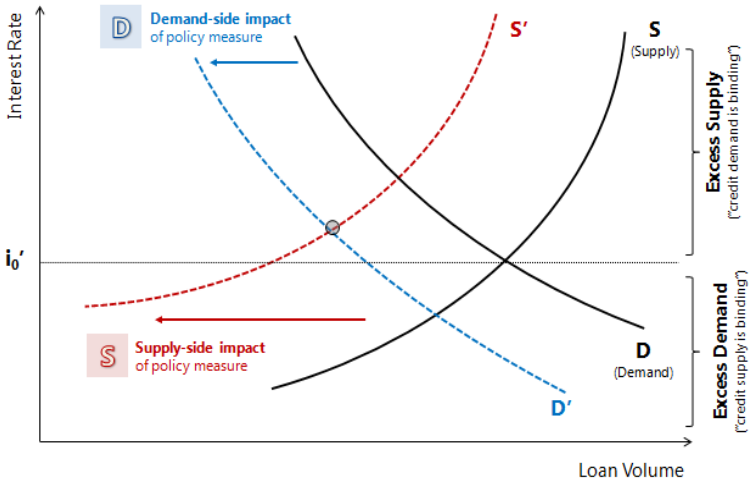
13. The volume of new lending has continued to rise after the introduction of current macroprudential measures, arguing for further analysis.[10] Either supply- or demand-side constraints determine the effectiveness of macroprudential measures and their impact on credit growth, depending on the loan market disequilibrium.[11] In an environment of excess supply (i.e., credit demand is the binding factor), measures focused on demand would impact demand only (i.e.,

[10] Since the global financial crisis there has been a growing literature on the effectiveness of macroprudential policy objectives and the design and goals of corresponding instruments and measures supporting financial stability surveillance, but, a thorough understanding of the interaction between the financial system and the economy and how it might be affected by macroprudential policy is still lacking (Galati and Moessner, 2011). However, there are several papers that estimate the impact of changes in capital requirements or limits on LTVs on credit growth. For example, using bank-specific and time-varying capital requirements imposed by the regulator, Aiyar and others (2012 and 2014) show that capital measures have a significant impact on credit growth in the UK. Quint and Rabanal (2013) quantify the optimality and effectiveness of macroprudential instruments in the euro area.

[11] A lower LTV ratio implies a higher down payment requirement, which could force some marginal homebuyers out of the property market (Zumpano and others, 1986). The LTV ratio can also have a positive impact on loan supply since the actual price of a mortgage loan is determined not only by the mortgage rate, but also by other contractual terms, such as LTV ratio and maturity (Stiglitz and Weiss, 1981). So, banks can shift the aggregate supply of loans by adjusting these non-price mortgage terms.

their supply-side impact would remain invisible) and would be expected to be more effective. If tighter measures also shifted supply more significantly than demand, loan volume would decrease significantly (and push up borrowing rates). Thus, given banks' excess liquidity in the current accommodative monetary conditions, binding demand-side measures are critical to the design and implementation of effective policies (see Figure 3).

14. Existing LTV ratio limits and debt affordability criteria fall within the broad category of demand-side macroprudential measures. Borrower-based tools, such as limits on LTV, debt-to-income (DTI), LTI, and debt service-to-income (DSTI) ratios focus on credit conditions and are often used together to strengthen the resilience of the banking sector by reducing the likelihood of mortgage defaults and losses in the event of defaults (see Box 1).[12] They are more effective when lending supply is excessive (i.e., low and declining interest rates), whereas supply-side measures (e.g., capital add-ons) help rein in excess demand through higher interest rates.[13] The LTV limit requires borrowers to provide a minimum deposit relative to the value of the property that serves as collateral for the housing loan, and, thus makes creditors less vulnerable to falling property prices by reducing potential losses in the event of a borrower default. The debt affordability limit represents a DSTI measure, which acts similarly way to LTI limits by restricting the debt servicing cost relative to the income of the borrower.[14]



15. These housing loan recommendations have helped improve lending standards and collateral valuation practices. According to the NBS (2015a), the share of new loans with a LTV ratio of more than 90 percent has fallen to 21.2 percent. An increasing number of banks use statistical models for re-appraising real estate collateral at higher frequency. In most cases, such re-

[12] These caps can be introduced on all new lending or on a proportion of new lending.

[13] Empirical evidence regarding the effectiveness of limits on LTV ratios is mixed. Cerutti and others (2015) find that macroprudential instruments can be effective in mitigating the risk from credit booms during financial cycles. This is consistent with Crowe and others (2011), who focus on dynamic provisioning as an effective way of strengthening banks against the effects of a bust, but also acknowledge that they can do little to stop the boom itself. More specifically, the econometric analysis from Wong and others (2011) suggests that LTV policy has reduced the systemic risk associated with boom-bust cycles of the property market in Hong Kong SAR. Igan and Kang (2011) find that in Korea, LTV and DTI limits were associated with a decline in house price appreciation and transaction activity.

[14] The implementation of a DSTI ratio on net income is operationally difficult since it involves a comprehensive view of debt service costs, including all the borrower's loans, under different interest rate scenarios.

appraisals now occur on an annual basis (and at least once every three years) and cover either all real estate collateral or a particular category identified as a greater risk. Moreover, all banks have adopted the recommended stress test scenario of a two percentage point increase in future interest rates and both living costs and other financial liabilities in order to assess whether the projected debt service burden exceeds the borrower's annual income.[15] In addition, banks monitor increases in loan balances resulting from the refinancing of existing loans.

16. Nonetheless, current limits might not be sufficiently stringent even if they have the proper aim. Current recommendations on LTV ratios and customer repayment ability appear more lenient compared to those in other EU countries (see Table 1), and do not seem to have limited lending growth. While an increasing number of euro area countries are introducing or have already introduced borrower-based measures to address the impact of low interest rates on housing market developments, in most, maximum LTV ratios range between 80 and 85 percent, with only three countries having implemented LTV ratio limits and exemptions that are equal to or higher than those in Slovakia (Estonia, Latvia, and the Netherlands).[16] Given typical LTV ratios only between 70 and 75 percent for larger banks in Slovakia, the existing limits are unlikely to have any impact on lending in the near term.[17] The majority of countries that have introduced an LTV ratio limit also set a limit for borrower repayment capacity. This can be important, especially if rising property values mean repayment capacity is at risk despite LTV limits being observed. In the case of Slovakia, the debt affordability rules only require that banks not lend to borrowers whose debt repayments would exceed their income.

17. Structural factors could weaken current demand-side measures and might call for supplementary measures to safeguard prudent lending. Lower interest margins in an increasingly competitive mortgage market might delay the adjustment of credit supply unless demand-side measures are binding. Introducing a stringent LTI ratio limit could help restrict the size of a mortgage loan to a multiple of the borrower's gross income and act as a restraint on unsustainable increases in household debt.[18] Applying a ceiling to a DTI ratio would take into account a borrower's total debt and can therefore, if enforceable, be more effective than LTV or LTI limits in constraining the build-up of credit risk from rising household leverage. Also a proper valuation of collateral is crucial for the LTV limit to work properly. However, both borrowers and lenders may have incentives to overestimate the real value of collateral. Inflated collateral values

[15] Also note that the introduction of maximum maturity terms for consumer loans has prevented lenders from circumventing the debt affordability requirement for mortgages by increasing the term on consumer loans that are used as down payment on mortgage loans in order to satisfy the LTV limit.

[16] In non-euro EU countries that exhibit degrees of financial deepening and effectiveness of debt enforcement regimes that are similar to those of Slovakia, LTV limits do not exceed 80 percent.

[17] The cross-country comparison of LTV ratios is not straightforward. The LTV limit could be higher in countries with more effective debt enforcement and insolvency frameworks, which helps improve asset recovery and, thus, reduces the importance of higher ex ante collateralization via the LTV ratio.

[18] However, a cap on a LTI ratio might not capture over-indebtedness due to additional secured or unsecured borrowings from multiple sources and could result in leakage through additional non-mortgage borrowing.

could help banks offset the impact of lower interest margins, including through increased lending volumes, while borrowers could avoid LTV restrictions, and are not taxed in relation to the value of dwellings.[19] Also, loans provided through external financial intermediaries make up a sizable share of new business (NBS, 2015a), which could amplify potential valuation bias.

Table 1. Overview of Housing Loan Regulations in Selected European Countries

	LTV ratio limit		DTI ratio limit	Other instrument(s)
	Base *(percent)* [year] 2/	Exemption(s) 3/	[year] 4/	
Euro area countries 1/				
Slovakia	90 [2014]	25 percent of new loans above limit (reduced to 10 percent by 2017)	Yes [2014]	Maturity cap of 30 years (10 percent of new loans with maturity <40 years)
Estonia	85 [2015]	90 percent for up to 15 percent of new loans	Yes [2015]	Maturity cap of 30 years (15 percent of new loans above limit)
Ireland	80 [2015]	90 percent LTVs for up to 15 percent of new loans 5/	Yes [2015]	—
Cyprus	80 [2003]	70 percent	Yes [2003]	—
Latvia	90 [2007]	95 percent	Yes [2007]	Maturity cap of 40 years
Lithuania	85 [2011]	—	Yes [2011]	—
Netherlands	94 [2012]	Initial limit (100 percent) is gradually reduced by 1 pcp per year until 2018.	Yes [2013]	—
Finland	90 [2016]	—	—	—
Selected non-euro area and non-EU countries				
Hungary	75 [2015]	35-50 percent	Yes [2015]	—
Poland	80 [2014]	Gradual decrease from 95 to 80 percent in 2017	Yes [2014]	—
Sweden	85 [2010]	—	—	Mandatory amortization of loans with LTV ratio >50 percent
Norway	85 [2011]	—	—	Minimum LGD raised from 10 to 20 percent

Sources: NBS, ESRB, and IMF staff. 1/The following euro area countries also adopted house loan regulations, but have been excluded from the table above: Austria (LTV ratio limit of 80 percent, only for home savings banks), Luxembourg (mandatory stress testing), and Greece (DTI ratio limit); 2/ The base limit for the LTV ratio usually applies to residential housing loans denominated in local currency, without any specific guarantees; 3/ LTV ratio limits under exemptions may be higher than the base (e.g., for first-home buyers or in the case of guarantees) or lower than the base (e.g., buy-to-let loans, foreign currency loans, and loans to non-residents); 4/ The DTI limit denotes any limit based on customer repayment ability; 5/ first-time home buyers are exempted for the first €250,000 of the loan amount.

[19] The recurrent tax on immovable property is effectively the only property tax levied in Slovakia. Rates are relatively low and taxation does not respond to changes in the market value (Harvan and others, 2015), creating strong bias towards home ownership. Also, real estate transfers are tax-free as gifts and inheritance of property is not taxed. However, mortgage interest payments are not tax deductible.

C. Counter-cyclical Capital Buffer as a Possible Supply-side Measure

How Counter-cyclical Capital Buffers Work

18. A binding counter-cyclical capital buffer (CCB) could complement borrower-based measures.[20] The purpose of a CCB is to strengthen banks' financial soundness and their resilience to future loan losses when financial imbalances are building up. As opposed to the LTV limit, which is aimed at reducing demand through higher credit standards, a CCB is designed to counter pro-cyclicality in the financial system and the possible emergence of a credit boom. A CCB is deployed when credit growth is deemed to be excessive and associated with a build-up of system-wide credit risk to ensure that banks are sufficiently capitalized to withstand future losses (see Table 2).

