REPUBLIC OF LITHUANIA

2014 ARTICLE IV CONSULTATION

May 2014

SELECTED ISSUES

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REPUBLIC OF LITHUANIA

SELECTED ISSUES

April 18, 2014

Approved By **European Department**	Prepared By Nan Geng and Hélène Poirson (both EUR)

CONTENTS

SUSTAINABILITY OF PUBLIC FINANCES AND LOW INFLATION ON THE EVE OF LITHUANIA'S EURO ADOPTION APPLICATION

1.   **Lithuania aims to adopt the euro in 2015—it would be the fifth EU member state in Central and Eastern Europe to do so after Slovenia in 2007, Slovakia in 2009, Estonia in 2011, and Latvia in 2014.** Lithuania already tried to join the euro area back in 2007 but narrowly missed the inflation entry criterion when it was assessed in the spring of 2006. Indeed, inflation ended up rising further thereafter as domestic overheating intensified up until the height of the global financial crisis in 2008/09, which plunged the economy into a deep recession.

2.   **This time Lithuania seems on track to meet all four quantitative entry criteria for euro adoption.** The European Commission and the ECB will formally assess Lithuania's readiness in their June 2013 convergence reports, which form the basis for a final ECOFIN decision in July. At the heart of the assessment will be four entry criteria: (i) a fiscal deficit below the Maastricht threshold of 3 percent of GDP in 2013; (ii) a debt-to-GDP ratio of no more than 60 percent of GDP at end-2013; (iii) annual average inflation below the average of the three "best performing" EU countries plus a margin of 1.5 percentage points; and (iv) interest rates on long-term government debt below the average of the same "best performers" plus a margin of 2 percentage points. Available data suggest compliance with all four criteria.

3.   **This set of Selected Issues Papers assesses the sustainability of sound public finances and low inflation—necessary in staff's view for successful euro area membership beyond the entry criteria.[1]** The strictures of monetary union make it difficult to deal with high public debt— ensure its continued rollover or reduce the debt ratio—underscoring the heightened need to avoid the accumulation of excessive public debt in the first place. Similarly, any erosion of competitiveness from periods of excessive price and wage inflation become particularly costly to correct in a monetary union because exchange rate depreciation is no longer an option, thereby putting a premium on steering clear of inflationary bouts.

4.   **The chapter on fiscal sustainability speaks to Lithuania's overall sound public finances.** While the government rightly aims for further fiscal consolidation to achieve the medium-term objective of a broadly balanced budget, the deficit has already been reduced to stabilize debt under

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[1] The chapters benefitted from the discussions with the Ministry of Finance and the Bank of Lithuania during the 2014 Article IV Consultation. The research assistance of Bartek Augustyniak and Felix Winnekens is gratefully acknowledged. Fernando Morán's and Solange de Moraes Rego's support was instrumental in finalizing this document.

reasonable assumptions for future economic growth. At some 40 percent of GDP, public debt is relatively low by both EU and emerging market standards and its structure is favorable. Downside risks to public finances over the medium term seem limited. Moreover, there is ample room to further improve fiscal performance to achieve the consolidation objectives, address the fiscal challenges associated with population aging, and deal with eventualities.

5.   **Over the medium term, inflation in Lithuania will likely run somewhat higher than in the euro area on average, but this will be driven by continuing income convergence, according to the chapter on inflation sustainability.** The long-term inflation track record is favorable and Lithuania has demonstrated the ability to deliver adjustment when needed without recourse to exchange rate depreciation. Past inflation differentials with the euro area are found to be well explained by productivity catching-up in the tradable goods sector—the "Balassa-Samuelson effect." However, in the shorter run, inflation differentials are strongly driven by divergent business cycle positions and asymmetric effects of commodity price developments. The latter seem responsible for inflation in Lithuania falling below that of the euro area in early 2014. As they run their course, underlying Balassa-Samuelson effects are likely to come to the fore and restore the historical pattern of somewhat higher inflation in Lithuania.

6.   **The benign outlook for public finances and inflation is contingent on historical patterns of economic policy making and private sector behavior remaining in place after euro adoption.** The disciplined approach to fiscal policy is assumed to continue after 2015 rather than giving way to complacency after passing the milestone of euro adoption. On the inflation front, wage setting behavior is assumed to conform to historical patterns. Productivity catching-up is also set to match past patterns. Considering Lithuania's two-decade success under the currency board arrangement—which imposes strictures similar to those of membership in a monetary union—continuity appears a fair assumption.

7.   **A common finding of both chapters is the need to strengthen policy frameworks to reduce the volatility in fiscal and inflation performance.** Long-term average performance has been favorable, but the volatility of fiscal deficits and inflation has been much higher than in the euro area. This is largely related to Lithuania's boom-bust cycle during the past decade, which allowed structural fiscal deficits to build up under the surface and inflation to escalate in the boom years. While Lithuania has demonstrated the economic flexibility and the political grit to deliver the needed adjustment thereafter, this has imposed costs on the economy that could have been partly avoided under better policy frameworks to smooth the business cycle.

SUSTAINABILITY OF LITHUANIA'S PUBLIC FINANCES[1]

1.   **This chapter aims to assess Lithuania's fiscal sustainability.** Section A evaluates Lithuania's track record of fiscal performance, with a focus on the period since the 2008/09 crisis. Section B presents medium-term projections for public finances, including all major downside and upside risks to them. Conclusions and policy recommendations are offered in Section C.

## A. What Has Been Achieved Since 2008/09 and Where Do We Stand Now?

2.   **Lithuania's public finances are back on track thanks to a tremendous post-crisis consolidation effort.** With deficits of around 1 percent of GDP in the boom years 2003–08, the public debt ratio declined to just 15 percent of GDP. But much of the improvement proved cyclical and went into reverse when the economy fell into deep recession in 2009. Despite emergency consolidation measures, the deficit deteriorated sharply to 9.4 percent of GDP and it took a determined multi-year effort to put public finances back on track. In 2012, the general government deficit had declined to 3.2 percent of GDP—just enough for the Excessive Deficit Procedure to be abrogated in spring 2013, taking into account the net cost of Lithuania's systemic pension reform. The deficit declined further to an estimated 2.1 percent of GDP in 2013, ahead of the 2½-percent-of-GDP target in the budget (Text Figure 1). The bulk of the improvement in the fiscal position has so far been driven by expenditure-side measures, with none of the major spending categories spared (Text Figures 2 and 3).

Text Figure 1. General Government Fiscal Deficit
(Percent of GDP)
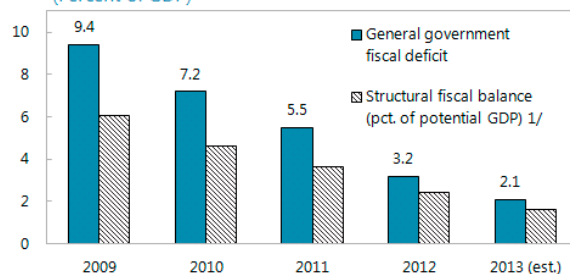
Sources: Eurostat and IMF staff estimates.
1/ Calculation takes into account standard cyclical adjustments as well as absorption gap.

Text Figure 2. Composition of Cumulative Fiscal Adjustment after Crisis: Revenue vs. Expenditure-Based
(Excl. temporary measures on transfers to Pillar II pension funds)

Source: IMF staff estimates.
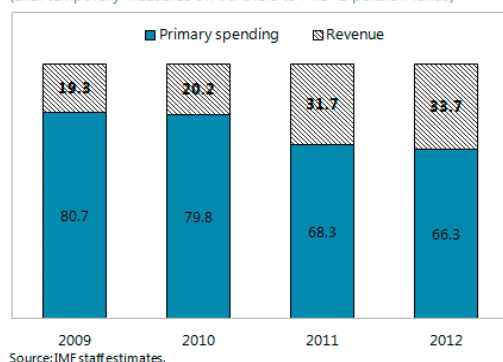
Text Figure 3. Structure of Expenditure-Based Measures in Lithuania 1/
(Percent of total, 2009-12)
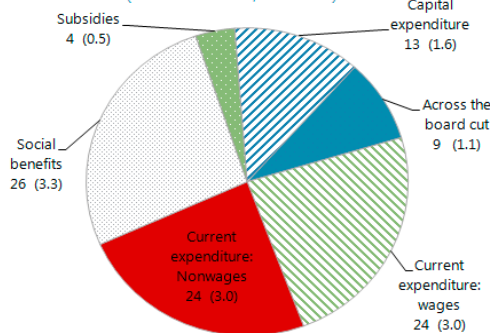
Source: IMF staff estimates.
1/ Percent of GDP in parentheses.

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[1] Prepared by Nan Geng (EUR).

3.   Gross public debt remains low by EU standards and EM thresholds; interest rate, exchange rate, and rollover risks are well contained. The ratio of public debt to GDP increased rapidly in the post-crisis period, but remained well below the 60 percent mark of the Stability and Growth Pact. By 2013 it had stabilized at some 40 percent of GDP, and steers well clear of the threshold considered prudent for emerging market economies (Text Figure 4). Rollover and interest rate risks are limited, considering the small shares of short-term debt (6.1 percent of total) and floating-rate debt (1.1 percent of total) (Text Figure 5). The share of foreign currency-denominated debt is considerable, but exchange-rate risks remains muted because it is either denominated in Euros (Text Figure 6)—the anchor currency of Lithuania's currency board arrangement—or fully hedged through derivative transactions. Lithuania's public debt is mainly foreign held, primarily by institutional and long-horizon investors that have demonstrated commitment to their positions (Text Figure 7). Soon after the depth of the crisis, Lithuania managed to tap capital markets again in June 2009, thereby avoiding recourse to an international financial assistance program. Interest rates were initially elevated, but came down quickly with Lithuania placing a 10-year Eurobond at a record-low yield of 3.46 percent this January. Thus far, the tapering of unconventional monetary policy in the U.S. has had little repercussions for Lithuania.

Text Figure 4. General Government Gross Debt
(Percent of GDP)
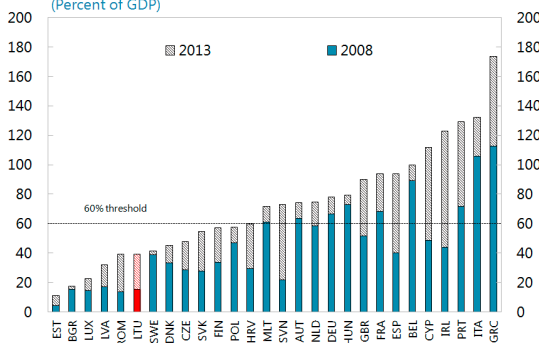
Sources: IMF World Economic Outlook; and IMF staff calculations.

Text Figure 5. General Government Gross Debt by Original Maturity, 2013
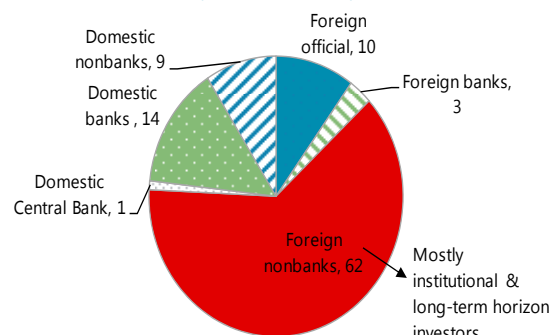(Percent)
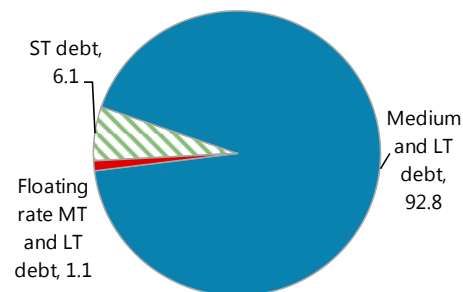
Source: Ministry of Finance of Lithuania.

