Finland: Selected Issues and Analytical Notes

This paper on Finland was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on August 3, 2012. The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of Finland or the Executive Board of the IMF.

The policy of publication of staff reports and other documents by the IMF allows for the deletion of market-sensitive information.

INTERNATIONAL MONETARY FUND

FINLAND

Selected Issues and Analytical Notes

Prepared by Lone Christiansen, Michelle Hassine, Daniel Kanda, Mika Kortelainen, Sebastian Weber

Approved by European Department

August 3, 2012

Contents   Page

I. ANALYTICAL NOTE 1: INTERNATIONAL SPILLOVERS[1]

This note sheds light on potential spillovers to Finland from various shocks associated with cross-country interlinkages. First, the note provides an overview of the trade and financial linkages. Second, the note assesses the impact of global fiscal consolidation on Finland via trade links. Third, it quantifies dynamic contributions from external sources to growth and uses these contributions to forecast the potential loss to Finnish GDP from a growth slowdown in other European countries. Fourth, the note analyzes the potential impact from banking sector or sovereign stress.

A. Trade and Financial Linkages

1.   **Finland's regional trade pattern is relatively diversified**. With an export to GDP ratio of around 39 percent in 2011, Finland is a typical small open economy in Northern Europe. However, the regional diversification of trade is rather atypical. Germany, Sweden, and Russia account for roughly similar shares of Finnish merchandise exports, while imports from Russia (18 percent in 2011) account for a larger share than imports from Sweden and

Germany (14.1 and 13.9 percent). Other significant import trading partners include the Netherlands, the U.S., and China. Developing countries and emerging markets account for a comparably high share of exports, recently strengthened further by high export growth to Asia. Finland's trade balance is supported by a surplus with Asia and the U.S., while Finland runs significant deficits with other euro area members and Russia due to imports of consumer goods and raw materials, respectively.

Comparison - Export Market Destinations
(in percent of total merchandise exports)

Sources: IMF Direction of Trade Statistics and Fund staff calculations.

---
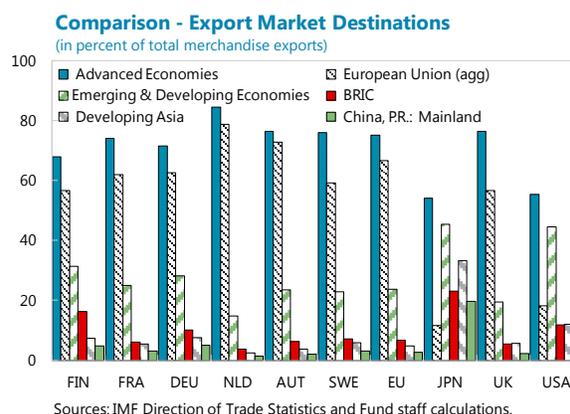
[1] Prepared by Sebastian Weber.

Finnish Trade by Regions and Countries, 2011

Origin/Destination	Balance Value in USD mill.	Exports Value in USD mill.	Exports Share (percent)	Exports Change (percent)	Imports Value in USD mill.	Imports Share (percent)	Imports Change (percent)
Total	-6,251	76,723	100.0	13	82,974	100.0	22
EU	-8,053	43,536	56.7	15	51,589	62.2	17
Sweden	-2,423	9,274	12.1	17	11,696	14.1	18
Germany	-3,738	7,829	10.2	12	11,567	13.9	16
Netherlands	-1,150	5,298	6.9	20	6,448	7.8	15
United Kingdom	1,462	4,046	5.3	25	2,584	3.1	19
France	-60	2,444	3.2	4	2,504	3.0	1
Italy	-212	1,877	2.4	5	2,089	2.5	15
Poland	614	2,201	2.9	23	1,587	1.9	32
Spain	424	1,374	1.8	-2	949	1.1	20
Estonia	-484	1,744	2.3	17	2,228	2.7	26
Denmark	-895	1,613	2.1	21	2,508	3.0	19
Norway	-254	2,155	2.8	20	2,410	2.9	86
Russian Federation	-7,672	7,259	9.5	25	14,931	18.0	26
America	230	1,990	2.6	20	1,760	2.1	31
United States	1,907	3,879	5.1	-19	1,972	2.4	42
Developing Asia	485	5,617	7.3	6	5,131	6.2	22
China,P.R.: Mainland	88	3,660	4.8	4	3,572	4.3	18

Sources: IMF Direction of Trade Statistics and Fund staff calculations.