Table 2. Mapping of Macroprudential Objectives and Instruments

	Excessive credit growth and leverage			Excessive maturity mismatch and market illiquidity		Concentration risk	Misaligned incentives	
Key instrument(s)	Counter-cyclical capital buffer (CCB)	Capital instruments: (i) leverage ratio, (ii) by sector (real estate, intrafinancial), (iii) systemic risk buffer	Loan-to-value/loan-to-income ratio (LTV/LTI) limits	Funding restrictions	Liquidity charges	Large exposure restrictions (by counterparty, sector, geographic)	SIFI capital surcharges (G-SII and O-SII buffers)	Systemic risk buffer (SRB)
Risk indicator(s)	Credit-to-GDP gap	Housing credit/prices		Structural funding ratio (e.g., NSFR), short-term liquidity stress indicators		Indicators for large exposures, interconnectedness, and price contagion	Size, complexity and interconnectedness of systemically important institutions	
Transmission channel(s)	Resilience of banks; curbing excessive credit growth		Resilience of borrowers and banks; mitigate procyclicality	Resilience of funding base to stressed outflows		Resilience to a counterparty and concentration to sectors	Lower probability and impact of SIFIs; increased reslience of banks	

Sources: ESRB and author.

19. Adjustments to CCBs occur both on the upswing, when vulnerabilities are building, and on the downswing, when risks of a destabilizing credit contraction are rising. The additional layer of capital can be lowered when a general deterioration of economic and financial conditions increases the potential of system-wide stress ("down-cycle"), thereby supporting the sustainable provision of credit to the economy during the downturn.[21] Thus, a CCB, if appropriately calibrated, can help limit the banking sector's vulnerability to generalized shocks.[22] CCBs should be

[20] However, Constâncio (2015) points to the existence of several problems with capital-based measures. Aside from the CCB, capital-based measures tend to have more indirect and limited effects on cyclical adjustments and the costs of loans, which can make them less effective in restraining excessive credit demand in environments of house price appreciation.

[21] On April 28, 2015, in its regular decision on setting the CCB, the NBS decided to maintain the current rate of zero percent on account of the continued heterogeneity of the domestic credit market.

[22] N'Diaye (2009) finds that binding counter-cyclical prudential regulations can help reduce output fluctuations and reduce the risk of financial instability.

regularly reviewed to ensure that they take into account changes in credit aggregates and economic growth.[23]

20. CCBs are usually calibrated quantitatively based on a pre-defined methodology using primarily information about domestic credit growth. In 2010, the Basel Committee on Banking Supervision published a consultative document (BCBS, 2010a) and operational guidelines (BCBS, 2010b) for regulators on CCBs, which were incorporated in the Basel III framework in 2011 (BCBS, 2011). The central feature of the BCBS guidance on CCBs is the use of cyclical movements in the credit-to-GDP ratio as a basis for triggering additional bank capital. The deviation of the credit-to-GDP ratio from its long-term trend ("credit gap") could indicate existing or emerging imbalances and financial sector vulnerabilities. In the European context, CCBs normally are set between 0 and 2.5 percent of risk-weighted assets, reflecting the extent of any build-up of systemic risk based on the change in credit exposures relative to economic growth; they can be set higher when justified by the underlying risk. A high credit gap signals excessive amounts of credit in the economy, potentially fuelling a credit bubble; from a systemic risk perspective, the credit gap therefore has an important forward-looking dimension. The determination of the credit gap requires a trend-cycle decomposition[24] through a statistical smoothing technique, such as the Hodrick-Prescott (HP) filter.[25]

21. However, the credit gap should not be viewed as a mechanical one-size-fits-all benchmark for activation of a CCB. The lack of a counter-factual makes it difficult to demonstrate that the reduced likelihood and impact of a systemic crisis justifies the short-term costs a CCB imposes on banks. While a purely rules-based approach has attractions, especially when it comes to dealing with the political economy of macroprudential policy, available indicators and thresholds of excessive credit growth might not fully capture risks due to model uncertainty and/or estimation error as described in greater detail below. Thus, the credit gap should be used only as one of several indicators to help guide macroprudential policy and overcome inaction bias. Consistent with the "guided discretion" approach (ESRB, 2014), the activation of a CCB would require the use of judgment anchored by a clear set of rules-based principles, supported by several indicators and thresholds of financial imbalances.

[23] CCBs are generally assessed on a consolidated reporting basis and must be met fully by Common Equity Tier 1 (CET1) as the simplest and most effective way to increase the going-concern loss-absorbing capacity of a bank.

[24] Both the trend and the gap obtained from the trend-cycle decomposition are unobservable and are thus subject to uncertainty; there are different possible decompositions depending on the properties (definition) of the trend and the time-varying dependence between the trend and the cycle.

[25] Two main alternatives are the one-sided HP filter using a recursive estimation approach as suggested by the Basel Committee (BCBS, 2010a and 2010b), and an alternative that applies the (two-sided) HP filter to forecast-augmented data. Both approaches apply a smoothing parameter of λ=1,600.

Empirical Analysis of the Credit Gap as a Counter-Cyclical cyclical Capital Buffer Indicator

22. A simplified calibration approach of the CCB for Slovakia suggests that the credit gap is still small but has widened since early 2014. Over the last five years, the credit-to-GDP ratio of household lending increased by more than 12 percentage points to 32 percent (see Figure 4). Since early 2014, the rate of credit expansion has outpaced the strong recovery of real activity, resulting in a positive credit gap. Under the conventional estimation approach (which identifies the credit gap as the cyclical deviation from the long-run trend using a one-sided, recursively estimated HP filter with a smoothness parameter λ=1,600; see Box 2), the credit gap has increased to about 0.5 percent of nominal GDP by end-Q3 2015 (see Figure 12)—still far below the recommended threshold of 2.0 percent (BCBS, 2010a and 2010b) for activating the CCB.[26] The statistical confidence of the current credit gap is about 70 percent even under the (stricter) null hypothesis of a non-normally distributed credit-to-GDP ratio.[27]

23. Alternative specifications of the credit-to-GDP calculation method do not materially alter these findings. Under all reasonable estimation approaches, the positive credit gap for household lending stays below one percent of GDP.[28] Even after adjusting the credit-to-GDP ratio by the output gap, the credit gap remains largely unchanged. We also find little impact from alternative technical specifications, such as a two-sided filter[29] with augmented data over a certain forecast horizon or increasing the "smoothness parameter" to λ=400,000 (in lieu of λ=1,600) in order to take into account the longer duration of the financial cycle and the higher volatility of financial data compared to macroeconomic data at the same (quarterly) frequency.[30]

[26] Note that an appropriate threshold for the credit gap might be higher than the general norm of two percent in an environment of financial deepening where a lower long-term trend of household lending might make a high deviation from the credit-to-GDP ratio more likely.

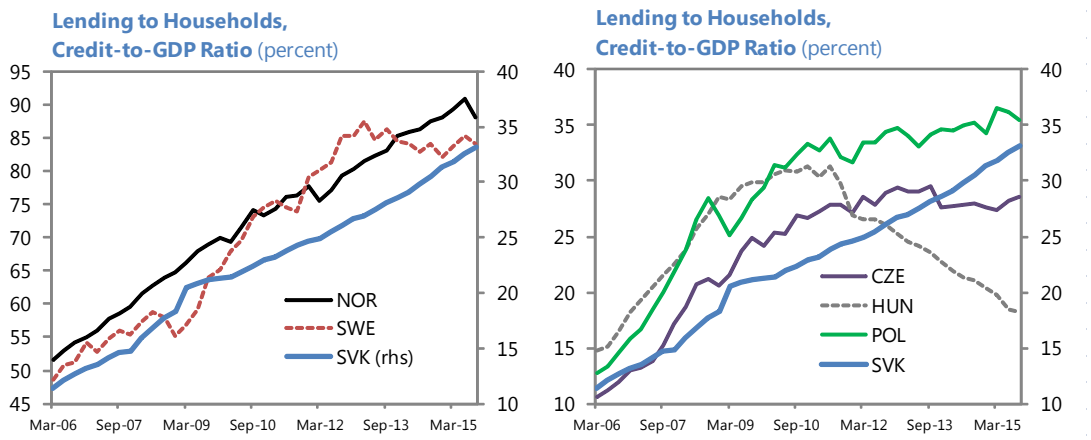
[27] Replacing the concept of a normative threshold (of 2.0 percent) with a statistical threshold (based on the historical volatility of the credit-GDP ratio) provides a more comprehensive diagnostic of excessive credit growth using the credit gap measure. Given that the credit-to-GDP ratio tends to be non-normally distributed, the *Generalized Extreme Value* (GEV) distribution is applied to identify a statistically significant deviation of the credit gap from the long-term trend (see right chart in third row of Figure 12 and Box 2).

[28] However, based on a broader measure of credit (and prudential data), NBS staff estimates (2015b, p. 58) indicate that the "deviation of the credit-to-GDP ratio from its long-term trend […] continued to increase and [has already] exceeded 1 percentage point [by mid-2015]."

[29] The robustness of our results based on both a one- and two-sided HP filter might be due to the small deviation from trend; however, they also contrast with Edge and Meisenzahl (2011), who compare the credit gaps obtained from one-sided and two-sided filters and suggest that one-sided filtered (ex ante) estimates of the credit gap are unreliable due to substantial differences. In response, van Norden (2011) points out that the BCBS (2010b) as well as Drehmann and others (2010) rely largely on the leading indicator properties of one-sided filters rather than ex post revised estimates using two-sided filters.

[30] Setting λ to 400,000, implies that financial cycles under consideration are four times longer than conventional business cycles. Drehmann and others (2011) argue that this is appropriate as crises occur on average only every 20–25 years in their sample.

Figure 4. Cross-Country Comparison of Credit-to-GDP Ratios for Household Lending



Sources: Haver and IMF staff calculations.

24. However, the small credit gap may reflect methodological challenges related to using the credit-to-GDP ratio.[31] If financial deepening occurs at a steady pace, the gradual and persistent growth of credit would be embedded in the long-term trend of the credit-to-GDP ratio. Similarly and of greater concern, past credit booms could "contaminate" the long-run trend of the credit-to-GDP ratio, and thus, weaken the signaling ability of the credit gap.[32] Also, rapid real growth might mask a larger credit gap and delay the timely recognition of rising system-wide vulnerabilities from rising leverage (see Figure 5).[33]

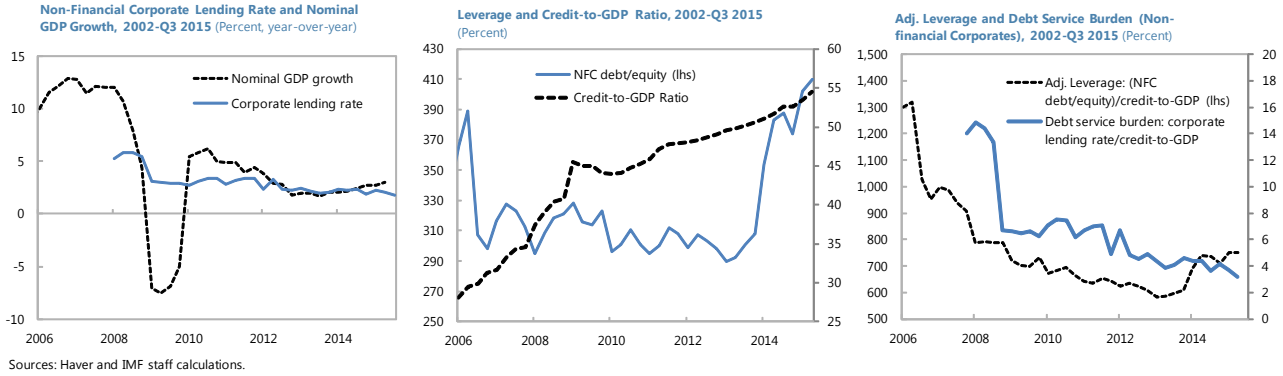
25. Combining the credit gap analysis with an overall assessment of financial imbalances suggests timely activation of the CCB could be appropriate. Whether to increase the CCB for Slovakia requires a broad assessment of risks from developments in credit markets, private sector leverage, property prices, and the banking sector. Household indebtedness continues to rise rapidly, as mentioned above. Rising leverage (see Figure 5) including more borrowing activity among corporates may indicate that the financial cycle is beginning to turn, and low lending rates could lead to even higher debt levels. Housing prices have remained broadly stable, but this may understate price pressures since much new mortgage borrowing is used for refinancing and renovating existing homes in a market with a very high ownership rate (while demand-side measures might normally be preferred, higher debt affordability due to declining interest rates could limit their effectiveness). Considering these factors, timely activation of the CCB would be warranted if above-trend credit growth continues and broadens to include strong bank lending to the corporate sector.