Text Figure 6. Central Government Gross Debt by Currency Denomination, 2013
(Percent)
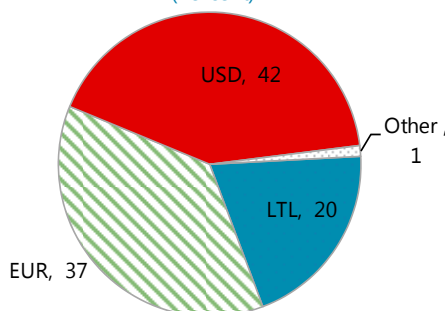
Source: Ministry of Finance of Lithuania.

**Text Figure 7. Investor Base of General Government Debt**
(Percent, end-2012)

Source: Bank for International Settlements.

B. Fiscal Prospects, Debt Sustainability, Risks, and Policy Room

Baseline Projections

4.   In the baseline projections deficits remain well below the Maastricht threshold (Text Figure 8). Baseline projections reflect a passive scenario that accounts only for announced budgetary measures. It incorporates the budgeted deficit of 1.9 percent of GDP for 2014. Beyond 2014, only a few fiscal policy changes with very limited impact have been announced and are incorporated. Otherwise, most revenue and expenditure categories are assumed to grow in line with GDP, but VAT and excise tax collections are projected to expand somewhat faster as tax administration improves and the absorption gap closes. As a result, the deficit is projected to improve to 1.5 percent of GDP by 2019.

Text Figure 8. General Government Fiscal Deficit: Baseline Projections Under Passive Scenario
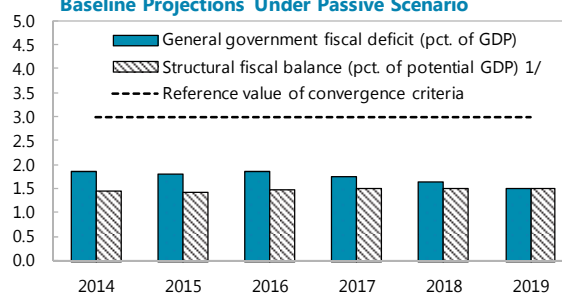
Source: IMF staff estimates.
1/ Calculation takes into account standard cyclical adjustments as well as absorption gap.

5.   The debt ratio is set to decline over the medium term. The deficits under the baseline would be sufficient to reduce the debt ratio to some 35 percent of GDP over the next five years, mainly on account of GDP growth, which is projected to gradually pick up from 3.3 percent in 2014 to 3¾ percent over the medium term (Text Figures 9 and 10). In their 2013 Convergence Program, the authorities pledged a medium-term structural deficit objective of 1 percent of GDP. Approaching it in annual consolidation increments equivalent to ½ percent of GDP would secure a somewhat faster debt reduction trajectory than under the baseline (indicated by the dashed line in Text Figure 9). Moreover, the authorities have indicated that their next Convergence Program will target a more ambitious consolidation path.

Text Figure 9. General Government (GG) Gross Debt and Primary Deficit
(Percent of GDP)
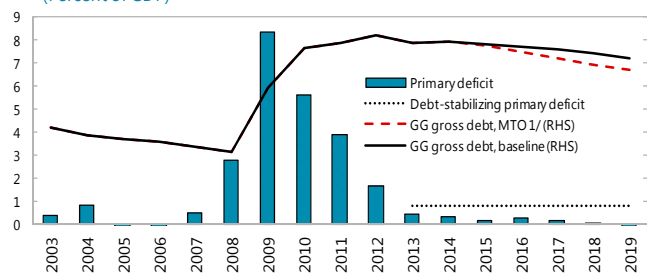
Sources: Eurostat; Ministry of Finance of Lithuania; and IMF staff calculations.
1/ MTO scenario assumes structural adjustment of 0.5% of GDP until MTO of 1% of GDP structural deficit is reached.

Text Figure 10. Debt-Creating Flows
(Percent of GDP, baseline scenario)
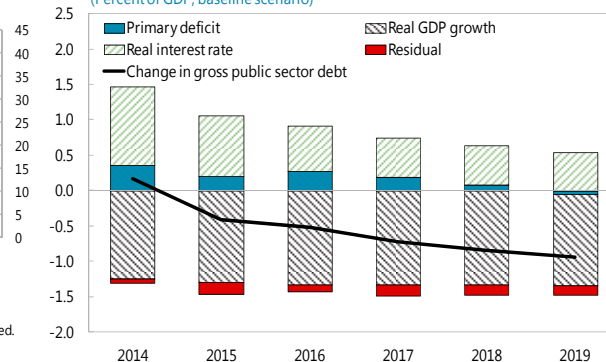
Sources: National authorities; and IMF staff calculations.

Resilience of Baseline Projections to Adverse Shocks

6.   Applying both standard and customized shocks under the IMF's debt sustainability analysis shows that the public debt ratio would remain below the 60-percent-of-GDP Maastricht threshold in all cases. Even in the unlikely event that key parameters such as the primary balance and real growth went back to their ten-year historical averages, which include the challenging crises years, debt would not breach the 50-percent of GDP mark by 2019 (Text Figure 11). The debt trajectory would remain essentially unchanged from the baseline if primary deficits remained pegged to their 2014 value (Text Figure 12). A combined shock of fiscal relaxation, lower GDP growth, and higher interest rates would set public debt on an upward trajectory, but even without any corrective action it would remain below 50 percent of GDP over the next five years and below 60 percent of GDP over thirteen years (Text Figure 13).

Text Figure 11. Debt-to-GDP Ratio under Customized Alternative Scenario 1 2/
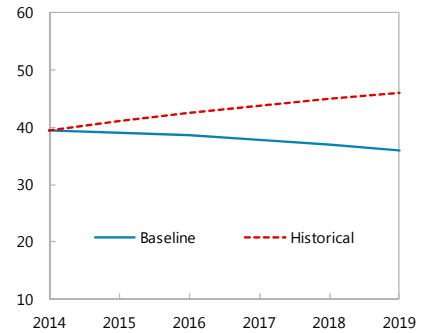
1/ Under this shock scenario, real GDP growth, real interest rate, and primary balance are set at historical averages.

Text Figure 12. Debt-to-GDP Ratio under Customized Alternative Scenario 2 1/
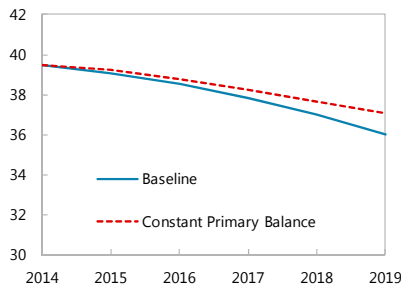
1/ Under this shock scenario, primary balance is set as constant as in the first year of projection.

Text Figure 13. Debt-to-GDP Ratio under Customized Alternative Scenario 1/
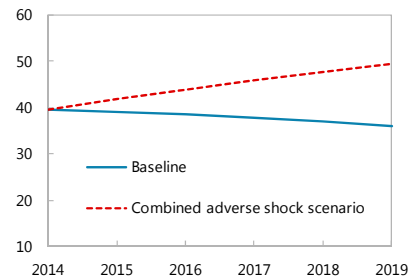
1/ Real GDP grows 2 ppts lower, primary balance is 2 ppts worse and interest rate is 25 bps higher than baseline under the shock scenario.

Downside Risks to Baseline Projections

7.   There are small Lithuania-specific downside risks, but these would not make a material difference to debt projections. These include:

- Difficulties in controlling local government deficits, with spending overruns and arrears accumulation. While problematic, to put this issue into perspective, it is useful to recall that arrears accumulation accounted for 0.2 and 0.15 percent of GDP in 2012 and 2013, with the stock now standing at 1 percent of GDP. Explicit local government debt currently stands at 1.6 percent of GDP. In terms of their spending, local governments account for a moderate 9 percent of Lithuania's public sector.

- The fiscal cost of bank restructuring related to the interventions of Snoras and Ukio banks in 2011 and 2013. In this context, the government extended loans to the Deposit Insurance Fund for bank resolutions, with outstanding balances of 1.5 and 0.7 percent of GDP, respectively. Snoras-related loans are expected to be fully repaid by the bankruptcy estate. It is less clear

whether this would also be possible for the Ukio-related loan, but other revenues of the Deposit Insurance Fund are a secondary line of defense.

- Revenues from the sale of carbon emission rights. These amount to around 0.3 percent of GDP, but the associated earmarked spending has yet to take place, which would push up the deficit somewhat if not offset elsewhere in the budget.

- Finally, the government has yet to implement the court-mandated compensation of disproportionate pension and wage cuts during the crisis years, which were found to be unconstitutional. Compensation payments are not reflected in the 2014 budget or incorporated into the baseline projections. They are estimated to amount to between 0.8 and 1.5 percent of GDP, but would be a one-off expense (Text Table 1).

Text Table 1. Constitutional Court Rulings on Restoration and Compensation of Disproportionate Public Sector Pension and Wages Cuts

	Constitutional Court Ruling (CCR)	Subject	Implementation status	Budgetary Impact
Wages	July 2013 CCR	Restoration	Restored in Oct 2013	LTL 34 million in 2013 and additional LTL 211 million in 2014 (0.19 ppt of GDP in total)
		Compensation	No concrete timetable for implementation specified yet.	0.2-0.6 ppt of GDP
Pensions	April 2010 CCR (February 2012 CCR re-iterated the April 2010 CCR; it also ruled that postponement of compensation of pension cuts is not unconstitutional.)	Restoration	Restored in 2012	LTL 500 million (or 0.5 ppt of GDP)
		Compensation	Compensation envisaged to begin in late 2014.	0.6-0.9 ppt of GDP

8.   The risk that post-crisis expenditure compression unwinds could be defused by careful changes in the composition of spending. Post-crisis consolidation left Lithuania with the lowest ratio of public spending to GDP in the EU, together with Bulgaria (Text Figure 14). This raises the question whether such low spending is sustainable or advisable. Cuts in certain areas have been substantial—capital spending declined by 21 percent in real terms compared to the 2006–08 average and outlays for goods and services are down 7 percent—while real GDP has increased by 3 percent (Text Tables 2, 3 and 4). Anecdotal evidence suggests that cuts have gone too far in

Text Figure 14. Size of Public Sector, 2012
(General government expenditure as percent of GDP)

Sources: WEO and IMF staff estimates.

some areas, with complaints that roads are no longer properly maintained or that the resources of the anti-corruption agency have been unduly curtailed. On the other hand, the share of population drawing disability benefits remains much above international norms (Text Table 5) and Lithuania maintains a large number of universities compared to its small population size. A public expenditure review would help identify ways to reallocated spending within an overall tight envelope to improve sustainability and increase the quality and efficiency of public spending more generally.

Text Table 2. Lithuania General Government Expenditure by Economic Classification

| | 2006 | 2007 | 2008 | 2012 | 2013 | Change in 2013 with regards to average 2006-08 | | |
						% nominal	% real	ppts of GDP
		(billions of litas)						
Total expenditure	27.8	34.4	41.7	40.9	41.8	20.9	2.8	0.0
Current spending	24.4	29.2	36.1	36.9	37.5	25.3	6.5	1.1
Compensation of employees	8.6	9.8	12.0	11.2	11.1	9.3	-7.2	-1.0
Goods and services	4.9	5.2	6.4	5.8	6.0	10.1	-6.7	-0.5
Interest payments	0.6	0.7	0.8	2.0	2.1	211.2	163.3	1.1
Subsidies	0.6	0.9	0.8	0.4	0.5	-30.7	-41.3	-0.3
Grants	0.6	0.7	0.9	0.9	0.9	24.7	5.8	0.0
Social benefits	8.4	10.6	14.2	15.8	15.7	42.2	21.4	2.0
Other expense	0.7	1.4	1.1	1.0	1.1	0.8	-14.3	-0.2
Capital spending	3.4	5.1	5.6	3.9	4.3	-7.7	-21.4	-1.1
Nominal GDP growth	83.2	99.2	111.9	113.7	119.3	21.6	3.1	

Sources: Eurostat and IMF staff calculations.