2.   **The banking sector has significant linkages with banks in Sweden and Denmark**. Although claims of *Finnish banks* on foreign banks have increased compared to pre-crisis levels, they declined to slightly below 9 percent at end-Q4 2011. However, these figures understate the strong regional financial linkages, which are due to the domination of the domestic banking sector by subsidiaries of large *international banks* from Sweden and Denmark. When using assets of *banks that reside in Finland* as a measure of inter-linkages, claims on banks outside Finland reached 165 percent of GDP in 2011Q4. The more than tripling of exposure—from 49 percent of GDP in 2010Q1—is a consequence of Nordea Group's decision to concentrate its derivatives business on the balance sheet of Nordea Bank Finland. While this has left the net position relatively unchanged, it has

Finland: Foreign Claims of Finnish Banks, 2005-11
(Percent of GDP)
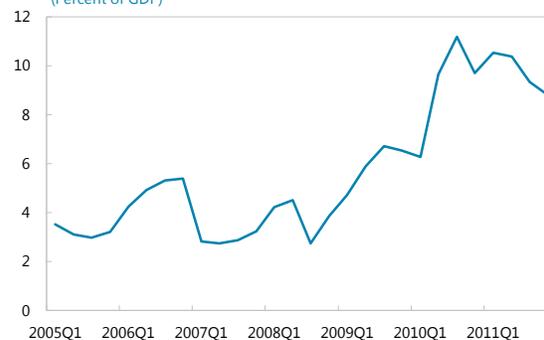
Sources: BIS, Haver Analytics, and Fund staff calculations.

Finland: External Position of Banks in Finland, 1984-2011
(Percent of annual GDP)
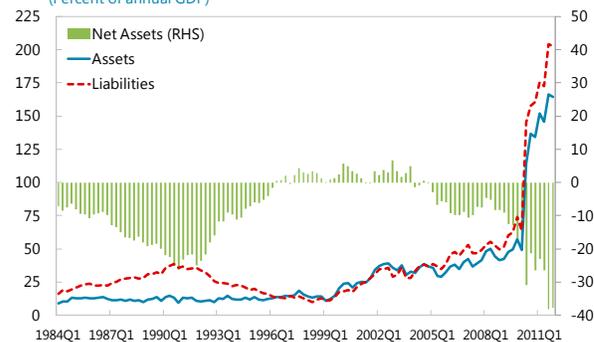
Sources: BIS (Table 2A), Haver Analytics, and Fund staff calculations.

increased the bilateral exposure. These linkages are also reflected in the high foreign liabilities of Finnish banks to the Swedish banking sector.

3. **Though Finnish banks do not appear directly exposed to peripheral sovereign debt, exposures to select other counterparties are not negligible**. International assets of *Finnish banks* on individual countries do not exceed 2 percent of GDP in the respective countries at end-2011. However, Finnish banks are indirectly exposed through international lending operations of banks active in Finland.[2] For instance, on the basis of BIS end-2011 data, Swedish banks—of which several are active in Finland—hold claims abroad worth 169.4 percent of Swedish GDP, of which close to 20 percent of GDP are claims on Finland. The high liabilities of the Finnish banks to Swedish banks create upstream risk, as measured by a country's potential rollover needs through both direct cross-border lending by banks and the domestic lending operations by foreign affiliates that are funded by their parent bank.[3] The high international exposures of Swedish banks make this upstream risk not only subject to developments in Sweden (and Denmark, the home country of Danske Group, which has a subsidiary in Finland, Sampo Pankki) but also to developments in other countries on which Sweden has claims.