[31] Other practical measurement problems relate to the choice of the starting point of the HP filter estimation, especially if the data history is limited. For two-sided HP filters, specification challenges are amplified by potential end-point bias.

[32] Also, during periods of slowing real activity, a rapid expansion of credit will be flagged by the measure as periods of vulnerability due to changes in the business cycle (rather than the financial cycle).

[33] The credit-to-GDP measure has been criticized as an indicator for the calibration of a CCB because it increases even in absence of positive credit growth if real growth declines, thus, suggesting a pro-cyclical [increase] in the CCB (Drehmann and Tsatsaronis, 2014). We find that a positive credit gap is positively correlated with growth (see third row, left chart in Figure 12), confirming its counter-cyclical properties as useful signal for the activation of a CCB.

Figure 5. Financial Cycle Indicators



Sources: Haver and IMF staff calculations.

Comparative View of the Counter-cyclical Capital Buffer

26. Sweden and Norway provide a comparative (albeit limited) benchmark to assess how the financial cycle can affect CCB activation (see Figures 13–14; Table 3). Both countries recently introduced a positive CCB—the first two EU countries to do so. Over the last ten years, significant credit expansion resulted in an increase of the household credit-to-GDP ratio from about 50 percent of GDP in 2006 to more than 85 percent. While household lending in Slovakia, at about 33 percent of GDP, is still far below that in Sweden and Norway, greater financial deepening in Slovakia has resulted in higher credit expansion (170 percent vs. 70 percent in Sweden and Norway between 2006 and 2015). However, the trend-cycle decomposition under varying assumptions suggests a much more volatile credit gap over time in Sweden and to a lesser extent in Norway (see Figures 12–14). Over the last two years, the credit gap in Slovakia has risen by less than a percentage point and now stands at about 0.5 percent of GDP. It is worth noting that the credit gap in Slovakia never exceeded 2.0 percent even during the boom period in 2008. In contrast, the peak-to-trough change in the credit gap in Sweden was more than 12 percentage points in less than three years (from 6.0 percent in 2012 to -6.0 percent at end-2014). Similarly, the credit gap in Norway changed by as much as five percentage points during the last large credit boom (2009–12).

27. Cross-country evidence suggests that the activation of the CCB over the near term may be warranted. Both Sweden and Norway introduced a CCB of 1.0 percent in Q1 2015 but at different points in the financial cycle. In Sweden, the CCB was announced when the credit gap had already turned negative (in Q3 2014), whereas in Norway, the announcement of the CCB (in Q4 2014) occurred at the peak of the credit gap (at 1.0 percent only) and was followed by a significant decline of the credit gap to almost -1.0 percent in 2015. While both countries share similar characteristics, such as a concentrated and mortgage-focused banking sector, high home ownership, and a very open economy, differences in financial integration and monetary policy make a direct comparison difficult. However, the case of Norway is instructive regarding the credit-to-GDP ratio as a necessary but insufficient indicator of excessive credit growth. When the CCB was raised to 1.0 percent in Q1 2015 the credit gap was still below the recommended level of 2.0 percent—quite similar to the projected credit gap in Slovakia by early 2016 (1.0 percent) under the assumption of continued strong credit growth.

Table 3. Overview of Counter-cyclical Capital Buffers in Europe (by announcement date, until mid-2015)

	2013				2014				2015	
Country	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Croatia	—	—	—	—	—	—	—	0.0	0.0	0.0
Czech Republic	—	—	—	—	—	—	0.0	0.0	0.0	0.0
Denmark	—	—	—	—	—	—	—	0.0	0.0	0.0
Finland	—	—	—	—	—	—	—	—	0.0	0.0
Latvia	—	—	—	—	—	—	—	—	0.0	0.0
Lithuania	—	—	—	—	—	—	—	—	—	0.0
Slovak Republic	—	—	—	—	—	—	—	**0.0**	**0.0**	**0.0**
Sweden	—	—	—	—	—	—	1.0	1.0	1.0	1.5
United Kingdom	—	—	—	—	—	0.0	0.0	0.0	0.0	0.0
Norway	—	—	—	0.0	0.0	0.0	0.0	1.0	1.0	1.5

Source: ESRB. Note: The overview only shows countries that have implemented the CCB under the macroprudential requirements of CRD-IV (which is mandatory starting January 1, 2016) as of end-Q3 2015. The buffer rate indicated in a given quarter is the rate that was announced during this time. The exact starting date in the quarter can vary depending on the country. In both Sweden and Norway, the implementation has substantially lagged the announcement of CCBs. In the case of Norway, the increase of the CCB from 0 to 1.0 percent was announced on December 12, 2013 but was effective from July 1, 2015 only. The second increase from 1.0 to 1.5 percent was announced on June 18, 2015, and will come into effect only on June 30, 2016, in order to give banks sufficient time to adjust to the higher capital requirements. In Sweden, notification periods were similar: (i) first increase from 0 to 1.0 percent (announced: September 8, 2014; effective: September 13, 2015) and (ii) second increase from 1.0 to 1.5 percent (announced: June 22, 2015; effective: June 27, 2016).

D. Policy Recommendations

28. Already rapid household credit growth has received a further boost from accommodative monetary policy and robust domestic demand, with household debt climbing at one of the fastest rates in Europe. While private sector debt levels remain low and banks enjoy sound capital and liquidity buffers, fast credit expansion could weaken resilience to shocks, mainly due to potentially lower debt affordability in the future. With corporate borrowing having only picked up recently, current concerns are focused squarely on household lending, which grew by more than 12 percent year-on-year during the second half of 2015. The NBS has already introduced various borrower-focused macroprudential measures, including limits on the LTV ratio and the maturity of mortgage loans. These measures have contributed to improved overall lending practices, but household credit has continued to grow quickly.

29. Additional supervisory measures would strengthen the resilience of the financial sector and help guard against risks from financial imbalances. Current macroprudential recommendations, while contributing to improved lending standards, are relatively lenient compared to those in other countries and do not seem to have mitigated credit growth. Additional policy actions might be warranted:

- *Strengthening existing demand-side macroprudential measures.* With the planned transposition of its recommendations into law, the NBS should consider lowering the LTV

ratio limit to 85 percent for residential mortgage lending, which would be more in line with those of peers, and accelerating the move to tighter exceptions to the limit. The limit should strike a balance between sufficient flexibility and prudent lending standards in an environment of high credit growth by allowing no more than 10 percent of new lending above the LTV ratio limit. Issuing clear guidance on maximum debt affordability (based on current recommendations), introducing a combination of stringent LTI/DTI limits to complement the existing LTV ratio limit, and imposing restrictions on home refinancing (e.g., reducing or eliminating the cash-out of home equity) would enhance the effectiveness of the LTV ratio limit.

- *Adopt more tailored measures to address real-estate-related exposures.* The NBS should (i) ensure the timely implementation of new European standards for loan classification, (ii) implement an enhanced reporting framework for impaired assets (with a focus on the performance of different vintages of loans) under Pillar II of CRD-IV (Art. 105), (iii) issue guidance on higher provisions for loans with LTV ratios above the prevailing macroprudential limit, and (iv) conduct a regular assessment of collateral valuation standards, which should include mandatory verification by lenders of external appraisals, to avoid inflated collateral valuations that could enable risky lending and undermine asset recovery.[34] Also, better and more comparable data on LTV ratios, lender incentives, risk-weighted assets, and borrower concentration would facilitate assessment of mortgage lending practices.
- *Augmenting the macroprudential stance with supply-side measures*. In the context of still benign financial conditions, if above-trend credit growth continues and broadens to the corporate sector, raising the CCB to at least 0.5 percent (from zero percent currently)—with a sufficient notification period—would be warranted.[35] The activation of the CCB should occur sufficiently early to ensure the timely build-up of credit buffers and would require the use of judgment anchored by a clear set of principles, and supported by the credit gap as one of several indicators to inform the assessment.
- *Adopting more targeted and near-term macroprudential measures to address real-estate-related exposures.* Raising loss-given-default assumptions and imposing stricter risk weights on real estate-related exposures should be considered under Pillar I of CRR (Arts. 124 and 164). Raising credit risk weights and imposing stricter loss-given-default (LGD) assumptions on real estate-related exposures would raise the cost of mortgage loans without affecting non-financial corporate borrowing. The calibration of these requirements would benefit from regular solvency and liquidity stress-testing.

[34] This could be further supported by a shift to value-based taxation of residential property (which would also reduce the strong preference for owner-occupied housing) and by a reduction in regulatory and administrative burdens for housing construction in order to increase responsiveness of housing construction and forestall potential excesses in the housing market (Harvan and others, 2015).

[35] In the case of Norway and Sweden, the national competent authorities announced the activation of the CCB (i.e., raising the requirement from 0 to 1.0 percent) at least half a year prior to implementation.

Box 1. Categories of Macroprudential Measures for Banking in the European Union

Macroprudential policy aims at mitigating potential financial distress by strengthening the resilience of the financial system so that it can withstand variations in credit and liquidity (the "financial cycle") or the impact of other economic shocks. It can be tailored to country-specific circumstances, which is especially important in a heterogeneous monetary union such as the euro area (Claeys and Darvas, 2015). The wide range of macroprudential instruments within the EU regulatory framework for banking reflects the different underlying sources of risks to financial stability, as well as the different intermediate objectives they aim to achieve in reducing vulnerabilities from the build-up of systemic risk:

- *Instruments that help curb excessive credit growth and leverage* include (i) capital buffers and (ii) quantitative limits on loan-to-value (LTV)/loan-to-income (LTI) ratios (usually in combination with measures of debt affordability, such as debt-to-income (DTI) or debt-service-to-income ratios (DSTI)). The counter-cyclical capital buffer (CCB) is a broad-based instrument designed to strengthen the resilience of the banking sector through additional capital, which can be released when a general deterioration of economic conditions increases the potential for system-wide stress ("down-cycle"). The leverage ratio requirement also could be changed over time to counter pro-cyclicality in the financial system and maintain the ratio's function as a backstop to risk-based capital measures. While capital buffers are aimed at altering the incentives of lenders, LTV/LTI ratios directly affect borrowers and help limit risks from real estate and consumer lending (car loans and credit cards). As opposed to system-wide measures, other capital-based instruments are sector-specific or address the build-up of vulnerabilities of certain groups of institutions (e.g., such as additional requirements under Pillar II or higher sectoral credit risk weights). These instruments operate as restrictions on banks' balance sheets (e.g., capital instruments and liquidity charges) or borrower eligibility (e.g., LTV/LTI ratio limits), while others work through market discipline (e.g., higher disclosure requirements).