Text Table 3. Lithuania General Government Expenditure by Functional Classification

| | 2006 | 2007 | 2008 | 2012 | Change in 2012 with regards to average 2006-08 | | |
					% nominal	% real	ppts of GDP
		(Percent of GDP)					
Total expenditure	34.2	35.3	37.9	36.1	16.3	0.5	0.3
General public services	4.1	4.0	3.9	4.3	24.9	7.5	0.3
Defence	1.6	1.9	1.4	1.0	-28.7	-38.8	-0.6
Public order and safety	1.8	1.7	1.9	1.8	15.6	-0.2	0.0
Economic affairs	4.1	4.2	4.7	3.3	-12.3	-24.1	-1.0
Environment protection	0.8	0.9	0.8	0.9	25.1	7.8	0.1
Housing and community amenities	0.3	0.3	0.4	0.2	-31.4	-40.4	-0.1
Health	5.3	5.3	5.6	5.9	26.3	9.0	0.5
Recreation, culture and religion	1.0	1.0	1.1	0.8	-10.7	-22.8	-0.2
Education	5.3	5.2	5.8	5.6	19.0	2.8	0.2
Social protection	9.8	10.9	12.3	12.1	26.1	9.4	1.1
Nominal GDP growth					21.6	3.1	

Sources: Eurostat and IMF staff calculations.

Text Table 4. General Government Expenditure by Functional Classification: Lithuania vs. EU27

	Lithuania (2012)	EU27 (2011)	Difference (Lithuania - EU27)/EU27 (Percent)
	(Percent of GDP)		
Total expenditure	36.1	49.1	-26.5
General public services	4.3	6.6	-34.8
Defence	1.0	1.5	-33.3
Public order and safety	1.8	1.9	-5.3
Economic affairs	3.3	4.0	-17.5
Environment protection	0.9	0.9	0.0
Housing and community amenities	0.2	0.9	-77.8
Health	5.9	7.3	-19.2
Recreation, culture and religion	0.8	1.1	-27.3
Education	5.6	5.4	3.7
Social protection	12.1	19.6	-38.3

Sources: Eurostat and staff calculations.

Text Table 5. Disability Benefit Claims by Age Groups

| | Number of disabled per 1000 | | | |
	20-34	35-44	45-54	55-59
OECD14 Average, 1999	15	33	73	144
Lithuania, 2005	11	46	113	233
Lithuania, 2009	8	43	108	226
Lithuania, Jan. 2014	10	47	119	241

Sources: OECD database on programs for disabled persons; Lithuanian SoDra; and Statistics Lithuania.

9.   This leaves the long-term concern how to deal with mounting fiscal costs related to population aging. According to the 2012 Ageing Report by the European Commission, Lithuania's old-age dependency ratio is expected to rise from 1:4 currently to 1:3 by 2030 and to 1:1.5 by 2060, significantly more than elsewhere in the EU. If unaddressed, this would add 5–6 percent of GDP to

public spending on pensions and health between 2014 and 2060, again significantly above the EU average (Text Table 6). While the bulk of these additional costs will only materialize after 2030, it remains important to address it through pension reform early in view of the usually long lead time for such reforms. In addition, it may be necessary to fall back on some of the upside potential in Lithuania's public finances (see below) to deal with the fiscal fallout from the aging challenge.

Text Table 6. Projections of the Ageing-related Fiscal Cost
(Percent of GDP)

	2010	2015	2020	2030	2040	2050	2060	Change compared with 2010 (pct.)
Old-age dependency ratio (20-64) (percentage)								
Lithuania	26	27	29	39	46	52	62	36
EU27	28	31	34	42	50	55	58	29
Euro Area	30	33	36	44	53	57	58	28
Pension expenditure								
Lithuania	8.6	7.4	7.6	8.4	9.6	10.8	12.1	3.5
EU27	11.3	11.2	11.3	11.9	12.6	12.8	12.9	1.5
Euro Area	12.2	12.1	12.3	13.1	13.9	14.3	14.1	2.0
Health expenditure								
Lithuania	4.9	5.1	5.2	5.3	5.5	5.6	5.6	0.7
EU27	7.1	7.3	7.4	7.8	8.1	8.3	8.3	1.1
Euro Area	7.3	7.4	7.6	7.9	8.3	8.4	8.4	1.1

Source: "The 2012 Ageing Report", European Commission, 2011.

Policy Space to Improve Upon the Baseline

10.   Lithuania's public finances have ample room for further improvement, mostly related to underexploited tax revenue potential (Geng, 2013). At about 26 percent of GDP in 2011,

Lithuania's overall tax take is the lowest in the EU— some 13, 6 and 4 percentage points of GDP lower than EU, CEE, and the other Baltics averages, respectively. To a large extent, the gap reflects generous allowances, exemptions, and preferential rates in Lithuania's tax system, thereby shrinking the tax base and complicating compliance while not always being effective in achieving economic or social objectives. Lithuania's large shadow economy, which mostly escapes taxation, is another key factor (Text Figure 15).


Text Figure 15. Shadow Economy, 2012
(Percent of GDP)
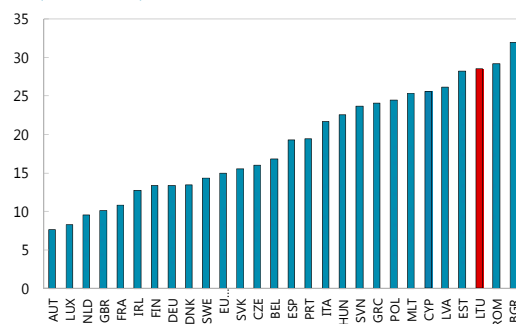
Source: Schneider, F. (2012), "Size and development of the Shadow Economy from 2003 to 2012: some new facts".

11.   Generous tax policy provisions, a large shadow economy, and weak tax administration then lead to an overall low "tax effort" in Lithuania. It is defined as the ratio between actual tax revenue and the tax capacity—the maximum tax revenue that a country can collect given its economic, social, institutional, and demographic characteristics (Pessino and Fenochietto, 2010). At 60.8 percent in 2011, Lithuania's tax effort is well below the average of 77.1 percent for its CEE peers (Text Figure 16). Hence, if Lithuania raised its tax effort

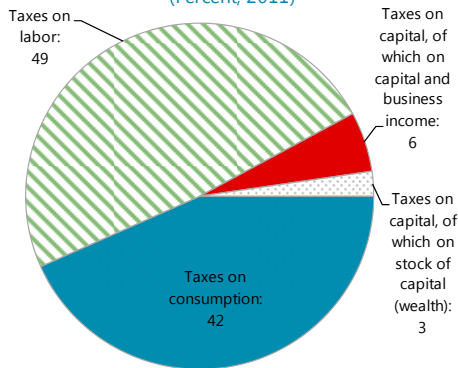**Text Figure 16. Tax Effort in CEE Countries, 2011 1/**
(Percent)
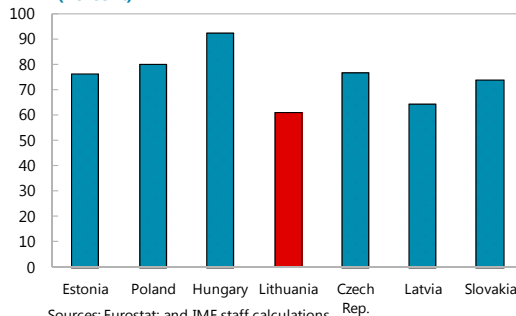
Sources: Eurostat; and IMF staff calculations.
1/ Tax effort is defined as the ratio between actual revenue and tax capacity. Tax capacity is from Pessino & Fenochietto (2010), estimated as a function of variables determining tax-to-GDP potential using panel data of 96 countries .

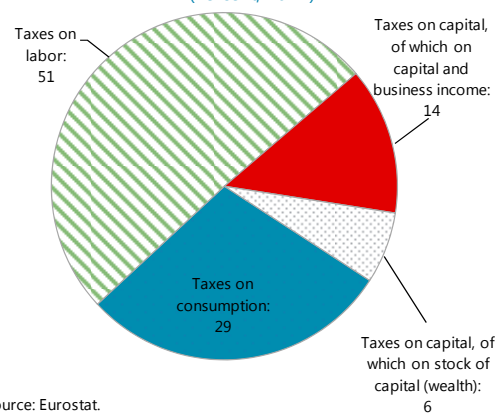to the CEE level, tax revenues would be 27 percent, or 7 percentage points of GDP, higher than currently.

12.   The taxation of capital and wealth is particularly underdeveloped. In comparison with the EU average, Lithuania's tax structure remains heavily reliant on labor and consumption taxes, while taxation of capital remains very light and wealth attracts almost no taxes (Text Figures 17 and 18).

**Text Figure 17. Tax Structure in Lithuania**
(Percent, 2011)

Taxes on labor: 49

Taxes on capital, of which on capital and business income: 6

Taxes on capital, of which on stock of capital (wealth): 3

Taxes on consumption: 42

Source: Eurostat.

Text Figure 18. Average Tax Structure in EU Countries
(Percent, 2011)

Taxes on labor: 51

Taxes on capital, of which on capital and business income: 14

Taxes on capital, of which on stock of capital (wealth): 6

Taxes on consumption: 29

Source: Eurostat.

- Lithuania's revenue from taxing capital and wealth is only one quarter of the euro area average and one half of the CEE average (Text Figure 19). The OECD (2010) ranks capital and wealth taxes as the least-distortive and most growth-friendly source of tax revenue. But it remains the least exploited tax base in Lithuania, especially when it comes to recurrent property taxes. Residential properties valued below one million litas (about €290,000) are not taxed, and neither are motor vehicles nor is net wealth. Property tax collections amount to less than 0.5 percent of GDP, compared to about 2 percent of GDP in the EU (Text Figure 20).

Text Figure 19. Taxation of Capital Stock/Wealth, 2011
(Percent of GDP)
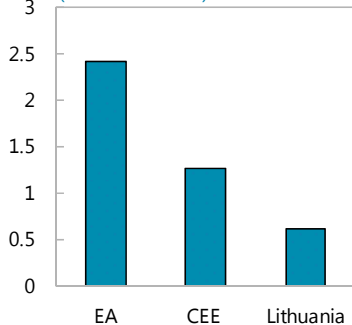
Text Figure 20. Revenue from Property Taxes, 2011
(Percent of GDP)

Recurring taxes on immovable property
Other property taxes

Source: Eurostat.

Source: Eurostat.

- At only 0.8 percent of GDP, Lithuania's corporate income tax (CIT) revenue collections are half those in CEE and one third those in the euro area (Text Figure 21). Apart from the difference in

statutory rates, Lithuania's wider gap between statutory and implicit rate contributes to its relatively low revenue take. At only one fifth of its statutory rate, Lithuania's low implicit CIT rate could reflect various exemptions and preferential rates on capital transfers, capital gains, and corporate profits.[2] Loopholes and compliance gaps likely also play a role (Text Figure 22).

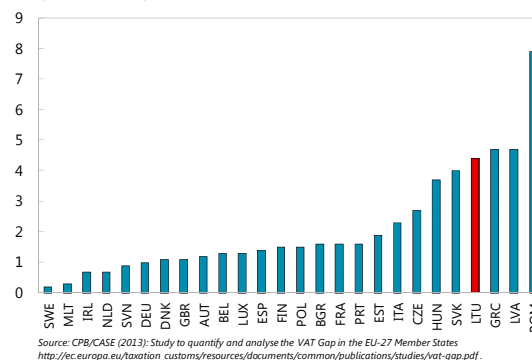**Text Figure 21. Taxation of Corporate Income, 2011**
(Percent of GDP)

Source: Eurostat.
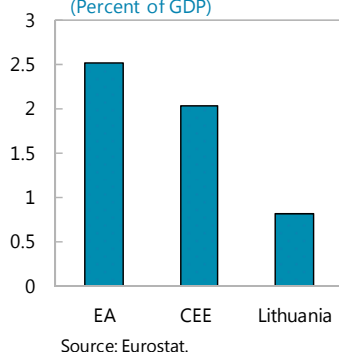
Text Figure 22. Tax Rates of Corporate Income, 2011
(Percent)

Source: Eurostat.
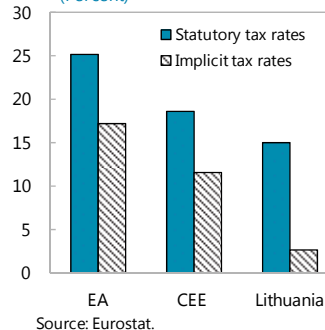
13.   There also appears to be room to raise more revenue from the taxation of consumption, especially through improvements in tax administration. Overall consumption tax collection is comparable to elsewhere in the EU, but this reflects relatively high rates, while the tax yield given these rates remains comparatively poor. For the VAT, a study by the European Commission estimates a compliance gap as high as 4.4 percent of GDP—considerably above the estimates for most other EU countries (Text Figure 23). Meanwhile, smuggling and cross-border shopping are draining excise tax collection.