Finnish Bank Claims Abroad
(As of end-December 2011)

	USD billion	Share (percent)
All countries	23	100.0
Developed countries	21	88.8
Europe	20	85.3
France	3	14.4
Sweden	3	14.2
United Kingdom	2	10.1
Germany	2	10.4
Netherlands	2	9.6
Spain	1	5.1
Norway	1	5.4
Denmark	1	3.8
Italy	1	2.3
Ireland	1	2.2
Other developed countries	1	3.6
Australia	0	0.9
United States	0	1.8
Developing countries	1	3.0
Offshore centres	0	0.3

Sources: BIS (on ultimate risk basis) and Fund staff calculations.

Swedish Bank Claims Abroad
(As of end-December 2011)

	USD billion	Share (percent)
All countries	846	100
Developed countries	757	89
Europe	652	77
Denmark	191	23
Norway	132	16
Finland	163	19
Germany	67	8
United Kingdom	40	5
Estonia	17	2
France	10	1
Netherlands	10	1
Spain	3	0
Greece, Ireland, Portugal	2	0
Italy	1	0
Other developed countries	105	12
United States	101	12
Developing countries	65	8
Latvia, Lithuania, Estonia	46	5
Poland	11	1
Offshore centres	23	3

Source: BIS, on ultimate risk basis.

4. **Foreign direct investment (FDI) in Finland is dominated by Sweden**. On the basis of 2010 bilateral FDI data, Swedish residents account for 55.9 percent of the FDI stock in Finland, and the Nordic countries combined contribute 63.7 percent of the total FDI stock. These are followed by the Netherlands (15.8 percent of the total FDI stock) and Germany (6.4 percent of the total FDI stock). Similarly, of total outward Finnish FDI, stocks are largest in Sweden (25.9 percent of total outward FDI stock), but outward shares are also

---

[2] The implementation of Basel III could further increase linkages across countries as Finland-based banks are likely to turn to foreign funding to increase long-term equity capital eligible as Tier 1 capital instruments under the more stringent Basel III definitions.

[3] In addition, the upstream exposure measure also includes the credit commitments (not used yet) that a borrower country has secured from BIS reporting banks.

significant for Belgium (21.1 percent), the Netherlands (16.5 percent), Luxembourg (14.6 percent), the U.S. (7.8 percent), and Germany (4.5 percent).

B. Fiscal Spillovers

5. **Export diversification and limited exposure to countries with high fiscal consolidation needs imply that worldwide fiscal consolidation may only have small spillovers on Finland**. Two of Finland's main trading partners—Sweden and Germany—are projected to tighten their fiscal balances by less than the average in the euro area. This should dampen the impact of external fiscal tightening on Finnish GDP growth in 2012–13 despite the relative openness of the Finnish economy.

6. **However, GDP growth could slow owing to domestic projected fiscal consolidation**. We simulate the effect of Finnish and external fiscal consolidation on Finnish output growth for 2011–13, allowing for carry-over effects from fiscal adjustment in the previous period to current GDP growth, using a model based on the national

Foreign Direct Investment Positions, 2010
(Billions of euros)

	Inward	Outward	Net
World	74.7	128.2	-53.5
European Union	70.7	98.9	-28.1
United Kingdom	1.1	1.4	-0.3
Nordics	47.6	35.3	12.3
Sweden	41.7	33.2	8.5
Denmark	5.3	0.9	4.4
Norway	0.5	1.2	-0.6
EU-17	23.7	60.0	-36.3
Netherlands	11.8	21.1	-9.3
Belgium 1/	-0.9	27.0	-27.9
Luxembourg	4.1	18.7	-14.6
Germany	4.8	5.8	-1.0
France	1.5	1.4	0.1
United States	0.6	10.0	-9.4
Canada	0.1	2.0	-1.9
Japan	0.2	0.0	0.2

Sources: IMF Coordinated Direct Investment Survey and Fund staff calculations.
1/ Direct investment positions are negative when a direct investor's claims on its direct investment enterprise are less than the direct investment enterprise's claims on its direct investor. Direct investment positions also can be negative due to negative retained earnings (which may result from the accumulation of negative reinvested earnings).

accounting framework.[4] Estimates are based on changes in cyclically adjusted revenue and expenditures of 20 countries, which cover about 70 percent of world GDP and more than 80 percent of Finnish exports.