- *Instruments that address excessive maturity mismatch and market illiquidity* are focused on existing micro-prudential measures (e.g., liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR)) to enhance the resilience of the funding base to stressed outflows. These measures complement simpler structural liquidity ratios (e.g., the funding gap, loan-to-deposit, and core funding ratios), which can also act as indicators and instruments. Higher valuation haircuts on certain exposures and collateralized financing during the upswing of the financial cycle can help limit the rise in asset prices due to higher asset-liability mismatches and leverage, while the release of haircut requirements would avert liquidity squeezes in the "down cycle."

- *Instruments that address large exposures* help enhance the resilience of banks to counterparties and limit concentration risks from particular sectors. Potential measures impose exposure limits reflecting the degree of interconnectedness and the extent to which links can trigger adverse spillover and contagion effects during times of stress.

Box 1. Categories of Macroprudential Measures for Banking in the European Union *(concluded)*

EU banking regulation and national legislation include a number of macroprudential instruments to enable national competent authorities (NCAs) to address financial stability risks. These instruments can be roughly divided into two main categories: (i) tools seeking to influence lenders' behavior, such as time-varying capital requirements, leverage ratios, or, under national rules, dynamic provisioning, and (ii) tools focusing on borrowers' behavior, such as ceilings on LTVs or DTIs. Borrower-focused instruments tend to be especially effective in reducing credit and house price growth (Claessens and others, 2011 and 2013; Cerutti and others, 2015; IMF, 2011 and 2013). However, these "other instruments under national legal frameworks" are not included in the "Single Rulebook" of EU banking regulation (i.e., Capital Requirements Regulation (CRR) and Capital Requirements Directive (CRD-IV)), and, thus, cannot be used by the SSM. In contrast, measures aimed at influencing lenders are mostly related to additional capital requirements and are governed by EU legislation:

- *Capital Requirements Regulation* (CRR). Real estate-related instruments and "national flexibility measures" allow national authorities to impose stricter prudential requirements: higher credit risk weights (up to 150 percent) and stricter loss-given-default (LGD) parameters, large exposure limits, the capital conservation buffer, and higher credit risk weights for residential and commercial property lending as well as intra-financial sector exposures (Art. 458 CRR); these instruments may only be used if the national authority can establish that the measure is necessary, effective and proportionate and other specified measures cannot adequately address the systemic risk.
- *Capital Requirement Directive* (CRD-IV). Counter-cyclical capital buffer (Arts. 130, 135-140, CRD-IV), systemic risk buffers (Arts. 133-134, CRD-IV), and capital surcharges on systemically important institutions (Art. 131, CRD-IV) can be imposed.

Box 2. Estimation of the Credit Gap and Statistical Significance Tests

The cyclical component of the aggregate credit-to-GDP ratio in Slovakia is determined using a one-sided Hodrick-Prescott filter (1997) as a singular indicator of excessive credit growth.[1] The HP filter decomposes the series y_t of quarterly observations of the credit-to-GDP gap for bank lending to either households or non-financial corporates into a trend μ_t and a stationary component $y_t - \mu_t$ by selecting the control (or instrument) μ_t so as to minimize the expression

$$L = \frac{1}{T}\sum_{t=1}^{T}\left(y_t - \mu_t\right)^2 + \frac{\lambda}{T}\sum_{t=2}^{T-1}\left[\left(\mu_{t+1} - \mu_t\right) - \left(\mu_t - \mu_{t-1}\right)\right]^2, \quad (1)$$

where the trend λ is the "smoothness parameter" (or "smoothing constant"), which penalizes variations in its growth rate over time period *T* with *t*-number of quarterly observations.[2] The choice of a one-sided filter is justified on the grounds that only information available at each point in time is used for estimating the trend. The stationary component in eq. (1) defines the credit gap; a positive credit gap of at least two percentage points indicates the lower boundary of excessive credit growth and maps to a CCB of zero percent, which increases to a maximum of 2.5 percent for a credit gap of 10 percentage points or higher.[3]

We also assess the statistical robustness of the credit gap. Given that the normative threshold of 2.0 percent of GDP for activating the CCB might not be appropriate for an economy that experiences considerable financial deepening, we examine whether the credit gap is sufficiently large to satisfy a statistical confidence level of at least 95 percent based on the historical volatility of the credit-to-GDP ratio. We assume that the cyclical deviation from trend growth conforms to either a standard normal or a *generalized extreme value* (GEV)[4] distribution, respectively, and assess whether the following conditions

$$F\left(\frac{credit\,gap_t}{\hat{\sigma}_t}\right) \geq \Phi\left(x\right) = \left(\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{1}{2}x^2\right)\right) = 0.95, \quad (2)$$

and

$$F\left(\frac{credit\,gap_t}{\hat{\sigma}_t}\right) \geq G\left(x\right) = \exp\left(-\left(1+\hat{\xi}x_t\right)^{-1/\hat{\xi}_t}\right) = 0.95 \quad (3)$$

hold, where $1+\hat{\xi}_t x > 0$, scale parameter $\hat{\sigma}_t > 0$, and shape parameter $\hat{\xi}_t$, are calibrated over a five-year rolling window of quarterly observations, starting in January 2001 (Jobst, 2007 and 2014). The GEV test in eq. (3) represents a more stringent test and accounts for the possibility of a non-normal distribution of the trend underlying the credit gap; the higher the absolute value of shape parameter, the larger the weight of the tail and the slower the speed at which the tail approaches its limit.[5]

1/ The choice of a one-sided HP filter acknowledges the real-time data issue affecting the calibration of the CCB based on the credit-to-GDP ratio, reflecting the important practical constraint that policy-makers rely on data that are available at that point (Drehmann and others, 2011).

2/ As a variation to the credit-to-GDP ratio, we replace nominal GDP with potential output in the numerator in order to examine the impact of the output gap on the assessment of excessive credit growth relative to trend.

3/Note that solvency stress testing can also be used to calibrate the CCB based on a counter-cyclical macroeconomic scenario. This would require (i) choosing a sufficiently severe but plausible scenario that corresponds to the identified state of the financial cycle, (ii) mapping the stress test results to the level of CCB with some expert judgment, and (iii) ensuring that the frequency of stress tests satisfies the requirement of a quarterly review of the CCB

4/ The GEV distributions were chosen as domain of attraction in order to account for the non-normal asymptotic tail behavior of the empirical distribution of credit-to-GDP ratio in Slovakia (as well as other countries considered as benchmark cases, such as Norway and Sweden).

5/ The moments of the corresponding density function are estimated via the linear combinations of ratios of spacings (LRS) method, which identifies possible limiting laws of asymptotic tail behavior of normalized extremes (Jobst, 2013 and 2014).

References

Aiyar, Shekhar, Charles Calomiris, and Tomasz Wieladek, 2014, "How Does Credit Supply Respond to Monetary Policy and Bank Minimum Capital Requirements?" Bank of England Working Paper No. 508 (London: Bank of England).

Aiyar, Shekhar, Charles Calomiris, and Tomasz Wieladek, 2012, "Does Macro-Prudential Regulation Leak? Evidence from a U.K. Policy Experiment," *Journal of Money, Credit and Banking*, Vol. 46, No. 1, pp. 181–214.

Alessi, Lucia, and Carsten Detken, 2011, "Quasi-real Time Early Warning Indicators for Costly Asset Price Boom/Bust Cycles: A Role for Global Liquidity," *European Journal of Political Economy*, Vo. 27, No. 3, pp. 520–33.

Ampudia, Miguel, Haas van Vlokhoven, and Dawid L. Żochowski, 2014, "Financial Fragility of Euro Area Households," ECB Working Paper No. 1737, October (Frankfurt/M.: European Central Bank), available at https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1737.en.pdf.

Basel Committee on Banking Supervision (BCBS), 2010a, "Countercyclical Capital Buffer Proposal," Consultative Document, July (Basel: Bank for International Settlements), available at http://www.bis.org/publ/bcbs172.pdf.

Basel Committee on Banking Supervision (BCBS), 2010, "Guidance for National Authorities Operating the Countercyclical Capital Buffer," December (Basel: Bank for International Settlements), available at http://www.bis.org/publ/bcbs187.pdf.

Basel Committee on Banking Supervision (BCBS), 2011, "Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems," revised version June (Basel: Bank for International Settlements), available at http://www.bis.org/publ/bcbs189.pdf.

Behn, Markus, Carsten Detken, Tuomas A. Peltonen, and Willem Schudel, 2013, "Setting Counter-cyclical Buffers Based on Early Warning Models: Would It Work?" ECB Working Paper No. 1604, November (Frankfurt/M.: European Central Bank), available at https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1604.pdf.

Cerutti, Enrico, Stijn Claessens, and Luc Laeven, 2015, "The Use and Effectiveness of Macroprudential Policies: New Evidence," IMF Working Paper No. 15/61 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/pubs/ft/wp/2015/wp1561.pdf.

Committee on the Global Financial System (CGFS), 2010, "Macroprudential Instruments and Frameworks: A Stocktaking of Issues and Experiences," CGFS Papers No. 38, 21 May (Basel: Bank for International Settlements), available at http://www.bis.org/publ/cgfs38.pdf.

Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones, 2011, "Financial Cycles: What? How? When?" in Clarida, Richard and Francesco Giavazzi (eds.) *NBER International Seminar in Macroeconomics* (2010), June 18-19, pp. 303-43, available at http://www.nber.org/chapters/c12210.pdf.

_____, Swati R. Gosh, and Roxana Mihet, 2013, "Macroprudential Policies to Mitigate Financial System Vulnerabilities," *Journal of International Money and Finance*, Vol. 39, pp. 153-85.

Claeys, Grégory, and Zsolt Darvas, 2015, "The Financial Stability Risks of Ultra-loose Monetary Policy," Bruegel Policy Contribution 2015/03, March 26 (Brussels: Bruegel).

Crowe, Christopher, Giovanni Dell'Ariccia, Deniz Igan, and Pau Rabanal, 2011, "How to Deal with Real Estate Booms: Lessons from Country Experiences," IMF Working Paper No. 11/91 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/pubs/ft/wp/2011/wp1191.pdf.

Constâncio, Vitor, 2015, "Strengthening Macroprudential Policy in Europe," Speech at the Conference on 'The Macroprudential Toolkit in Europe and Credit Flow Restrictions,' July 3 (Vilnius: Lietuvos Bankas).

Drehmann, Mathias, Claudio Borio, Leonardo Gambacorta, Gabriel Jimenez, and Carlos Trucharte, 2010, "Countercyclical Capital Buffers: Exploring Options," BIS Working Paper No. 317, July (Basel: Bank for International Settlements), available at http://www.bis.org/publ/work317.pdf.

_____, Claudio Borio, and Kostas Tsatsaronis, 2011, "Anchoring Countercyclical Capital Buffers: The Role of Credit Aggregates," *International Journal of Central Banking*, Vol. 7, No. 4, pp. 189–240.

_____, and Kostas Tsatsaronis, 2014, "The Credit-to-GDP gap and Countercyclical Capital Buffers: Questions and Answers," *BIS Quarterly Review*, March (Basel: Bank for International Settlements), pp. 55-73, available at http://www.bis.org/publ/qtrpdf/r_qt1403g.pdf.