Text Figure 23. VAT Compliance Gap, 2011
(Percent of GDP)

Source: CPB/CASE (2013): Study to quantify and analyse the VAT Gap in the EU-27 Member States
http://ec.europa.eu/taxation_customs/resources/documents/common/publications/studies/vat-gap.pdf .

14.   Finally, generous exemptions and deductions reduce revenue from the taxation of labor. At around 13 percent of GDP, Lithuania's labor tax revenue is 8 percentage points of GDP below the euro area average and 2 percentage points lower than in CEE peers (Text Figure 24). Various exemptions and deductions drive a large gap between implicit and statutory rates in Lithuania—32 percent against 55 percent from social security contributions (40 percent) and PIT (15 percent), although a relatively low labor share in national income also likely plays a role (Text

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[2] In Lithuania, small enterprises enjoy a preferential 5 percent rate instead of the 15 percent statutory rate; companies in free economic zones are CIT exempt for 6 years, and taxed at half the statutory rate for the following 10 years; there are also various investment incentives, e.g., taxable profits are reduced by up to 50 percent for 'high-tech' investment expenses.

Figure 25). Pensions are neither taxed at the contribution, accumulation, nor payout stage. The PIT largely exempts capital gains and allows deductions of interest payments on mortgages contracted prior to 2009.

Text Figure 24. Taxation of Labor, 2011 (Percent of GDP)

Source: Eurostat.

Text Figure 25. Implicit Tax rates on Labor, 2011 (Percent)

Source: Eurostat.
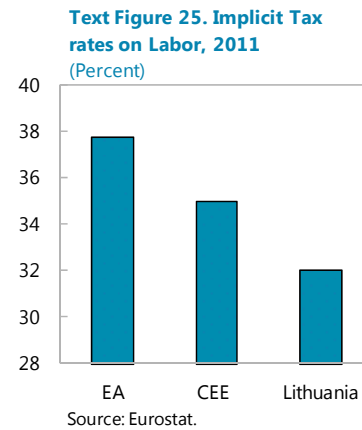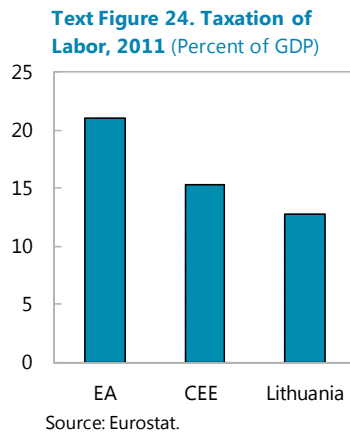
15. **In sum, considerable revenue potential in Lithuania's public finances provide ample scope to advance fiscal consolidation to reach the medium-term objective and deal with downside risks should they materialize.** This space reflects primarily scope to broaden tax bases and strengthen tax administration. It will require policy efforts to exploit this space, although some of the tax administration gains could materialize automatically as income convergence advances and the shadow economy recedes. Text Table 7 summarizes options for revenue-enhancing measures, which give a total annual yield equivalent to 3–4 percent of GDP.

Text Table 7. Lithuania: Options for Revenue-Enhancing Measures

Instrument	Proposed measures	Annual Yield (% of GDP)	
		Short-term	Medium-term
Property / Wealth			
	Broaden the base of residential property tax by lower tax-free threshold	0.4	0.4
	Introduce an annual motor vehicle tax, graduated per engine capacity (or by weight) in line with international best practice	0.4	0.4
	Strengthen inheritance and gift taxation		
CIT	Withdraw exemptions/preferential rates on investment incentive	0.3	0.3
	Withdraw preferential rate on small companies, remove 6 year tax relief in free economic zones and shorten duration for preferential rate	0.1-0.3	0.1-0.3
	Strengthen thin capitalization rule		
PIT	Subject all pension payments to income tax	0.5	0.5
	Restrict the exemption from capital gains tax on housing only for the sale of primary residences and subject all short-term gains on financial assets (realization within three years of acquisition date) to a withholding tax at a rate of 15 percent	0.1	0.1
	Withdraw tax deductibility of mortgage interest payments on mortgages contracted prior to 2009	0.08	0.08
	Consider removal of child allowances	0.12	0.12
Excises	Increase excise duties on fuel (green tax)	0.2	0.2
User charges	Expand on user-charges in the revenue system	0.2	0.2
Revenue administration	VAT compliance gap (including tightening border control and giving government seniority over creditors)	0.5	>1
	Demand partial or full-payment of contested taxes	0.2	0.2
	In case of bankruptcy allow STI to offset refund claims against arrears		
	Mandatory declaration of income, life-style surveys		
Total potential gains		**3.1-3.4**	**3.6-4.1**

Source: IMF staff estimates.

C. Conclusions and Policy Implications

16.   Decisive policy has put Lithuania's public finances back on track after the setback of the 2008/09 crisis. Even without new consolidation measures, public finances would be sustainable in the sense that the ratio of public debt to GDP would decline over time. However, the authorities are rightly targeting a more ambitious adjustment path that would achieve a material reduction of the debt ratio, build fiscal buffers, and guard against easy derailment by adverse shocks. But the underpinning measures to achieve this more ambitious adjustment path have yet to be specified. The authorities would be well-advised to strengthen fiscal frameworks further—including through putting in place a countercyclical rule—to minimize implementation risk.

17.   Downside risks to Lithuania's public finances appear manageable. Most of them prove quantitatively small when put into perspective. Expenditure compression of the past appears sustainable, but improvements in the composition of spending are needed to guard against partial unwinding of past consolidation efforts or poor spending quality. The main downside risk to public finances is age-related spending that would rise steeply after 2030 if left unaddressed until population aging intensifies. This calls for timely pension reform, together with steps to mobilize some of Lithuania's currently underutilized revenue potential.

18.   At the same time, there exists ample policy room to further improve Lithuania's public finances and deal with downside risks. Tax revenues could be boosted considerably by addressing exemptions and loopholes in tax legislation, weaknesses in tax administration, and the large shadow economy. Just closing the tax effort gap with regional peers would yield additional revenue of 7 percent of GDP. Hence, Lithuania's public finances have the potential to deliver remaining fiscal consolidation and to deal with eventualities.
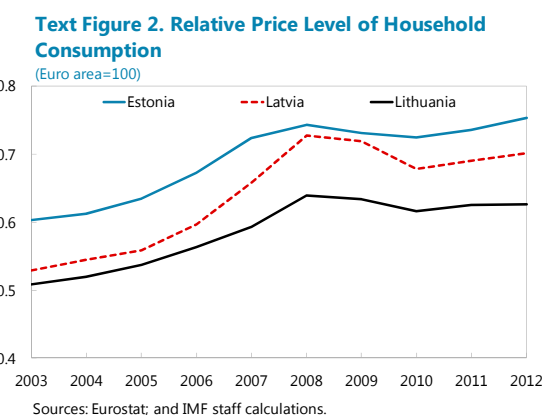
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INFLATION IN LITHUANIA: TRACK-RECORD AND PROSPECTS[1]

1.   This chapter aims to shed light on Lithuania's medium-term inflation outlook: is the currently low inflation sustainable; will inflation dynamics change with euro adoption; and would inflation differentials with the euro area (EA) be benign or a problematic sign of losses in competitiveness? After a brief account of Lithuania's inflation track record in Section A, Section B lays out a theoretical framework to disentangle inflation divergence inside a monetary union into benign structural factors and potentially problematic temporary factors. Section C drills down into one key structural factor related to income convergence of catch-up countries such as Lithuania—the so-called Balassa-Samuelson (BS) effect. The econometric estimates presented in Section D seek to quantify it. These estimates are then used in Section E to project inflation differentials forward, based on plausible assumptions for the evolution of the various drivers. Section E offers conclusions and policy implications.

A.   A Brief History of Inflation in Lithuania

2.   Lithuania has a comparatively favorable inflation track record. With the establishment of the currency board arrangement in 1994, inflation during the early transition period was quickly brought under control and steadily declined to below 5 percent toward the end of the decade. Since 1999, the annual inflation differential vis-à-vis the EA has averaged a modest 0.8 percentage points, only one-third that of Latvia and less than half that of Estonia (Text Figure 1 and Text Table 1). As a result, price levels in the Baltics have converged toward those prevailing in the EA but remain significantly lower (Text Figure 2).

Text Figure 1. Inflation, 1997–13
(Percent, Y-o-y)

Source: Eurostat.

Text Figure 2. Relative Price Level of Household Consumption
(Euro area=100)

Sources: Eurostat; and IMF staff calculations.

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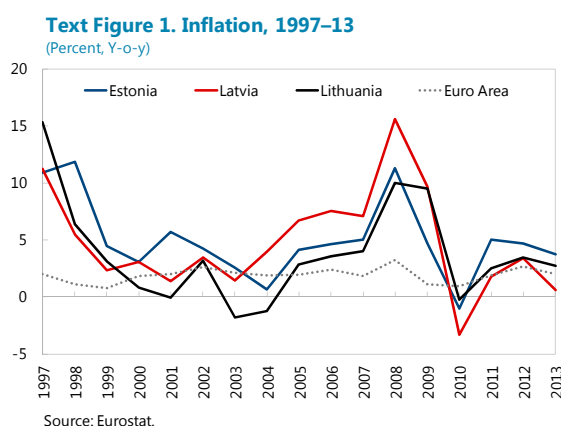
[1] Prepared by Hélène Poirson (EUR).

Text Table 1. Baltic Countries and Euro Area: Inflation During 2000–13

	Euro area (17)	Estonia	Latvia	Lithuania
Average inflation (pct.)				
HICP	2.1	4.2	4.6	2.9
Energy and unprocessed food	4.0	...	7.0	5.1
HICP excl. energy and unprocessed food	1.7	3.5	3.8	2.1
Standard deviation				
HICP	8.7	19.4	25.3	16.8
Energy and unprocessed food	16.0	...	39.3	30.3
HICP excl. energy and unprocessed food	7.3	16.0	21.2	12.7
Inflation differential to euro area (pp)				
HICP	0.0	2.1	2.4	0.8
Energy and unprocessed food	0.0	...	3.0	1.2
HICP excl. energy and unprocessed food	0.0	1.7	2.0	0.3
Standard deviation multiple to euro area				
HICP	1.0	2.2	2.9	1.9
Energy and unprocessed food	1.0	...	2.5	1.9
HICP excl. energy and unprocessed food	1.0	2.2	2.9	1.7
HICP weights (pct.)				
HICP	100	100	100	100
Energy and unprocessed food	18	24	26	28
HICP excl. energy and unprocessed food	82	76	74	72

Sources: Eurostat; and IMF staff calculations.

3.   However, inflation has been much more volatile in Lithuania than in the EA—a feature shared with the other Baltic economies (Text Figure 3). Since 1999, inflation has been about twice as volatile in Lithuania and Estonia compared to the EA. Latvia's inflation volatility has been even higher, at almost three times that of the EA. This partly reflects a relatively high sensitivity of inflation to global price shocks, due to high weights of energy and food products in the CPI basket. The strong correlation between commodity price inflation and inflation differentials between the Baltics and the EA confirms a higher vulnerability to tradable goods price shocks.

Text Figure 3. Commodity Prices and Inflation Differential, 2000–13
(Percent, Y-o-y)
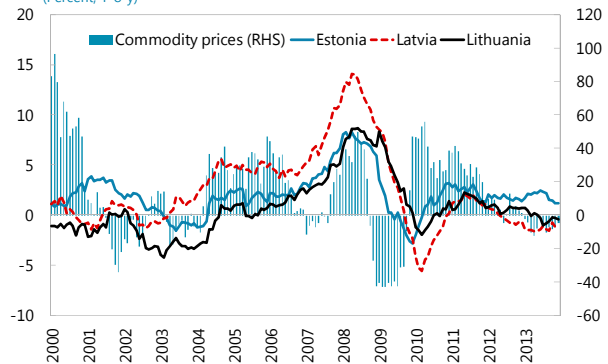
Sources: Haver; and Eurostat.