---

[4] For a detailed description see Ivanova and Weber (2011). A brief discussion is provided in Appendix A.

Fiscal Contribution to Growth 1/

(Percentage points)

	2011			2012			2013		
	Total growth impact	Of which:		Total growth impact	Of which:		Total growth impact	Of which:	
		domestic effect	spillover effect		domestic effect	spillover effect		domestic effect	spillover effect
Finland	0.0	0.1	-0.1	-0.3	-0.2	-0.1	-0.2	-0.1	-0.1
of which:									
- current year	-0.4	-0.3	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.1
- carry over from previous year	0.4	0.4	0.0	-0.3	-0.2	-0.1	-0.1	0.0	0.0
PPP weighted average	-0.4	-0.3	-0.1	-0.5	-0.4	-0.1	-0.5	-0.4	-0.1
Simple average	-0.6	-0.5	-0.1	-0.7	-0.6	-0.2	-0.7	-0.5	-0.1

Sources: Direction of Trade Statistics, World Economic Outlook, and Fund staff calculations.

1/ Financial sector support recorded above-the-line was excluded for the calculation of the growth impact for Ireland (2.5 percent of GDP in 2009 and 5.3 percent of GDP in 2010) and the U.S. (2.5 percent of GDP in 2009, 0.4 percent of GDP in 2010, and 0.1 percent of GDP in 2011 and 2012). Financial sector support is not expected to have a significant impact on demand. For Russia, only non-oil revenues are assumed to have an impact on growth. Values may not add up exactly because of rounding.

7.   **Specifically, growth could be lowered by about 0.3 percentage point in 2012 on account of fiscal consolidation**. The simulation results indicate that the *domestic* effect of fiscal consolidation is the main determinant of the growth slowdown from total fiscal consolidation. The largest effect should materialize in 2012 due to the cumulating effects from the carry-over from fiscal tightening in 2011 and 2012. Under the current budget plans there will be a smaller drag on GDP growth from fiscal consolidation in 2013.

Contribution to Growth from Global Fiscal Consolidation, 2011–13
(Percentage points)

Legend: Domestic; Germany, France, Netherlands; United States, United Kingdom; Others; Growth effect

Sources: Direction of Trade Statistics, World Economic Outlook and Fund staff calculations.
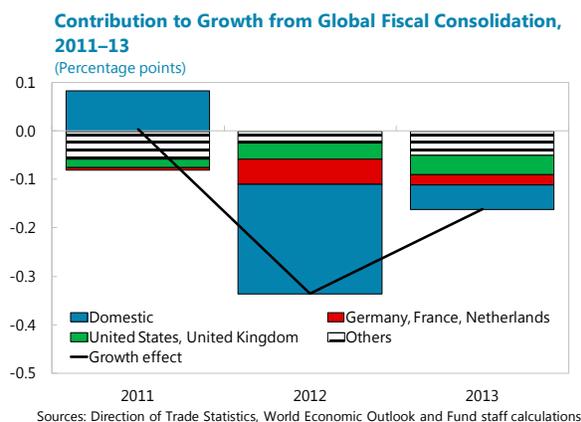
8.   **Negative growth spillovers from external fiscal consolidation are likely to be modest**. The negative growth effect from *external* fiscal consolidation is estimated to be limited to less than ¼ percentage point in each year during 2011–13. In 2012, about 50 percent of the spillover is accounted for by Germany, France, and the Netherlands. The magnitude of the total spillover effect for Finland is in line with the average spillover in our sample. On the one hand, this is a result of the relatively high openness of the Finnish economy, which, on the other hand, is moderated by the prevailing direction of Finnish exports to countries with comparatively milder fiscal consolidation efforts.