Edge, Rochelle M., and Ralf R. Meizenzahl, 2011, "The Unreliability of Credit-to-GDP Ratio Gaps in Real Time: Implications for Countercyclical Capital Buffers," *International Journal of Central Banking*, Vol. 7, No. 4, pp. 261-98.

European Commission, 2014, "Box I. 3: Housing Market Adjustment in the European Union," European Economic Forecast-Spring 2014 (Brussels: European Commission), pp. 34-6, available at http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee3_en.pdf.

European Systemic Risk Board (ESRB), 2014, "Flagship Report on Macro-prudential Policy in the Banking Sector," ESRB Instrument Working Group, March (Frankfurt/Main: European Central Bank), available at https://www.esrb.europa.eu/pub/pdf/other/140303_flagship_report.pdf.

Galati, Gabriele, and Richhild Moessner, 2011, "Macroprudential Policy – A Literature Review," BIS Working Paper No. 337, February (Basel: Bank for International Settlements), available at http://www.bis.org/publ/work337.pdf.

Hartmann, Philipp, 2015, "Real Estate Markets and Macroprudential Policy in Europe," ECB Working Paper Series No. 1796, May (Frankfurt/Main: European Central Bank), available at https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1796.en.pdf.

Harvan, Peter, Anton Jevčák, Peter Ponťuch, and Vladimír Solanič, 2015, "The Impact of Rapid Credit Growth on Slovakia's Housing Market," Economic Briefs, DG ECFIN, December (Brussels: European Commission), available at http://ec.europa.eu/economy_finance/publications/eeeb/pdf/eb006_en.pdf.

Igan, Deniz, and Heedon Kang, 2011, "Do Loan-to-Value and Debt-to-Income Limits Work? Evidence from Korea," IMF Working Paper No. 11/297 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/pubs/ft/wp/2011/wp11297.pdf.

International Monetary Fund (IMF), 2011, "Macroprudential Policy: An Organizing Framework," IMF Policy Paper, Monetary and Capital Markets Department, March 14 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/np/pp/eng/2011/031411.pdf.

_____, 2013, "Key Aspects of Macroprudential Policy," IMF Policy Paper, Monetary and Capital Markets Department, June 10 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/np/pp/eng/2013/061013b.pdf.

_____, 2015, "Monetary policy and Financial Stability," Staff Report, Aug. 28 (Washington, D.C.: International Monetary Fund), available at http://www.imf.org/external/np/pp/eng/2015/082815a.pdf.

Jobst, Andreas, 2013, "Multivariate Dependence of Implied Volatilities from Equity Options as Measure of Systemic Risk," *International Review of Financial Analysis*, Vol. 28 (June), pp. 112-29.

_____, 2014, "Measuring Systemic Risk-Adjusted Liquidity (SRL)—A Model Approach," *Journal of Banking and Finance*, Vol. 45, pp. 270-87.

N'Diaye, Papa, 2009, "Countercyclical Macroprudential Policies in a Supporting Role to Monetary Policy," IMF Working Paper No. 09/257 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/pubs/ft/wp/2009/wp09257.pdf.

National Bank of Slovakia (NBS), 2014, "Recommendation No 1/2014 of 7 October 2014 in the Area of Macroprudential Policy on Risks Related to Market Developments in Retail Lending," October (Bratislava: Národná banka Slovenska), available at http://www.nbs.sk/_img/Documents/_Dohlad/Makropolitika/Recommendation_NBS_1_2014_EN.pdf.

_____, 2015a, "Financial Stability Report," May (Bratislava: Národná banka Slovenska), available at http://www.nbs.sk/_img/Documents/ZAKLNBS/PUBLIK/SFS/FSR_052015.pdf.

_____, 2015b, "Financial Stability Report," November (Bratislava: Národná banka Slovenska), available at http://www.nbs.sk/_img/Documents/ZAKLNBS/PUBLIK/SFS/FSR_112015.pdf.

Quint, Dominic, and Pau Rabanal, 2013, "Monetary and Macroprudential Policy in an Estimated DSGE Model of the Euro Area," IMF Working Paper No. 13/209 (Washington, D.C.: International Monetary Fund), available at https://www.imf.org/external/pubs/ft/wp/2013/wp13209.pdf.

Ravn, Morton O., and Harald Uhlig, 2002, "On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations," *Review of Economics and Statistics*, Vol. 84, No. 2 (May), pp. 371-6.

Schularick, Moritz, and Alan M. Taylor, 2012, "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crisis, 1870-2008," *American Economic Review*, Vol. 102, No. 2, pp. 1029-61.

Stiglitz, Joseph E., and Andrew Weiss, 1981, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, No. 3, pp. 393–410.

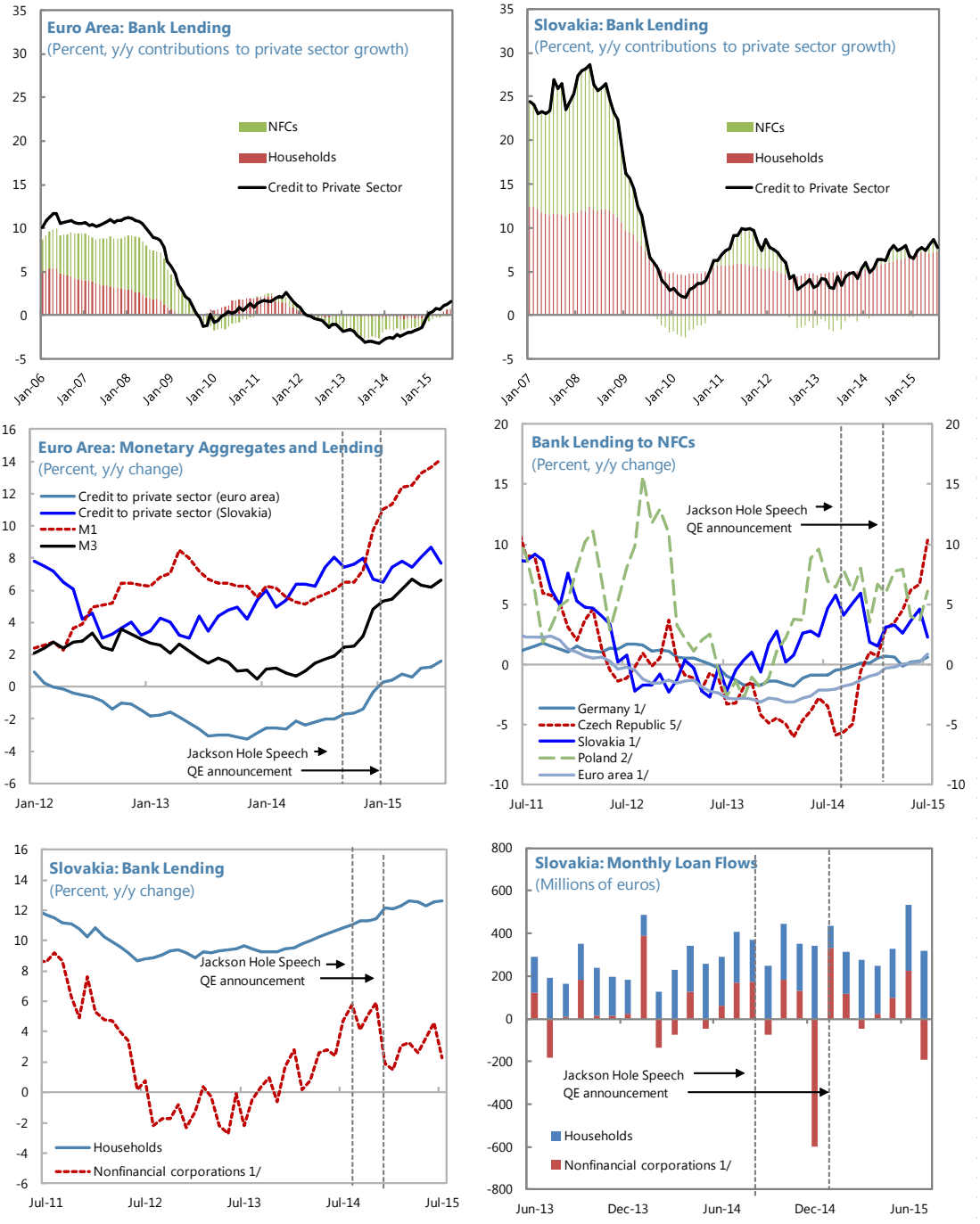
Zumpano, Leonard V., Patricia M. Rudolph, and David C. Cheng, 1986, "The Demand and Supply of Mortgage Funds and Mortgage Loan Terms," *Real Estate Economics*, Vol. 14, No. 1, pp. 91-109.

van Norden, Simon, 2011, "Discussion of 'The Unreliability of Credit-to-GDP Ratio Gaps in Real Time: Implications for Countercyclical Capital Buffers'," *International Journal of Central Banking*, Vol. 7, No. 4, pp. 299-303, available at http://www.ijcb.org/journal/ijcb11q4a11.pdf.

Wong, T.C., Tom Fong, Ka-Fai Li, and Henry Choi, 2011, "Loan-to-value Ratio as a Macroprudential Tool—Hong Kong's Experience and Cross- country Evidence," BIS Papers No. 57 (Hong Kong SAR: Hong Kong Monetary Authority), available at http://www.bis.org/publ/bppdf/bispap57k.pdf.

Figure 6. Credit Conditions—Monetary Dynamics and Lending

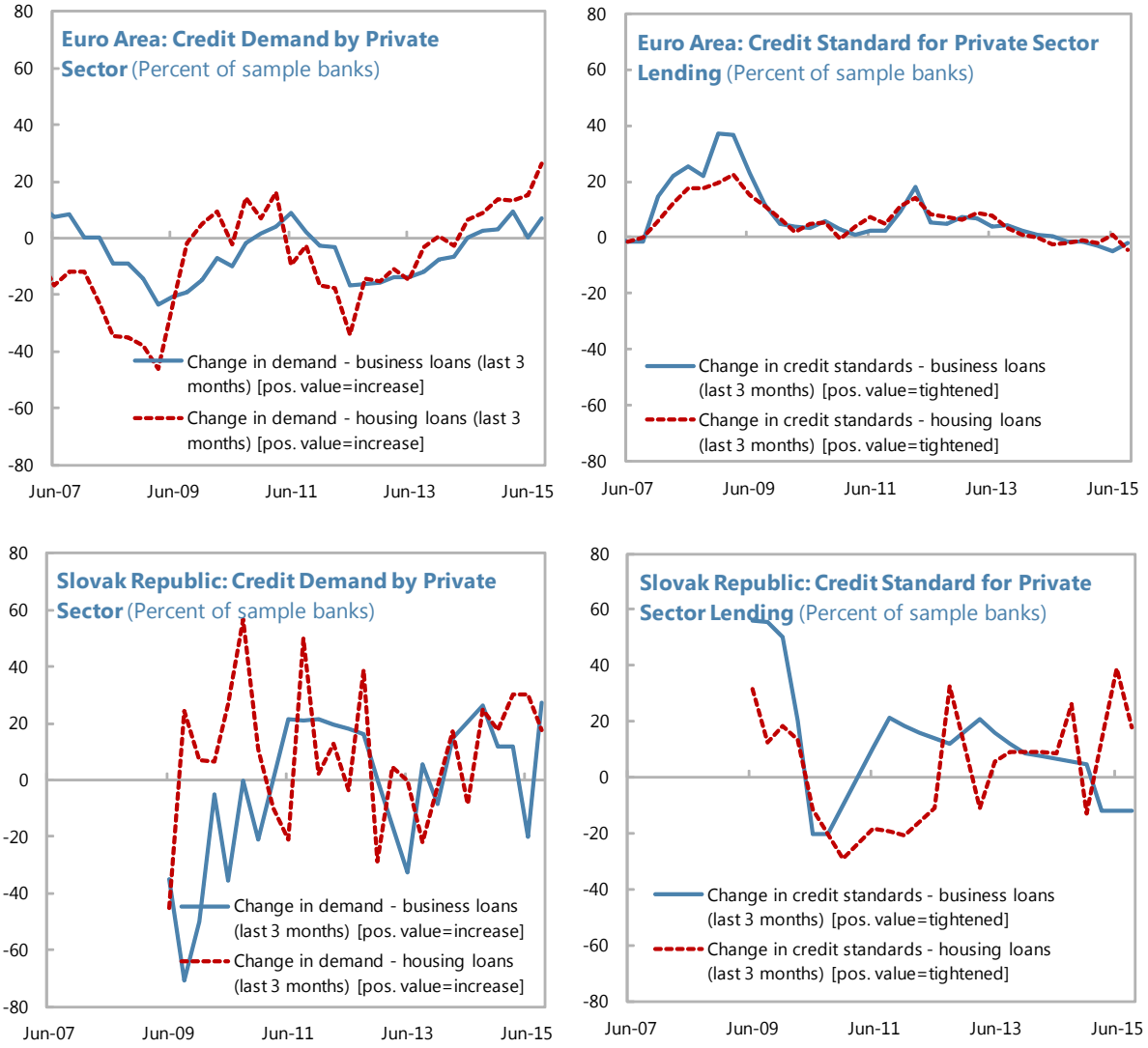
Credit growth in Slovakia has been front-running the euro area-wide recovery of credit conditions.