4.   The high inflation volatily also reflects short run imbalances. All three Baltic economies—along with much of the rest of emerging Europe—went through a pronounced boom-bust cycle (Bakker and Klingen, 2012). During 2003–08, these economies increasingly overheated with current account deficits widening to unprecedented levels and rapid growth of wages and prices. The global financial crisis of 2008/09 spelled the boom's end and economies went into deep recessions—the Baltics are projected to recover their 2008 income levels only this year. But with Lithuania's output gaps now closing and the emergence of some wage pressures (Text Figure 4), holding down inflation will likely be more challenging going forward than in the recent past.

5.   Lithuania's historical inflation differential with the EA could reflect international BS effects. Rapid apparent productivity growth in the tradable goods sector, accompanied by increases in real wages across sectors and higher relative inflation in nontradable goods would suggest that BS effects could be at work in Lithuania and the other Baltic countries (IMF, 2013).[2] Econometric estimates by Mihaljek and Klau (2008) of the impact of productivity growth differentials on inflation differentials in the Baltics and two other CEE countries point to a long-run BS effect of 1.1 ppt on average for the five countries, although they also present evidence that the effect has weakened since 2000.

Text Figure 4. Average Monthly Gross Earnings in Private Sector
(Percent, Y-o-y, NSA)

Source: Lithuania Department of Statistics.
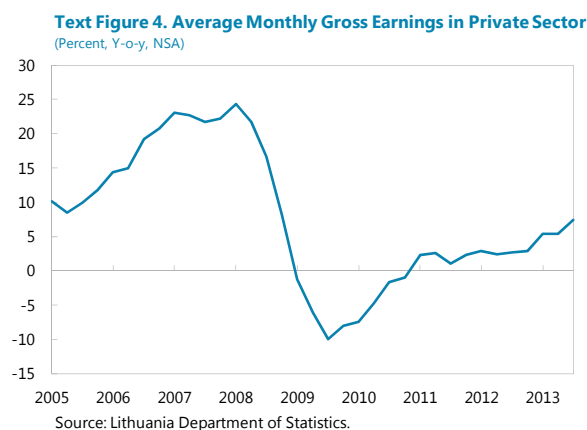
6.   Other factors could also have played an important role in inflationary dynamics of CESEE countries. Egert (2007) finds that regulated prices have a significant and non-linear effect on inflation and that commodity prices have a stronger effect on inflation in a higher inflation environment. Differential import price movements related to exchange-rate movements are another possibility. But Mihaljek and Klau (2008) find a negative impact of changes in the nominal exchange rate against the euro on inflation differentials for Latvia and Lithuania during 1996:Q1 to 2008:Q1, possibly reflecting that both countries switched their pegs to the appreciating Euro from the SDR and the U.S. dollar in 2005 and 2002, respectively, in the run-up to EU accession.

B.   Inflation in a Monetary Union

7.   Inflation rate differences within a currency union may be innocuous or could be problematic, depending on the underlying drivers. These could reflect an innocuous correction of initially relatively low price levels or the BS effect at work. But inflation differentials could also reflect harmful losses of competitiveness from localized aggregate demand disturbances that, in the presence of short-term supply rigidities, feed into domestic inflation and real exchange rate appreciation.

8.   Decomposing a country's inflation differential into tradable and nontradable inflation helps identify innocuous and problematic sources of inflation divergence (IMF, 2013):

$$\pi_t - \pi_t^* = (\pi_t^T - \pi_t^{T*}) + \gamma_t(\pi_t^N - \pi_t^T) - \gamma_t^*(\pi_t^{N*} - \pi_t^{T*}) \tag{1}$$

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[2] According to the BS hypothesis, productivity catching-up occurs mostly in the tradable goods sector. The resulting pressure on wages economy-wide is passed through to prices in the nontradable sector, which has less scope for productivity catching-up, resulting in overall higher inflation.

where π_t, π_t^T, π_t^N stand for headline inflation, tradable and nontradable goods inflation respectively, and γ_t represents the share of nontradable goods in the consumption basket; and asterisk denotes the EA counterparts and inflation is measured as year-on-year log differences.[3] The inflation differential comprises the relative inflation in tradable goods plus differences in the relative inflation in nontradable and tradable goods, appropriately weighted.

9.   A rise of nontradable prices relative to tradable prices in the country concerned in excess of that in the EA would give rise to an inflation differential but would not involve a loss of competitiveness. According to the BS hypothesis, this could be driven by differentials in productivity growth: First, express the relative price of nontradable goods as in Coudert (2004):

$$\pi_t^N - \pi_t^T = \frac{\alpha_N}{\alpha_T}(\Delta y_T - \Delta y_N), \tag{2}$$

where Δy is the growth rate of total factor productivity (TFP) and α is the labor share in each sector. Note that equation (2) can be rewritten as:

$$\pi_t = \pi_t^T + \gamma \frac{\alpha_N}{\alpha_T}(\Delta y_T - \Delta y_N), \tag{3}$$

with the second expression on the right hand side capturing the "domestic" BS effect—the impact of internal productivity growth differences on the overall price level. Then, substitute (2) and the corresponding equation for the EA into equation (1) to get:

$$\pi_t - \pi_t^* = \pi_t^T - \pi_t^{T*} + \gamma \frac{\alpha_N}{\alpha_T}(\Delta y_T - \Delta y_N) - \gamma^* \frac{\alpha_N^*}{\alpha_T^*}(\Delta y_T^* - \Delta y_{NT}^*), \tag{1'}$$

where the last two terms on the right hand side represent the "international" BS effect—the impact of relative productivity differentials across countries on cross-country inflation differentials.

10.   Asymmetric responses to tradable goods shocks across the monetary union are another source of innocuous inflation differentials (IMF, 2013). Formally, taking the partial derivative of equation (1) with respect to π_t^{T*} yields:

$$\frac{\partial(\pi_t - \pi_t^*)}{\partial \pi_t^{T*}} = \left((1 - \gamma_t)\frac{\delta \pi_t^T}{\delta \pi_t^{T*}} - (1 - \gamma_t^*)\right) + \gamma_t \frac{\delta \pi_t^N}{\delta \pi_t^{T*}} - \gamma_t^* \frac{\delta \pi_t^{N*}}{\delta \pi_t^{T*}}. \tag{1''}$$

According to equation (1''), a global shock to tradable prices will affect the inflation differential if the weight of nontradables in the consumption baskets differs across the countries in the currency

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[3] This expression does not fully capture inflation associated with price level convergence. To the extent that price and income are related, price convergence can arise in economies whose incomes are below the average of the monetary union. Nor is the model equipped to identify nontradable goods inflation associated with an economy running ahead of the monetary union's business cycle. In practice, those can be important. Thus the empirical application (Section D) controls additionally for broader price convergence effects and for the contribution of short-run imbalances to inflation differentials.

union even if competitiveness is fully maintained, i.e., $\frac{\delta\pi_t^T}{\delta\pi_t^{T*}} = 1$. In practice, weights in the CPI basket indeed differ significantly across countries (Text Table 1).

11.   However, differences in the evolution of tradable prices driven by asymmetric business cycles would harm competitiveness. Excess domestic demand pressures can lead to nontradable wages leading tradable wages. Excess demand pressures are often proxied by measures of the output gap, but some studies have argued that direct measures of short-run imbalances such as real unit labor costs or compensation growth are more appropriate (Galí and Gertler, 1999 and Lown and Rich, 1997).

C.   Balassa Samuelson Effects: Accounting Estimates

12.   The two basic premises of the BS model appear to hold in Lithuania, at least up to the crisis: productivity growth in tradable industries outpaced that of nontradables and labor mobility broadly equalized wages across sectors (Figure 1). However, productivity gains in tradables may not have been entirely passed through to real wages, especially post-crisis, although this may also reflect measurement issues: labor productivity growth is an imperfect proxy for TFP as it reflects in part capital deepening and therefore may overestimate productivity gains, particularly if the tradable sector is capital intensive. The evidence of wage equalization between tradables and nontradables has also weakened somewhat since 2009.

13.   The domestic BS effect is hard to uncover during the period examined. Since 2000, prices increased faster in the nontradable than the tradable sector, but not to the extent one would have expected on the basis of the large sectoral productivity differentials (Text Table 2). More specifically, the inflation differential was only of 0.5 ppt in favor of nontradables while the domestic BS effect would have suggested 1⅓ ppts (following equation 3, obtained by scaling productivity differentials by the share of nontradables in the CPI basket of 23.7 percent, shown in Text Table 3).[4]

14.   In particular, there is no evidence of a domestic BS effect post-crisis, possibly because it was swamped by the unwinding of the excesses of the boom years. Since 2007, relative prices increased less in nontradables sectors, despite persistently large productivity gains in the tradables sectors.[5] The difficulty of identifying the BS effect post-crisis could be due to the more pronounced slump in nontradable industries. Pre-crisis, the trends of slower relative productivity and higher price inflation in the nontradable sector are more pronounced than for the full period, possibly reflecting—in addition to BS effects—the pre-crisis domestic demand boom, with overheating and inflationary pressures particularly pronounced in the nontradable sectors.

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[4] For simplicity, the calculations assume equal labor shares across sectors. In practice, the tradable goods sector is generally more capital-intensive, making the estimate of the domestic BS effect a lower bound.

[5] Differential inflation in nontradables vs. tradables also turned negative in 2008–12 in the other Baltic countries (IMF, 2013).
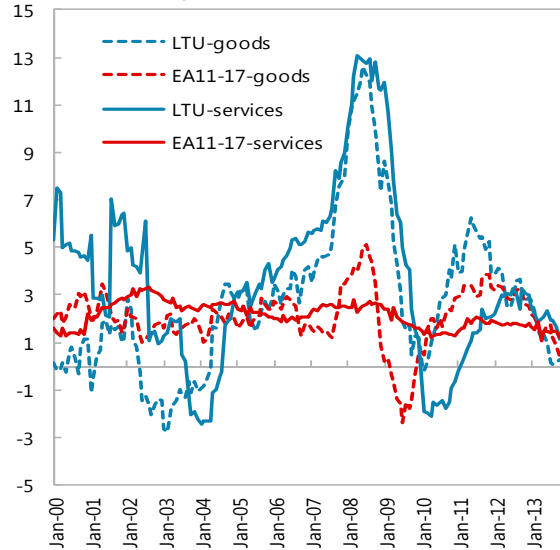
Figure 1. Inflation, Wages, and Productivity

Productivity in tradables has exceeded that in non-tradables ...

Productivity in Tradable and Non-Tradable Industries
(2008Q4 = 100 ; seasonally adjusted)
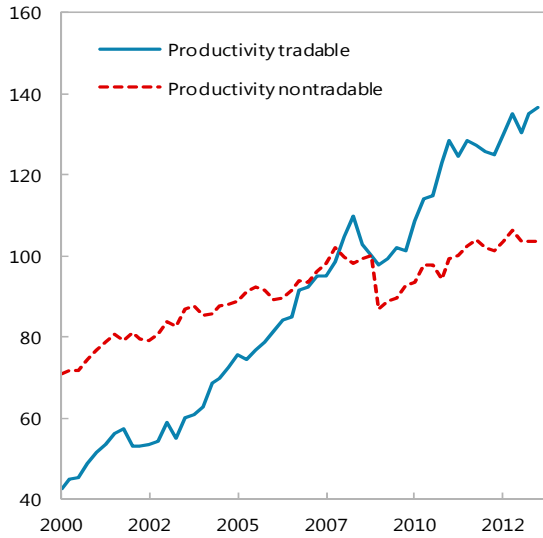
... and inflation in tradables has generally been contained relative to that in non-tradables.

Inflation in Tradable and Non-Tradable Sectors
(Percent, Y-o-y)

Compensation growth in tradables has been in line or below that of productivity growth except during 2005-08 ....