C. Growth Spillovers

9.   **A multi-country VAR analysis is used to assess the risk to Finnish GDP growth from a decline in domestic demand in other European countries**. Domestic components are identified following the VAR approach described in Poirson and Weber (2011), which

allows decomposing the growth rate into long-run, dynamic domestic, and dynamic foreign components. After decomposing growth into these three components, three different shock scenarios are analyzed to assess the growth implications for Finland. The assumption underlying the first scenario is a ½ standard deviation reduction in the dynamic domestic growth component of Italy, Spain, Greece, Ireland, and Portugal for each quarter in 2012 compared to the implied values under the WEO projections. In the second scenario, only Sweden's dynamic domestic growth component is lowered by ½ standard deviation. In the third scenario, all euro area members' dynamic domestic growth component is lowered by ½ standard deviation. In each scenario, the new growth rates for all 17 countries in the sample are computed, holding all other domestic components unchanged.[5]

10.   **Foreign factors matter more for variation in Finnish growth than domestic factors**. The dynamic domestic component to growth remained resilient throughout much of the crisis and supported the recovery. Most of the decline in output and its subsequent recovery of output were therefore driven by foreign factors. However, in the forecast period, the dynamic domestic component will exert a drag on GDP growth in line with the fiscal consolidation under way and a cooling down of consumer demand. It is important to note that the domestic component matters more for overall growth in Finland compared to some other small and medium-sized euro area members (e.g. Austria, Belgium, and the Netherlands). Swedish growth is even more dominated by domestic factors, despite a slightly higher export to GDP ratio. The exchange rate regime is likely to explain part of the difference as Sweden's floating exchange rate helps mitigate the effect of external shocks on the domestic economy.

Finland: Growth Contributions, 2005-15
(Percentage points)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

Sweden: Growth Contributions, 2005-15
(Percentage points)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

---
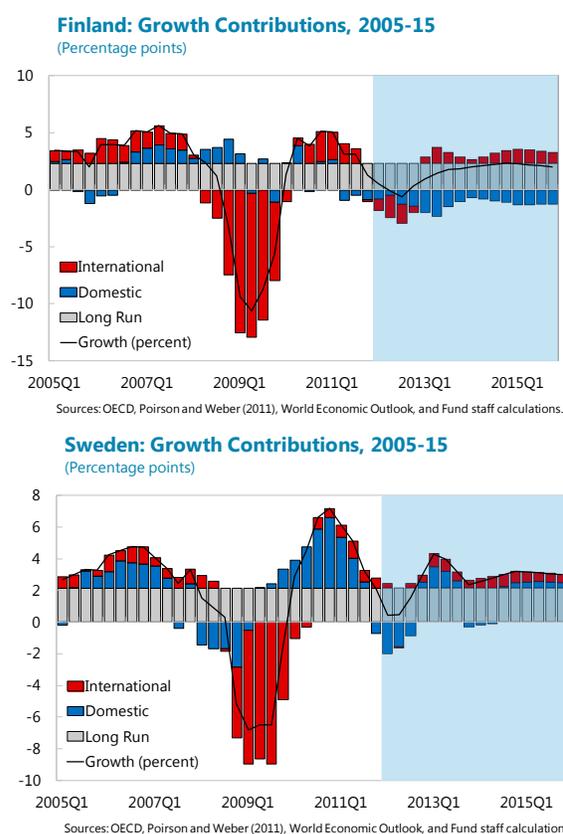
[5] Results underestimate the impact on growth as there is no second-round effect on other countries' dynamic domestic component but only on their external dynamic component. However, the approach has the advantage that it takes third country effects—e.g. the impact on Finland of the fall in Italian domestic demand channeled via Germany—into account and is thus estimating the spillover effects consistently across the 17 countries in the sample. The foreign component includes also three exogenous shocks: a dummy for the oil shock in 1979, a dummy for the oil shock in 1990, and a dummy for the recent financial crisis. The sample extends from 1975Q1 to 2011Q4. The country sample includes: Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

11.   **A shock to domestic demand in the high spread countries in 2012,[6] would impact moderately Finnish GDP growth**. The shock would only moderately impact Finnish growth as growth would be largely unaffected in 2012 and lowered by about 0.3 percentage points in 2013. The response is stronger in the Netherlands and Germany. The milder response in Finland is mostly accounted for by the fact that Sweden does not appear to be negatively affected by the growth shock in the high spread countries and thus supports growth in Finland.