Sources: Bloomberg, L.P.; Haver Analytics; ECB; and IMF staff calculations.
Note:
1/ MFI loans to nonfinancial corporations adjusted for sales and securitization.
2/ Poland data not available for MFI loans to nonfinancial corporations adjusted for sales and securitization.

Figure 7. Credit Conditions—Credit Demand and Supply

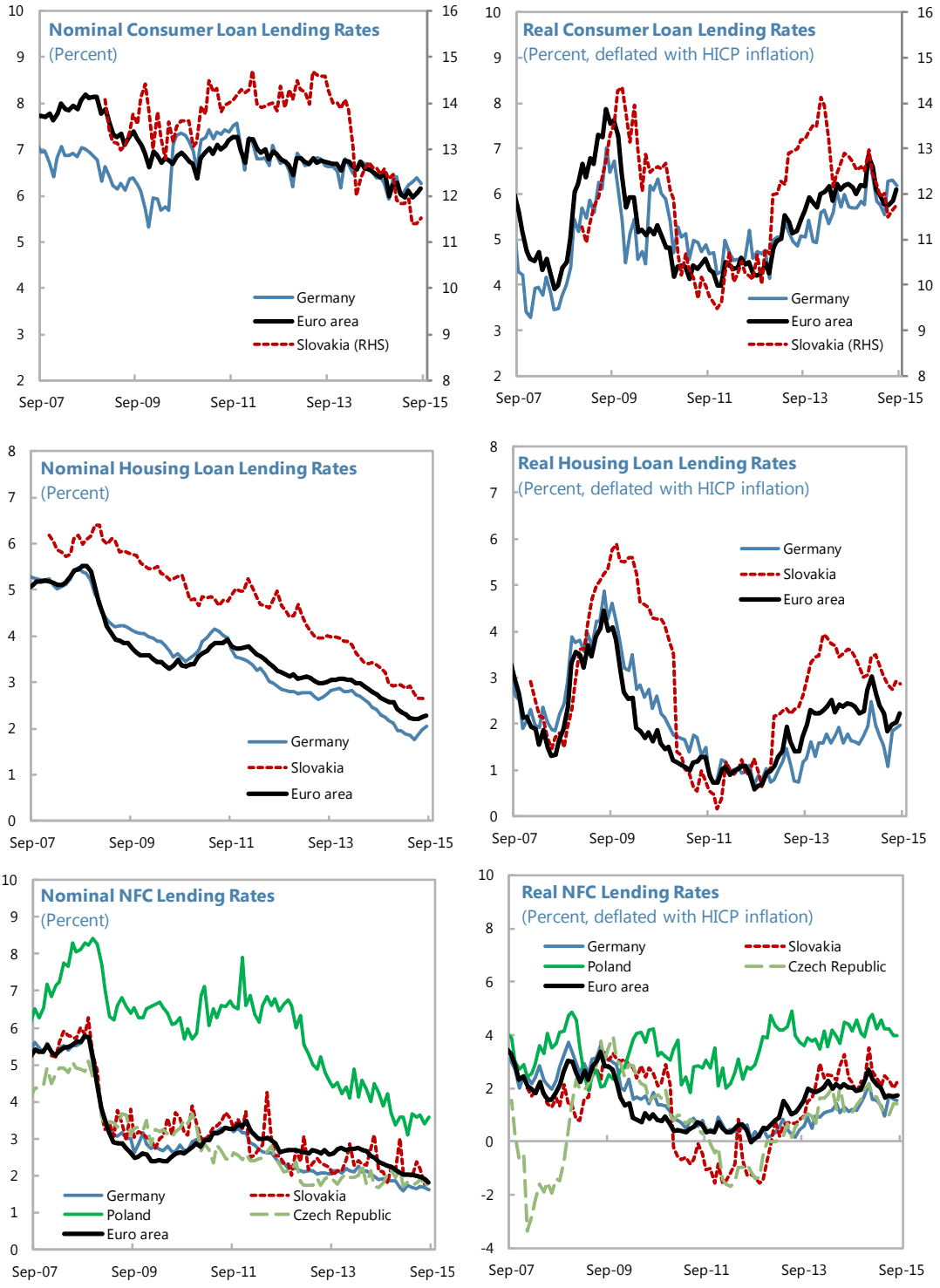
Across the euro area, credit demand from the private sector has been rising; credit standards have loosened for businesses and tightened for households, reflecting lending developments.



Source: ECB Bank Lending Survey (BLS).

Figure 8. Credit Conditions—Nominal and Real Lending Rates

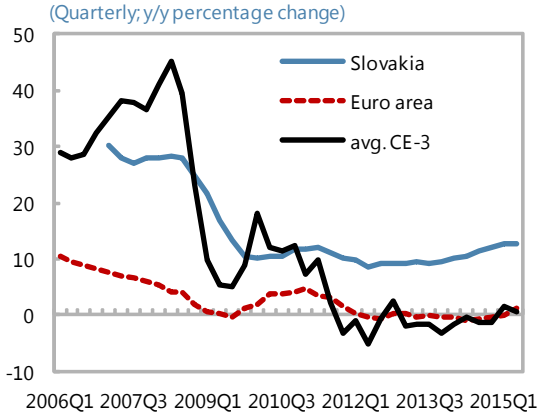
Despite the securlar decline of lending rates owing to monetary easing, low inflation has affected borrowing costs in real terms.

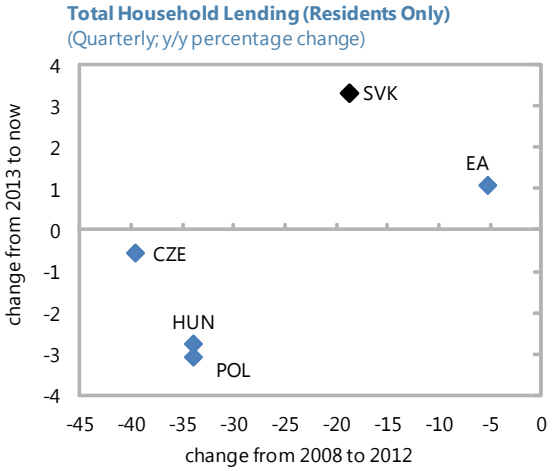


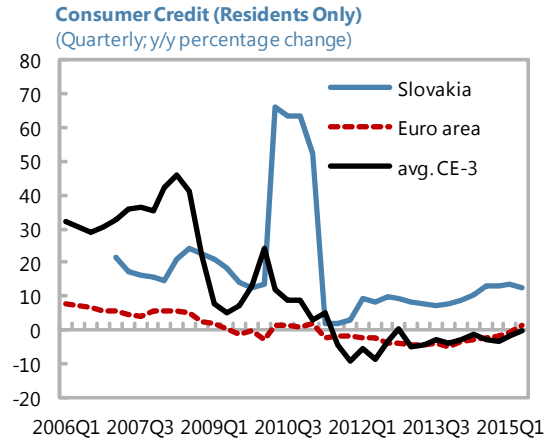
Source: Haver Analytics ; and IMF staff calculations,

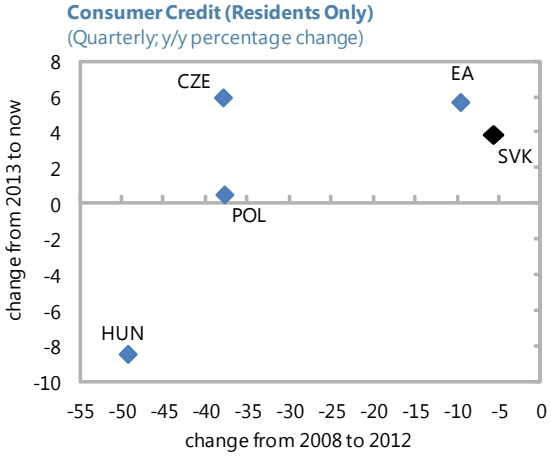
Figure 9. Credit Conditions—Lending Volumes

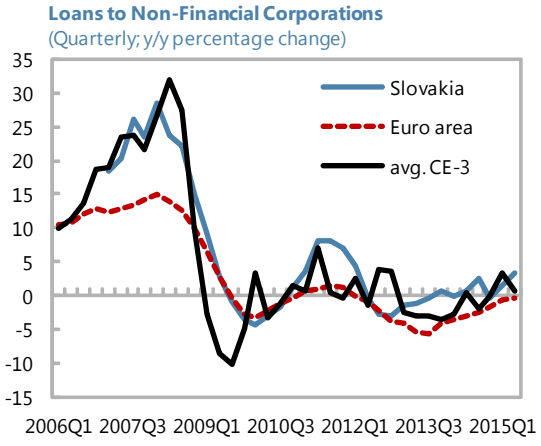
Household lending growth in Slovakia has been extraordinary, even if compared to regional peers.