Productivity and Wages in Tradable Industries
(Percent, Y-o-y)
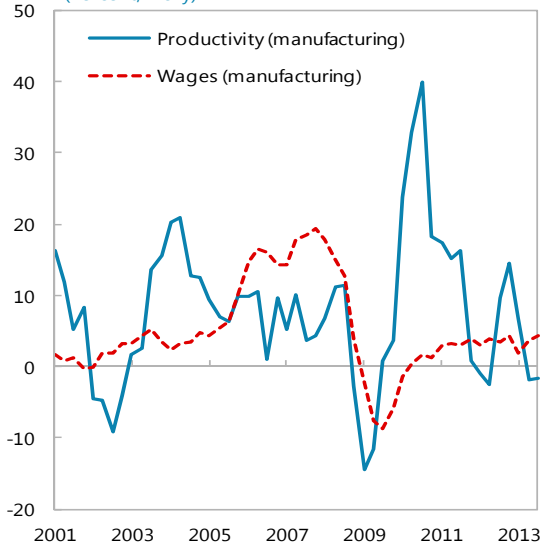
... when wages in the less productive non-tradable sector led tradable wages in a domestic demand boom.

Real Wages in Tradable and Non-Tradable Industries
(2008Q4 = 100 ; seasonally adjusted)
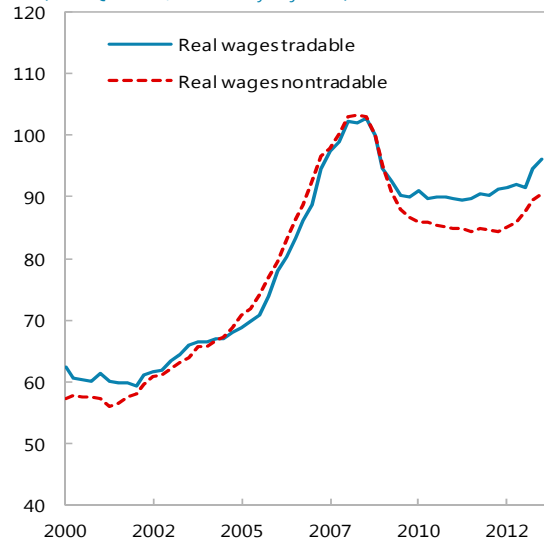
Sources: Eurostat; Haver; and IMF staff calculations.

Text Table 2. Lithuania and Euro Area: Productivity Growth and Inflation, 2000–13

(Percent, year-on-year)

	Productivity growth			Inflation			
	Tradables	Non-tradables	Difference	HICP	Tradables	Non-tradables	Difference
Lithuania							
2001-2007	10.6	4.3	6.3	2.0	1.7	3.1	1.5
2008-2013	6.0	1.2	4.8	4.2	4.3	3.7	-0.6
2001-2013	8.5	2.9	5.6	3.0	2.9	3.4	0.5
Euro Area							
2001-2007	3.0	0.4	2.6	2.2	2.0	2.5	0.5
2008-2013	0.6	0.2	0.4	2.0	2.1	1.8	-0.3
2001-2013	1.9	0.3	1.6	2.1	2.0	2.2	0.2

Note: Four-quarter log-differences, period averages, during 2001Q1 to 2013Q3. Productivity growth in tradables includes agriculture and manufacturing and productivity in nontradables includes all market services. Tradables (nontradables) inflation is measured by the goods (services) component of the HICP.
Sources: Eurostat; National authorities; and IMF staff calculations.

15.   International BS effects seem present in Lithuania to a greater extent than in other CEE countries, explaining almost three-quarters of inflation differentials with the EA in a simple accounting framework. Productivity and inflation developments relative to the EA during the period 2001:Q1 to 2013:Q3 were broadly in line with the international BS hypothesis (Text Table 3). The sectoral productivity differential (relative to the EA) averaged 4 ppts, contributing 0.7 ppt to Lithuania's relative inflation when scaled by the share of nontradables in the consumption basket (as measured by the CPI weight of services). On this basis, the international BS effect explained, on average, around 72 percent of Lithuania's inflation differential of 0.9 ppt with the EA over the period. Using output shares instead of CPI weights to measure the share of nontradables—as advocated in Mihaljek and Klau (2008)— would yield an even higher estimate (of 2.7 ppts). By comparison, Mihaljek and Klau (2008) find that BS effects explain on average 0.8 ppt (16 percent) of the CEE countries' 5 ppts inflation differential with the EA during 1997:Q1-2008:Q1 in this simple accounting framework and 1.3 ppt (100 percent) in the case of Lithuania.

Text Table 3. Productivity and Inflation Differentials in Lithuania vis-à-vis the Euro Area
(Percent)

	Explanatory variables			Share of non-tradables		International Balassa-Samuelson effect	
	Inflation differential	Change in nominal exchange rate	Sectoral productivity differential	Weight of services in CPI (1)	Share of market services in output (2)	Based on CPI weight (1)	Based on output share (2)
2001-2007	-0.2	-1.0	3.7	22.5	68.8	0.4	2.4
2008-2013	2.2	0.0	4.4	25.2	69.6	1.0	3.0
2001-2013	0.9	-0.5	4.0	23.7	69.2	0.7	2.7
Memorandum item: Euro Area							
2001-2007	...	...	...	40.6	74.5	...	...
2008-2013	...	...	...	41.6	75.4	...	...
2001-2013	...	...	...	41.1	74.9	...	...

Note: Inflation measured by the four-quarter percentage change in the HICP;
Balassa-Samuelson effect defined as the contribution of sectoral productivity differentials to the inflation differential vis-à-vis the euro area, using alternatively (1) the weight of market services in the CPI and (2) the share of market services in output to measure the non-tradables share in consumption.
Sources: Haver, Lithuania Statistical Office, and IMF staff calculations.

16. **Changes in nominal exchange rates had a negative impact on domestic inflation**—and hence on Lithuania's inflation differential with the EA in the accounting framework. The effect was -0.5 ppt on average, assuming a full pass-through of import prices to domestic inflation.[6]

D. Balassa Samuelson Effects: Econometric Evidence

17. **The accounting framework has a number of drawbacks that the econometric approach in this section seeks to address.** It fails to account for the contribution of other factors to persistent inflation divergence (see Section A). It also assumes that productivity growth differentials are translated into proportionate relative price increases in nontradable goods. In practice, the relationship need not be strict either because wage equalization between the tradable and nontradable sectors is not complete or because wage growth in tradable industries deviates from

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[6] Post-crisis, the effect of nominal exchange rate changes is nil, reflecting the exchange rate peg to the euro since February 2002.

productivity growth in those sectors. The regression setting relaxes this restriction and also allows controlling for other drivers of inflation.

18.   The starting point is the largely "structural" specification in Mihaljek and Klau (2008) which explains the inflation differential by its own lag, nominal exchange rate changes, and sectoral productivity growth differentials (to capture BS effects).[7] This can be written as:

$$\pi_t - \pi_t^* = \alpha + \beta_1(\pi_{t-1} - \pi_{t-1}^*) + \beta_2 \Delta E_t + \beta_3 BS_t + \varepsilon_t, \tag{4}$$

where π_t, π_t^* are the annual Lithuania and EA inflation rates, respectively; ΔE_t is the growth rate of the nominal exchange rate, and BS_t is the sectoral productivity growth differential, scaled by the share of nontradables in consumption relative to the EA. The inclusion of a lagged dependent variable on the right-hand side allows for persistence in inflation differentials and, at the same time, the possibility of partial adjustment of inflation differentials to the change in explanatory variables. The short-run elasticity, in the case of the BS effect, is thus given by β_3 while $\beta_3/(1 - \beta_1)$ captures the long-run elasticity. All variables in equation (4) are seasonally-adjusted, four-quarter log differences. Using quarterly time-series data for 2001–13 for Lithuania and the EA, the stationarity of all the time-series was tested and confirmed, making it possible to estimate equation (4) using ordinary least squares.

19.   Given the likely importance of the cyclical channel and Lithuania's exposure to commodity price shocks, equation (4) is augmented to control for business cycle divergence and global price shocks. On a technical level, the inclusion of additional variables helps address serial correlation of residuals in the basic specification identified by the Breusch-Godfrey tests:

$$\pi_t - \pi_t^* = \alpha + \beta_1(\pi_{t-1} - \pi_{t-1}^*) + \beta_2 \Delta E_t + \beta_3 BS_t + \beta_4 \Delta PCOM_t + \beta_5(GAP_t - GAP_t^*) +$$
$$\beta_6(z_t - z_t^*) + \varepsilon_t, \tag{4'}$$

where $\Delta PCOM_t$ is the growth in commodity prices; GAP_t and GAP_t^* denote output gaps in Lithuania and the EA to capture divergence in cyclical positions; and z_t and z_t^* are additional Lithuanian and EA variables that exert short-term influence on the inflation rate. In alternative specifications of (4'), the output gap is replaced with other measures of relative cyclical positions or short-run imbalances. These include unemployment rates, the changes in unemployment rates, growth in real manufacturing wages, growth in real unit labor costs (ULC), and growth in real manufacturing ULCs (see first four columns of Table 1).[8]

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[7] It may be more appropriate to use the NEER (Nominal Effective Exchange Rate) in the estimation instead of the bilateral exchange rate, but following Mihaljek and Klau (2008) the latter is used in the baseline regression as it is derived from equation (1') where all the variables are expressed relative to the EA. Results with the NEER are also presented as a robustness check.

[8] The growth in ULC and the change in unemployment rate were also included as measures of business cycle divergence, but found to be insignificant; hence results are only reported for the remaining four variables.

Table 1. Lithuania Inflation Differential vis-à-vis the Euro Area, 2001–13

	(1)	(2)	(3)	(4)	(5)	(6)
Lagged inflation differential	0.859***	0.876***	0.906***	0.870***	0.908***	0.863***
	(15.06)	(15.01)	(17.93)	(14.89)	(19.70)	(11.35)
Change in nominal exchange rate	0.00225	0.0217	0.0210	0.0418	0.0195	-0.0118
	(0.03)	(0.27)	(0.30)	(0.55)	(0.30)	(-0.14)
Balassa-Samuelson effect	0.0694	0.102	0.154**	0.190**	0.148**	0.179**
	(0.85)	(1.23)	(2.03)	(2.11)	(2.10)	(2.16)
Change in commodity prices	0.0151**	0.0153**	0.0108*	0.0138**		0.00978
	(2.38)	(2.31)	(1.75)	(2.04)		(1.54)
Output gap	0.119**					
	(2.67)					
Unemployment rate		-0.0682*				
		(-1.90)				
Change in real manufacturing wage			0.0684***		0.0461**	0.0739***
			(3.73)		(2.53)	(3.73)
Change in manufacturing ULC				0.0288**		
				(2.08)		
Change in oil price (6-month lag)					0.0113***	
					(2.94)	
Change in commodity prices excluding energy					0.0167*	
					(1.91)	
Lagged price level						1.585
						(0.76)
Constant	-0.0287	0.106	-0.265*	-0.0153	-0.322**	0.616
	(-0.19)	(0.58)	(-1.76)	(-0.10)	(-2.33)	(0.52)
Adjusted R2	0.909	0.903	0.920	0.904	0.933	0.919
Observations	51	51	51	51	51	51

Note: The Balassa Samuelson effect is defined as the contribution of sectoral productivity differentials to the inflation differential vis-à-vis the euro area, using weight of market services in CPI to measure the share of non-tradables in the consumption basket.
t statistics in parentheses   "* $p<0.10$ ** $p<0.05$ *** $p<0.01$"
Sources: Haver, Lithuania Statistical Office, WEO, and IMF staff calculations.

20.   The results point to the importance of short-run imbalances along with sectoral productivity differentials and persistence as drivers of inflation differentials. Inflation differentials are highly persistent, with estimates of the coefficient β_1 ranging from 0.86 to 0.9 (in line with the average of 0.9 found by Mihaljek and Klau (2008) for five CEE countries). The impact of the exchange rate on inflation differentials suggests a positive exchange-rate pass-through but is never significant.[9] The BS effect is important and significant (at the 5 percent test level) in all but the first two regressions. Commodity price shocks also have a positive and significant effect on inflation differentials across specifications (in the case of oil price shocks, only with a six-month lag), confirming the asymmetric response to global price shocks. There is a significant impact of cyclical fluctuations on inflation differentials, with real wage growth having the most sizeable and robust impact and resulting in the best overall regression properties. The specification of column 3 is therefore the preferred one and used in the remainder of the chapter.[10]

21.   No price convergence beyond the BS effect can be detected over the period analyzed. The lagged price level variable is neither correctly signed (the convergence hypothesis would suggest that low initial prices go hand-in-hand with high inflation) nor significant at conventional levels (column 6). Moreover, the result of a positive and significant impact of sectoral productivity differentials (BS effect) remains robust to inclusion of the lagged price level of consumption.

22.   In the long-run, a considerable portion of the inflation differentials in Lithuania can be systematically related to real convergence effects. The international BS effects for Lithuania obtained from the preferred specification (column 3 in Table 1) are higher than previous empirical results for the Baltics and other CEE countries. The short-run elasticity of 0.15 implies a long-run elasticity of around 1.6 (Text Table 4). When multiplied by the average relative sectoral productivity differential, the implied short-run and long-run international BS effects are 0.1 ppt and 1.1 ppts, respectively. By comparison, the BS effects estimated in Mihaljek and Klau (2008) for the Baltics and two other CEE countries average 0.07 and 1.3 ppts, respectively, in the short and long-runs, even though they are based on output shares instead of CPI weights (the use of CPI weights as in this paper would ceteris paribus lower their estimates).[11]

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[9] This likely reflects the stability of the exchange rate after Lithuania repegged its currency board to the euro from the U.S. dollar in 2002.

[10] The inclusion of the real wage variable helps fully eliminate serial correlation of the residuals and achieves the second best fit in Table 1 (as measured by the adjusted R2). Estimates of the other specifications are less satisfactory, showing residual serial correlation issues. The presence of heteroskedasticity was also tested using both the Breusch-Pagan and Cook-Weisberg and White tests. The null of no heteroskedasticity could not be rejected in all cases.

[11] Mihaljek and Klau (2008) also find that BS effects in Lithuania tend to exceed those in the other countries; however they focus their discussion more on the average results. Possibly due to omitted variable bias, their results for Lithuania imply an unrealistically high persistence of inflation and thus extremely large long-run BS effect (of 4.6 ppts).

	Short-run beta	Long-run beta	Balassa-Samuelson effect	
			Short-run	Long-run
Lithuania (2001-2013)	0.154	1.638	0.101	1.077

Note: Balassa Samuelson effect defined as the contribution of sectoral productivity differentials to the inflation differential vis-à-vis the euro area, using the weight of market services in the CPI to measure the share of nontradables in the consumption basket.
Sources: Haver, Lithuania Statistical Office, WEO, IMF staff calculations.

23.   In the short-run, aggregate demand imbalances and commodity price shocks play an important role in generating local inflation pressures. While more temporary, global price shocks will likely continue to contribute to higher volatility of inflation in Lithuania relative to the EA until weights of nontradables in the consumption basket fully converge (see equation 1''). Meanwhile, business cycle volatility could remain higher than in the rest of the EA if fiscal and macroprudential frameworks are not strengthened, also contributing to higher inflation volatility in Lithuania. Given high inflation persistence, even temporary shocks or imbalances can generate persistent inflation differentials for a few years (see section E on the medium-term outlook for inflation).

24.   Generally speaking, the results above are very robust to alternative model specifications. A variety of specifications were tried, expanding on equation (4').[12] In particular, the exchange rate variable was interacted with openness (sum of exports and imports to GDP), and the bilateral exchange rate was replaced with the NEER. None yielded significant results for the exchange rate pass-through. Similarly, the commodity price shock variable was interacted with the share of food and energy in the CPI in an alternative specification. This did not significantly alter the results.
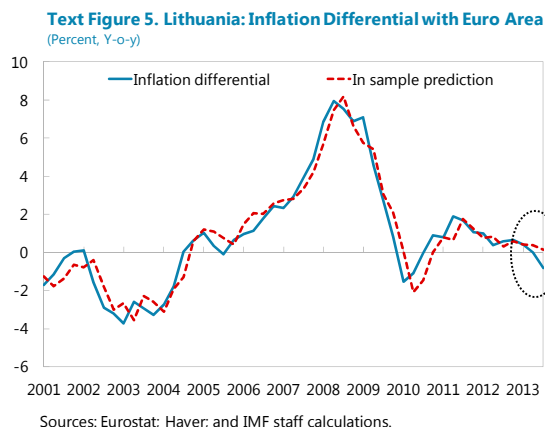
25.   The results for the main variables in the baseline specification (productivity growth differential, commodity price growth, and compensation growth differential) remained broadly unchanged when controlling for the credit cycle and several other possible drivers of inflation. Following Arratibel et al (2009), additional "z" control variables were added one at a time to the preferred specification including: monetary indicators (M3 growth and credit growth, both in real terms); fiscal indicators (change in direct taxes and indirect taxes, change in VAT, change in tax burden; growth in primary government consumption, and growth in government employee compensation); quality effects as captured by the change in the share of energy, food, and services in the CPI (see Egert, 2007 for a full discussion); house price growth (in real terms); and inflation expectations for the next 12 months (from European Commission consumer surveys). Following equation (4'), all the additional "z" control variables were specified in difference relative to the EA.

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[12] The results are not reported to save space, but available upon request from the author.

None of the variables had a significant impact, and the results for the main variables in the baseline specification were robust to their inclusion on the right hand side.

26.   Overall, the preferred specification captures country-specific inflation developments in Lithuania well, although it does not fully account for the effect of global price shocks in the most recent period (Text Figure 5). The average inflation predicted by the regression in 2013 is 1.5 percent vs. 1.2 percent realized.[13] The disappearing inflation differential in late 2013 which is unexplained by the regression could reflect a higher pass-through of falling global energy prices than what is estimated by the model on the basis of an aggregate commodity price index. Further analysis allowing for commodity-specific pass-through coefficients would be required to confirm this hypothesis.

Text Figure 5. Lithuania: Inflation Differential with Euro Area
(Percent, Y-o-y)

Sources: Eurostat; Haver; and IMF staff calculations.

E.   Inflation Outlook and Changeover Impact

27.   This section uses the estimation results to project inflation differentials forward. It also examines short-term inflationary effects of the changeover and what lessons can be drawn from the experience of other countries to mitigate these effects in Lithuania.

Medium-Term Inflation Outlook

28.   WEO projections for fuel and non-fuel prices and output gaps in Lithuania and the EA were used to underpin the medium-term inflation differential consistent with past inflation and wage dynamics. Specifically, the wage growth differential for forecasting purposes was modeled as a function of its own lags, the output gap differential, and the change in commodity prices (4 lags of each of the RHS variables are included to eliminate all serial correlation of the residuals). An out-of-sample prediction for HICP inflation differentials over a 5-year horizon forecast (2013:Q4 to 2018:Q4) was then derived based on the projected outlook for commodity prices, wage growth differential relative to the EA, and a sectoral productivity growth differential assumed to remain constant at the historical sample mean of 0.7 ppt.

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[13] For the last quarter of 2013 and 2014, out-of-sample predictions are used based on BS effect equal to historical average; output gaps returning to zero in both Lithuania and the EMU; and the wage setting behavior remaining the same after euro adoption (see section E for a detailed discussion).

29.   The outlook implied by the above modeling assumptions is for a mild (below 1 ppt) but persistent positive inflation differential with the EA (Figure 2). This finding is contingent on the wage setting behavior remaining unchanged after the changeover to the euro, stable commodity prices, and the output gaps remaining closed for Lithuania from 2014 onward and gradually closing over the projection horizon in the case of the EA. On this basis, the current bout of disappearing inflation is projected to be temporary with a positive inflation differential vis-à-vis the EA re-emerging starting in mid-2014 and projected to persist throughout 2018, reflecting Lithuania's more advanced cyclical position and the BS effect. The predicted inflation differential averages about 0.7 ppt over the next five years, peaking at about 1.2 ppts in the second half of 2015 and gradually declining to around 0.6–0.7 ppt by 2017.

30.   The re-emergence of short-run imbalances due to unexpected changes in wage setting behavior post-euro adoption and/or failure of policies to contain excess demand pressures poses a potential risk to inflation projections. The short-run coefficients from the baseline regression can be used to gauge the sensitivity of the outlook to shocks. Multiplying these by a shock of one standard deviation to external prices or internal demand factors suggests an inflationary impact of 0.2 to 0.5 ppts (Text Table 5). In particular, if an output gap of 3.5 percent (one standard deviation) opened up, the short-run impact on inflation would reach 0.4 ppt. If the shocks occurred simultaneously, the combined impact would be 0.6 to 0.7 ppts.[14]

Text Table 5. Estimates of Inflationary Shocks on Inflation Differential

|	Short-run elasticity	One standard-deviation shock 1/	Impact on inflation 1/
Commodity prices	0.011	22.6	0.2
Output gap	0.119	3.5	0.4
Real wages	0.068	7.1	0.5

Note: all variables including inflation are relative to the euro area.
Last column shows the short-run impact of a one-std deviation shock.
1/ in percentage points.
Sources: Haver, country authorities, WEO, IMF staff calculations.

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[14] These estimates are likely to provide a lower bound, given that the preferred specification fails to fully capture the pass-through of energy prices (see Section D).

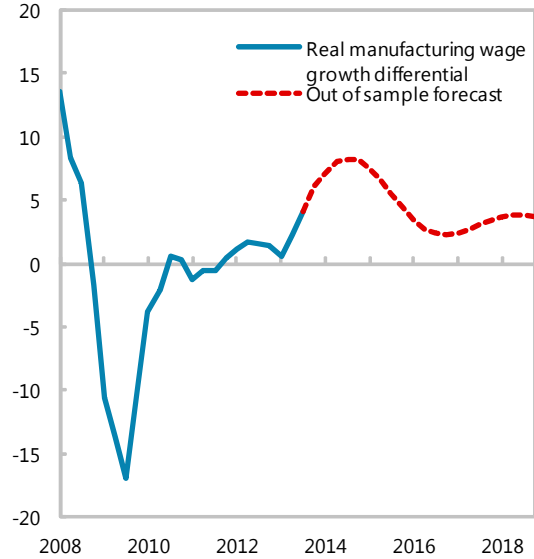**Figure 2. Lithuania: Inflation Forecast (Forecast Horizon=17 Quarters Ahead)**

Moderate inflation is likely to re-emerge next year
...

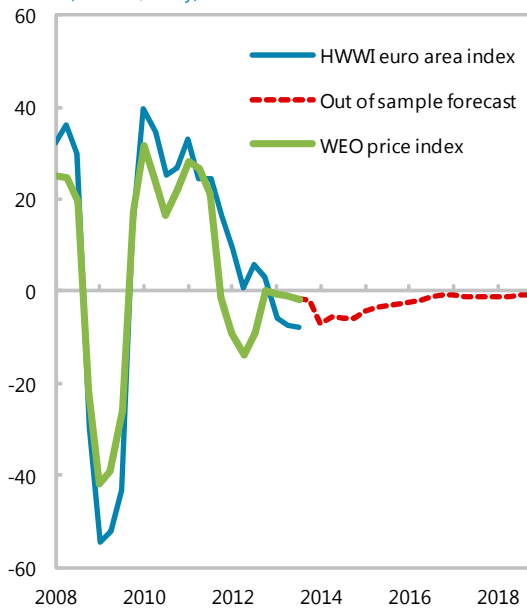**Inflation Differential with Euro Area**
(Percent, Y-o-y)
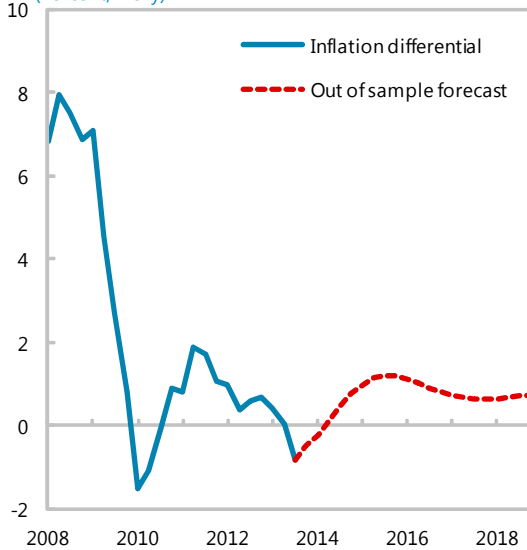
... reflecting Lithuania's more advanced position in the cycle ...