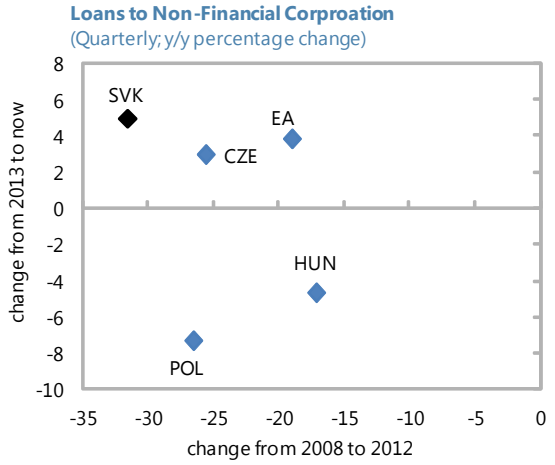








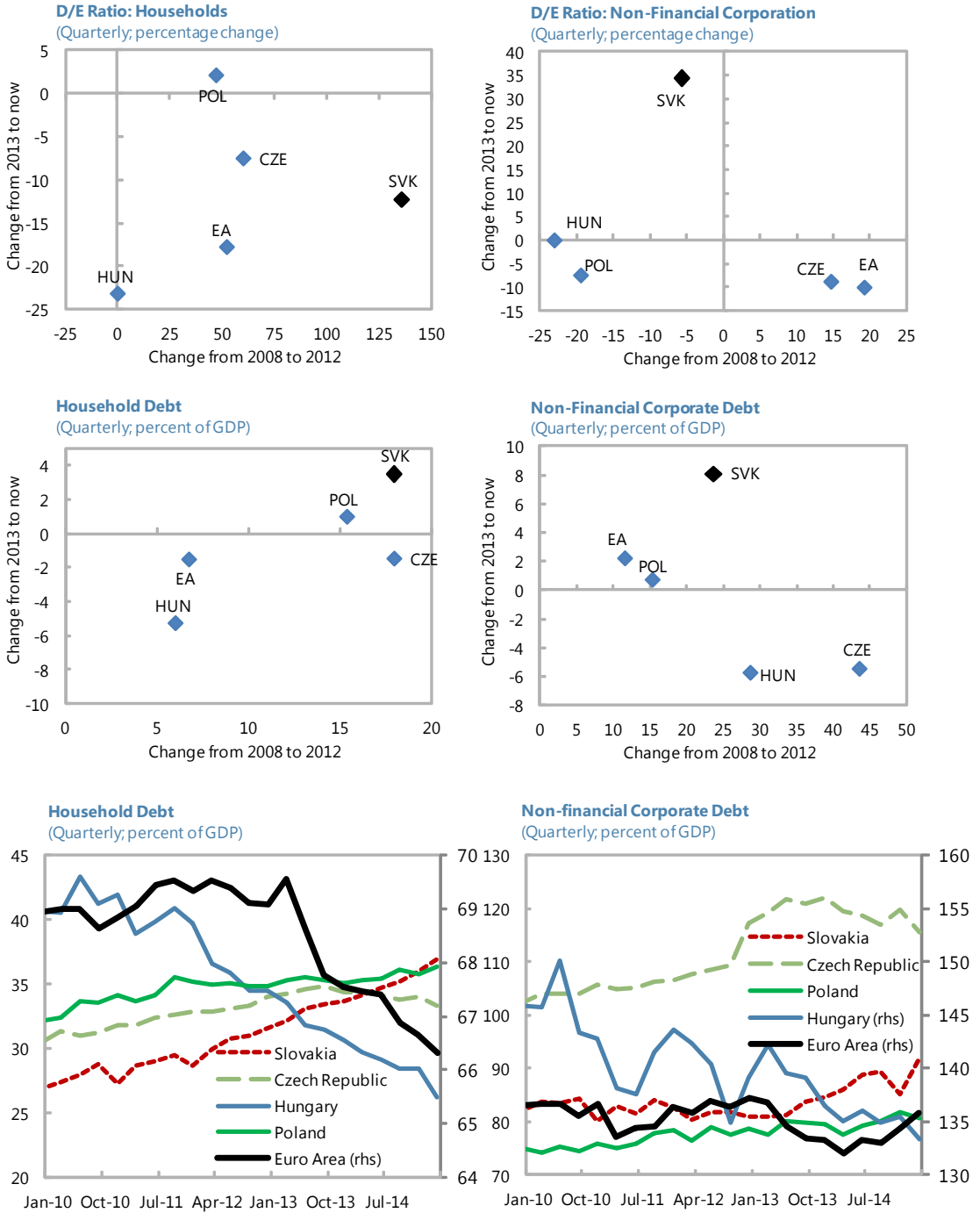




Sources: Haver Analytics and IMF staff calculations.

Figure 10. Household and Corporate Leverage

Slovakia has experienced a rapid increase of private sector indebtedness, with the rise for non-financial corporates largely due to intra-group lending within large corporates.

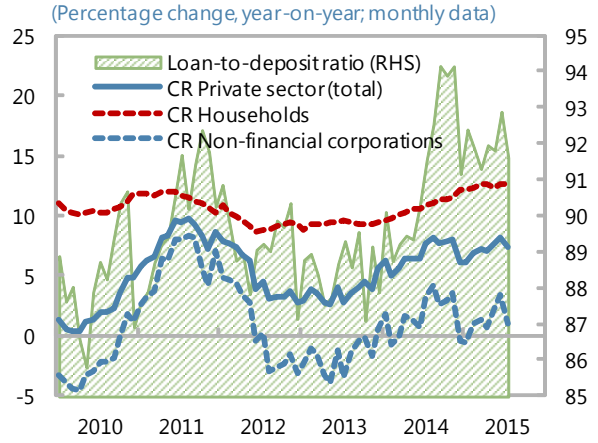


Sources: Haver Analytics and IMF staff calculations.

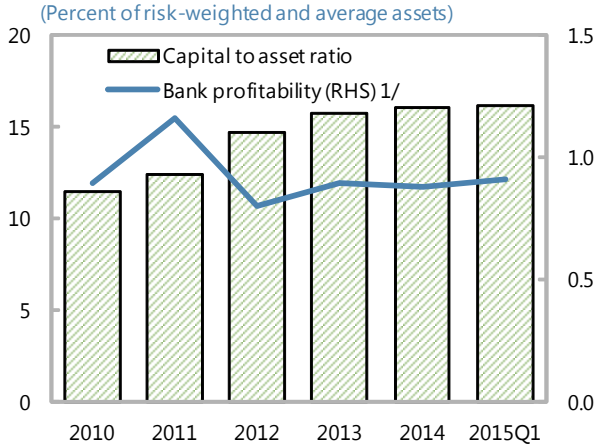
Figure 11. Banking Sector Indicators

Banks remain well-capitalized. Although provisioning has lagged somewhat, the accumulated loan loss provisions remain high, and loss absorption of potential credit losses is high. The rapid expansionn of credit has amplified asset-liability mismatches but the loan-to-deposit ratio is still low at 90 percent.

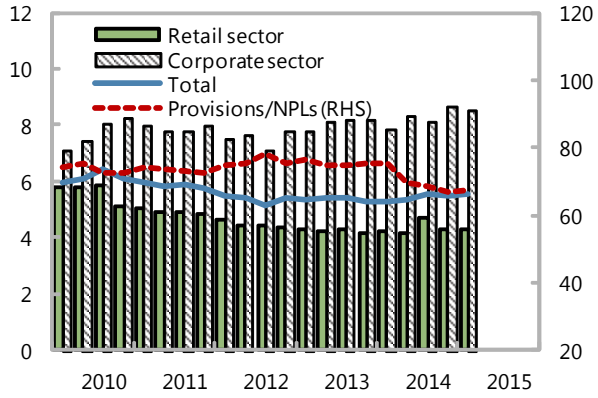
Private Sector Credit and Deposits
(Percentage change, year-on-year; monthly data)



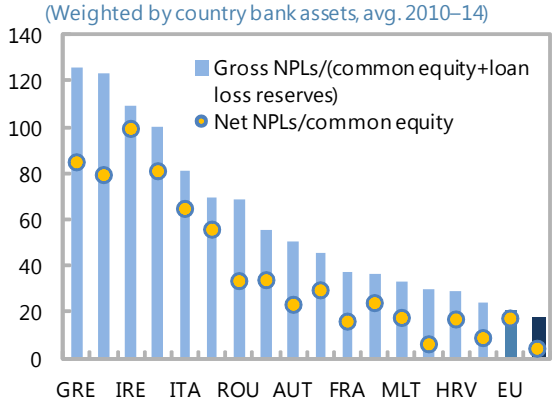
Tier 1 Capital Adequacy Ratio and Bank Profitability
(Percent of risk-weighted and average assets)



Nonperforming Loans (NPLs) and Provisions
(Percent, quarterly data)



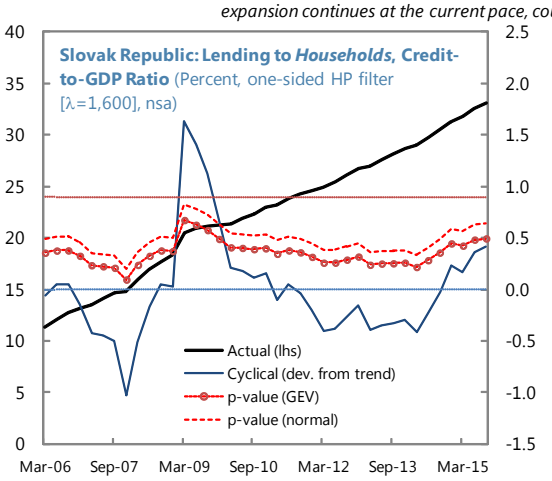
Europe: "Texas Ratio" (NPL to Common Equity and Loan Loss Reserves)
(Weighted by country bank assets, avg. 2010–14)

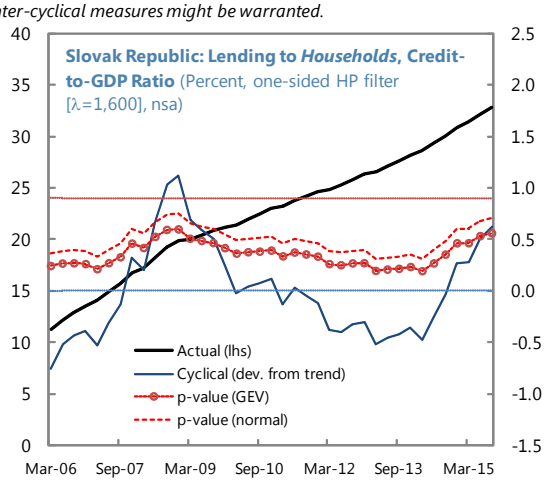


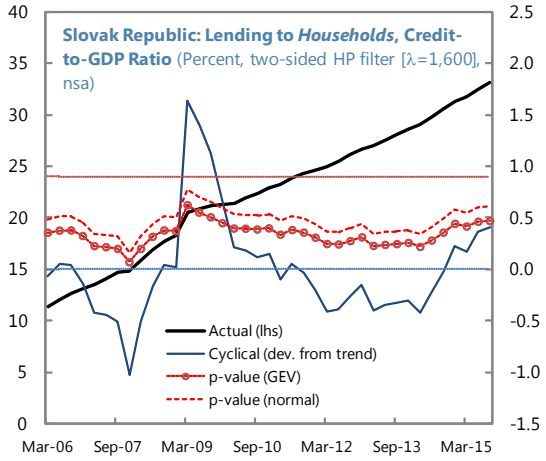
Sources: EBA; Haver; National Bank of Slovakia; Global Financial Stability Report; SNL; and IMF staff calculations.
1/ Net income after taxes on average assets.