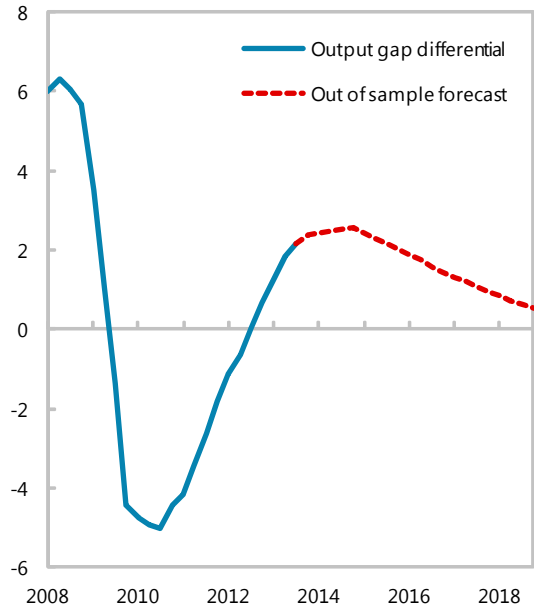**Wage Growth Differential with Euro Area**
(Percent, Y-o-y)

... and a benign outlook for tradable goods inflation.

Commodity Price Growth
(Percent, Y-o-y)

By 2018, the bulk of inflation differentials should reflect sectoral productivity differentials as output gaps converge.

Output Gap Differential with Euro Area
(Percent, Y-o-y)

Sources: Haver; WEO; and IMF staff calculations.

Near-Term Inflation Outlook and Euro Switchover Impact

31.   The model implies inflation in 2014 of 1.4 percent, higher than both the Bank of Lithuania's projection of 0.9 percent and the IMF baseline projection of 1 percent. This could reflect the inability of the model to fully capture the effect of declining commodity prices (see Section D).

32.   In the short-run, the switchover to the euro could have a small one-off inflationary impact. Rounding effects and menu costs are a commonly cited reason for changeover effects. Although in principle the rounding should be symmetric, in practice there was a tendency for retailers to round prices upward rather than downward.[15] The Bank of Lithuania considers that the likely impact of the switchover on consumer prices during and after the changeover period could be on the order of 0.2 to 0.3 ppt, based on estimates by Eurostat for countries which adopted the euro after 2007 (Lietuvos Bankas, 2013). This is in line with estimates from earlier studies which point to a range of 0.2 to 0.4 ppt for the one-off impact effect of the changeover (see Table 1 in Hüfner and Koske, 2008). These studies commonly find that price increases were not a general phenomenon but limited to certain categories of goods and services, resulting in a moderate short-term impact on headline inflation, but no longer term effect (Statistisches Bundesamt, 2004).[16]

33.   Managing inflation perceptions during the switchover period is important to avoid possible second-round effects on inflation or undermining support for euro adoption. The experience of the original EA members and the Baltic countries that already introduced the euro shows that perceived inflation can be quite off the mark in the period around the changeover (Figure 3). The perception gap is particularly noticeable during disinflationary periods (e.g., in Latvia and Lithuania). By contrast, perceptions of rising inflation appear fairly accurate (e.g., in Estonia). In Germany, perceptions were also disconnected from actual inflation developments during euro introduction, but otherwise on the mark (Brachinger, 2005). Finally, Beblavý (2010) finds that perceptions of inflation increased during the period surrounding the changeover in most countries adopting the euro (except in the Slovak Republic), whether actual inflation increased or not. Based on the experience of other countries, Lithuania will likely experience a rise in perceived inflation, starting as early as 6 months prior to euro introduction.

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[15] Folkertsma et al. (2002, as reported in Hüfner and Koske, 2008) find that the rounding behavior accounts for about two-thirds of switchover related retail price increases. The remainder is attributable to retailers passing on the menu costs of adjusting their businesses to the euro on to their customers.

[16] Changeover effects were noticeable for certain services sectors including restaurants and catering, hairdressers, cinemas, and dry cleaning, which experienced significant price increases, not compensated by lower inflation later on. Nonetheless, overall inflation was lower in the two years following euro introduction than in the two years preceding it, as the Statistical Office underscores.

## Figure 3. Euro Area and Baltics: Inflation Perceptions During Changeover

Inflation perceptions increased in the original euro area members in the year post-changeover even though actual inflation declined slightly ...

Euro Area: Perceived and Actual HICP Inflation
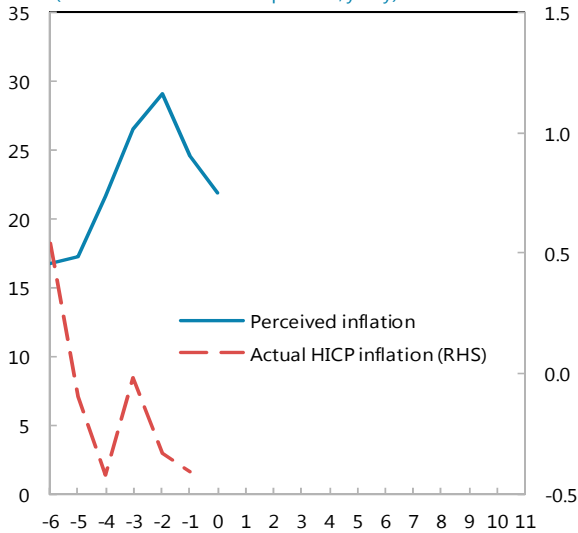(Balance of answers and percent, y-o-y)
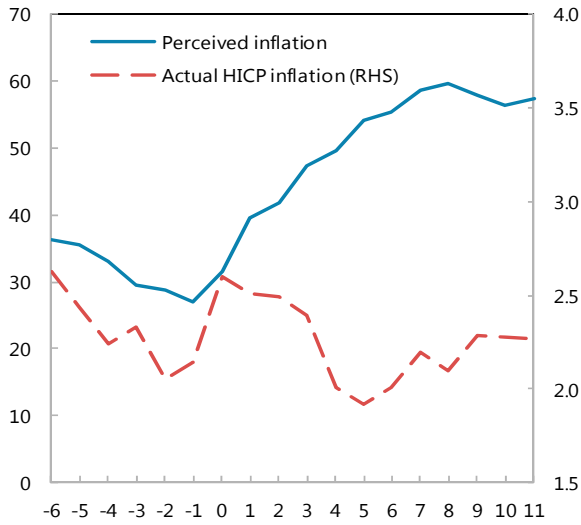
Estonia experienced inflationary pressures prior to and during the switchover with perceived inflation rising in tandem ...

Estonia: Perceived and Actual HICP Inflation
(Balance of answers and percent, y-o-y)
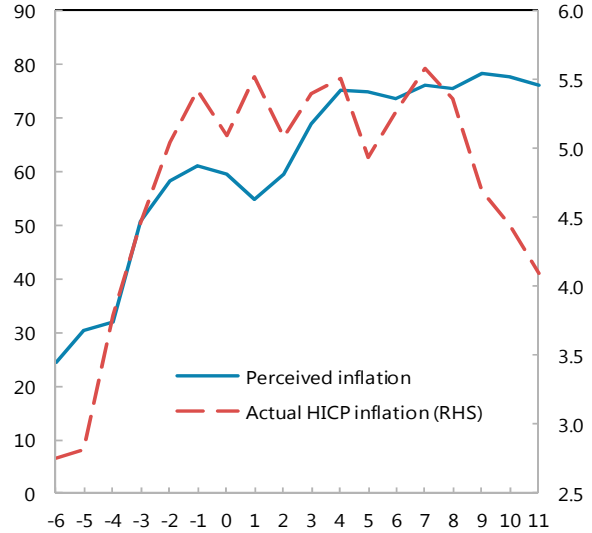
... while in Latvia inflation perceptions increased 6 months before the switchover even though actual inflation declined markedly ...

Latvia: Perceived and Actual HICP Inflation
(Balance of answers and percent, y-o-y)

... and in Lithuania inflation expectations have been declining but to a much lesser extent than actual inflation.

Lithuania: Perceived and Actual HICP Inflation
(Balance of answers and percent, y-o-y)
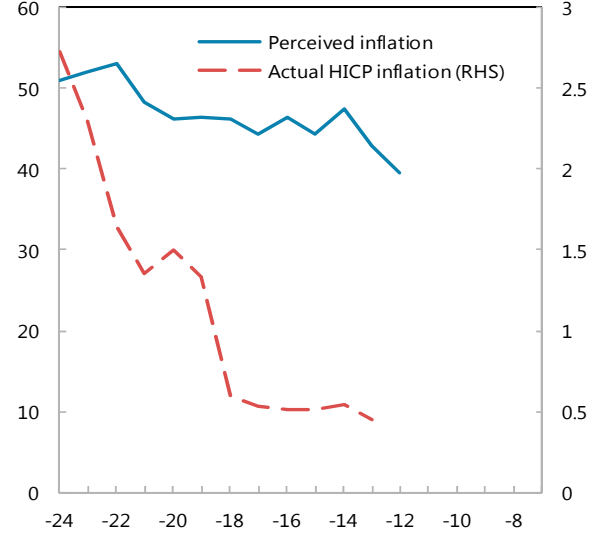
Source: Eurostat.

34.   Price monitoring and public information should help minimize changeover effects and anchor inflation perceptions. Lithuania's National Changeover Plan provides for dual display of prices starting before the changeover and continuing until end-2015. Control institutions will monitor prices and follow-up on consumer complaints so that possible abuses are limited. Keeping citizens informed of the nature and magnitude of any observed changeover effects would also help guide inflation perceptions and raise consumer awareness. In particular, a systematic request for consumers to report unusual price increases and the publication of euro-related price rises could usefully complement the use of sanctions and negative publicity to ensure a fair price conversion.[17] Price transparency could help decrease any gap that is likely to emerge between actual and perceived inflation before and during the switchover.

F.   Conclusions and Policy Implications

35.   Lithuania's inflation relative to the EA is likely to rise because of its more advanced cyclical position and income convergence. This gives rise to BS effects. A benign inflation differential of 0.7 to 1.2 ppts is projected that would be consistent with maintaining competitiveness, provided Lithuania can sustain the relatively high historical rates of productivity growth in sectors exposed to international competition and wage setting behavior does not fundamentally change with euro adoption.

36.   Policy frameworks to control the business cycle and prudent wage setting remain key to deliver consistently low inflation. Inflation differentials exceeding the 0.7 to 1.2 ppts band could result from a renewed bout of short-run imbalances, as evidenced by the experience of Lithuania and the other Baltics in the 2000s. Lithuania's real GDP growth rate currently is one of the highest in the EU, unemployment is approaching its natural level, and credit growth could see a revival. While economic overheating is currently not in the cards, strong policy frameworks to address it are important to secure Lithuania's long run success as an EA member.

37.   Inflation volatility will likely remain higher going forward in Lithuania than in the EA as a whole. While convergence effects dominate in the long-run, the findings of this chapter suggest that the inflationary impact of aggregate excess demand pressures is much larger in the short-run, contributing to inflation volatility. External commodity price shocks are another important source of inflation volatility, given Lithuania's high exposure to food and energy price developments and evidence of asymmetric responses to global price shocks across the EMU.

38.   The one-off inflationary impact of the switchover should be manageable provided inflation expectations remain well anchored. Given the high persistence of inflation, it is

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[17] See European Commission (2007) for an analysis of the lessons that can be drawn for other countries from the successful introduction of the euro in Slovenia.

important to ensure that any inflationary effect of the changeover is temporary and to keep inflation expectations well anchored. The National Changeover Plan contains a number of measures to that effect. However, additional measures to ensure full price transparency—such as systematic reporting and publication of unusual price increases related to the euro changeover—would help narrow the gap between actual and perceived inflation, which has emerged in Lithuania somewhat earlier than in other accession countries.

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