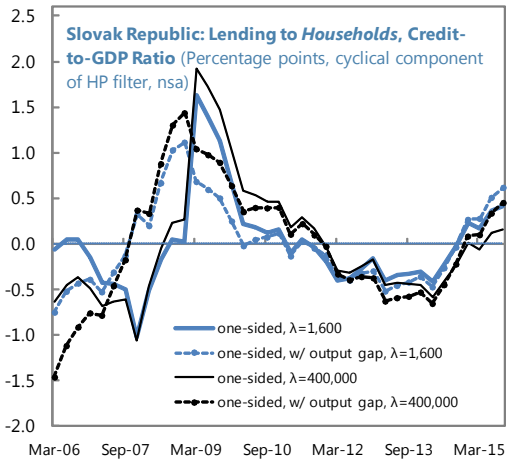
Figure 12. Slovak Republic: Credit Gap Analysis

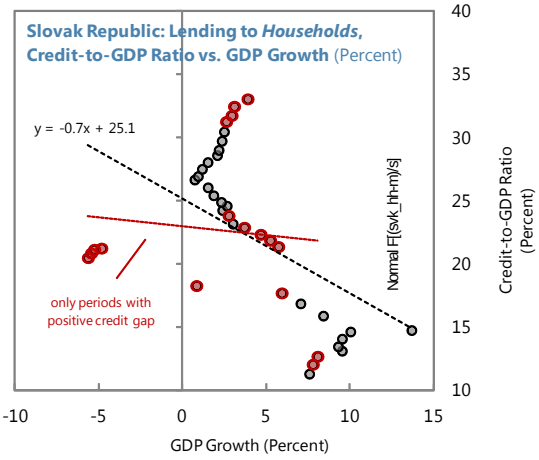
The credit gap of household lending has widening since early 2014 but does not indicate excessive credit growth yet; however, if credit expansion continues at the current pace, counter-cyclical measures might be warranted.

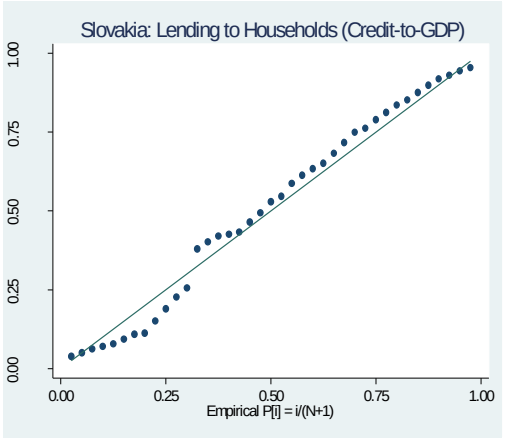








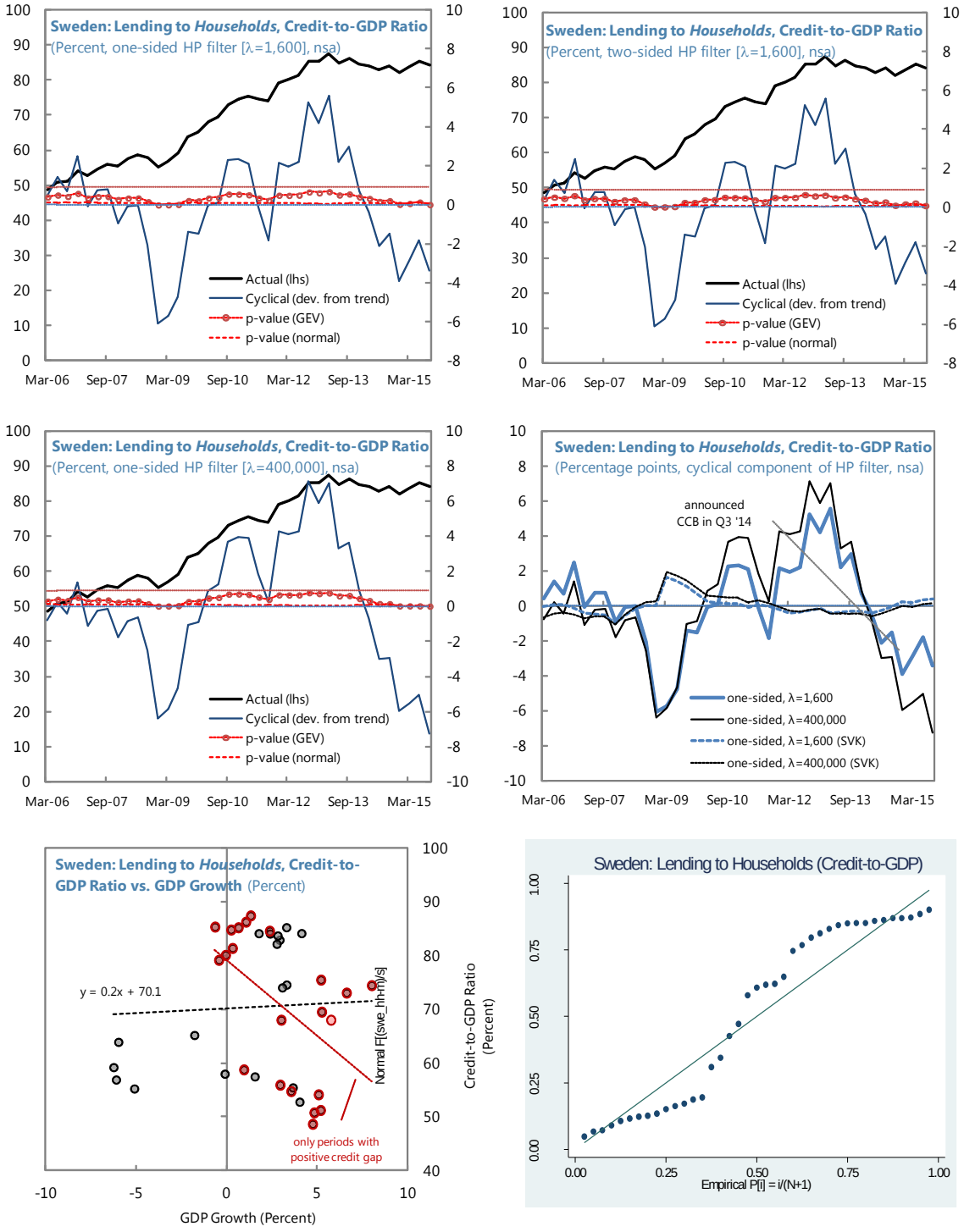




Sources: BCBS; ESRB; Haver Analytics; and IMF staff calculations.
Note: The historical volatility of the credit gap and credit-to-GDP ratio are based on a five-year rolling window (starting Jan. 2001). The chart at the bottom right compares the empirical probability distribution and the hypothetical normal distribution of the credit-to-GDP over the entire sample period of nearly 10 years. A deviation from the diagonal line indicates a deviation from the normal distribution.

Figure 13. Sweden: Credit Gap Analysis

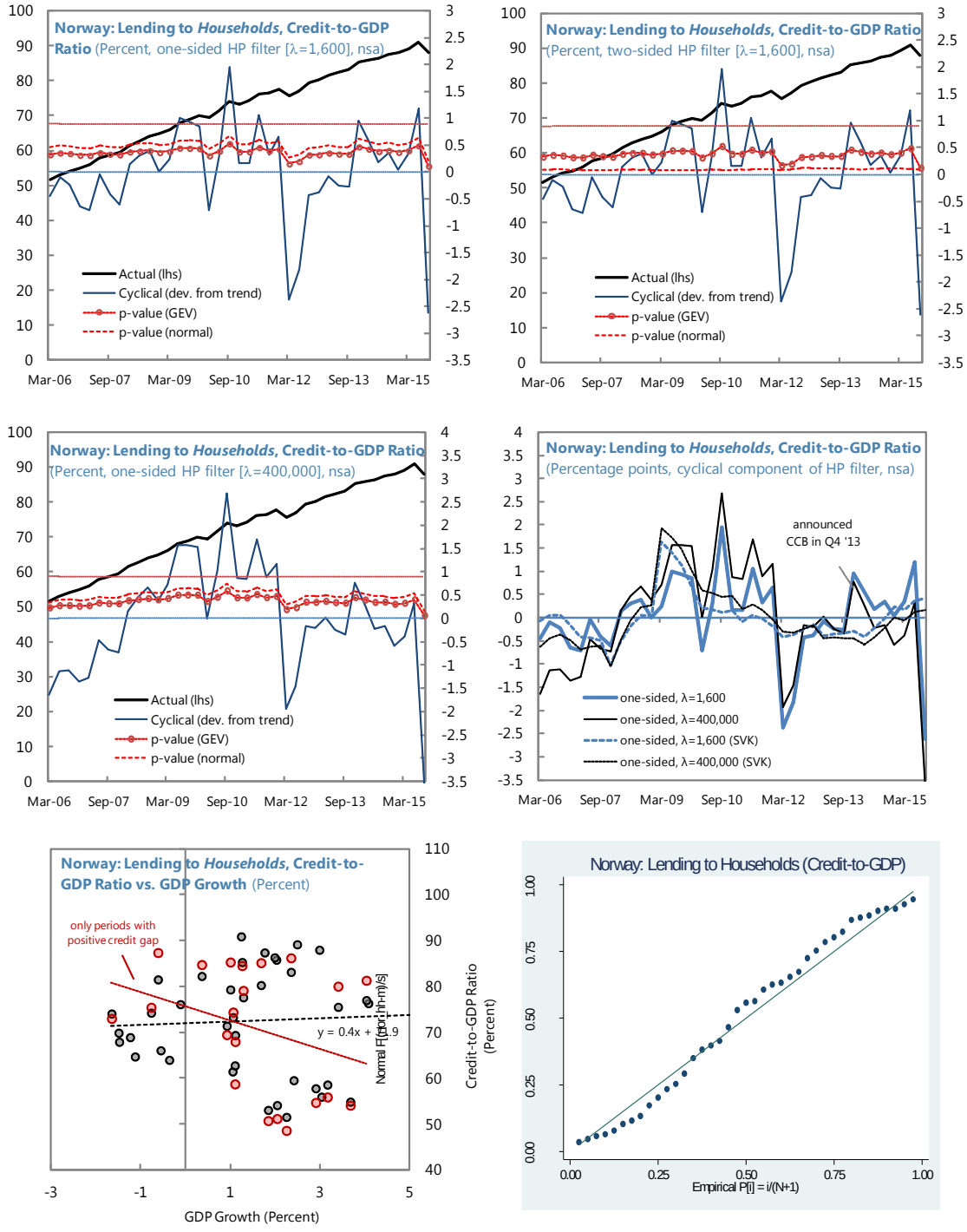
Sweden effectively announced macro-prudential measures, including a counter-cylical capital buffer (CCB), which halted excessive credit growth; however, the variation of the credit gap during the credit cycle far exceeds that of Slovakia.



Sources: BCBS; ESRB; Haver Analytics; and IMF staff calculations.
Note: The historical volatility of the credit gap and credit-to-GDP ratio are based on a five-year rolling window (starting Jan. 2001). The chart at the bottom right compares the empirical probability distribution and the hypothetical normal distribution of the credit-to-GDP over the entire sample period of nearly 10 years. A deviation from the diagonal line indicates a deviation from the normal distribution.

Figure 14. Norway: Credit Gap Analysis

The timing of raising the counter-cyclical buffer (CCB) in Norway coincided with a small positive credit gap, similar to projections in Slovakia for early 2016 if credit growth continues at the current rate; during Q3 2015 credit growth slowed dramatically.



Sources: BCBS; ESRB; Haver Analytics; and IMF staff calculations.

Note: The historical volatility of the credit gap and credit-to-GDP ratio are based on a five-year rolling window (starting Jan. 2001). The chart at the bottom right compares the empirical probability distribution and the hypothetical normal distribution of the credit-to-GDP over the entire sample period of nearly 10 years. A deviation from the diagonal line indicates a deviation from the normal distribution.