Output Growth Comparison: WEO Baseline
(Percent)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

Output Growth Comparison: High Spread 2012 Shock
(Percent)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

Output Growth Comparison: Sweden 2012 Shock
(Percent)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

Output Growth Comparison: Euro Area Wide 2012 Shock
(Percent)

Sources: OECD, Poirson and Weber (2011), World Economic Outlook, and Fund staff calculations.

12.   **Conversely, shocks to all euro area members or to Sweden have somewhat larger consequences for Finnish growth**. A shock to all euro area members (excluding Finland) could lower Finnish GDP growth by more than ½ percentage point in 2013. A ½ standard deviation shock in Sweden alone, which results in lower average 2013 Swedish growth of about 1 percentage point relative to the baseline, also has a negative effect. A growth reduction in Sweden lowers output growth in Finland by about 0.1 percentage point in 2012 and above ½ percentage point in 2013. This sensitivity to developments in one single country is underpinned by the multifaceted linkages that Finland has with Sweden.

---

[6] High spread countries are countries with spreads above the 10-year government bond yield of the Bund of more than 100 basis points at 2011Q1. These countries include Greece, Ireland, Portugal, Italy, and Spain.

D. Banking and Sovereign Stress Spillovers

13.   **Limited banking sector exposure to the euro area periphery countries implies very mild losses from even substantial haircuts in the sovereign debt of Greece or all the three IMF/EU-program countries**. Building on the RES/MFU Bank Contagion Module, a spillover analysis is conducted to simulate the *direct* effects of losses on Finnish bank claims abroad.[7] The direct exposure of the Finnish banking sector to the sovereign debt of Greece, Ireland, and Portugal is so low that there is no notable loss to Finnish banks even if they have to stand a simultaneous 50 percent default on sovereign assets held on the three program countries. In particular, such a default would not have any measured impact on the ability of Finnish banks to extend credit to the economy. Nonetheless, the analysis is performed at the aggregate level and therefore could hide potential larger losses for individual banks. Similarly, deleveraging needs are computed based on the Tier 1 capital ratio of the *aggregate* banking sector and thus could mask potential deleveraging needs of individual banks.

Spillovers to Finland from International Banks' Sovereign Exposures
(As of September 2011)

Shock originating from	Magnitude 1/	Deleveraging need 2/	Finnish banks' losses (percent of GDP)	Impact on credit availability (percent of GDP) 3/
Greece	50	0.0	0.0	-0.1
Greece, Ireland and Portugal	50	0.0	0.0	-0.2

Sources: RES/MFU Bank Contagion Module based on BIS, ECB, and IFS data.
1/ Magnitude denotes the percent of sovereign on-balance sheet claims that default.
2/ Deleveraging need is the amount (in percent of Tier I capital) that needs to be raised through asset sales in response to the shock in order to meet a domestic banking sector Tier I capital asset ratio of 10 percent, expressed in percent of total assets and assuming no recapitalizations.
3/ Reduction in foreign banks' credit to Finland due to the impact of the analyzed shock on their balance sheets, assuming a uniform deleveraging across domestic and external claims.

14.   **The direct losses to Finnish banks remain mild even if assets held also on banks and nonbanks default**. In fact, even if Finnish banks lose 30 percent of their assets in the three program countries, the loss to the Finnish banking sector would be small. In particular, the Finnish banking sector's ability to extend credit to the economy would remain largely intact.

15.   **More sizable losses could be incurred due to exposures to Sweden and Germany**. In contrast with the earlier example, the following table shows how the Finnish banking sector is more vulnerable to losses recorded on German and Swedish assets. For example, a 10 percent decline in the asset value held on Germany and Sweden could result in losses for

---

[7] See Cerutti et al. (2012) and Tressel (2010) for methodological details. A brief discussion is provided in Appendix B.

Finnish banks of around ½ and 2 percent of GDP, respectively. In addition, the 10 percent loss on Swedish assets alone could induce a credit squeeze. In the absence of corrective policy measures, credit availability may contract by more than 50 percent of GDP. In turn, this could have severe second round effects for overall GDP growth, well beyond the losses to the Finnish banks. The large impact on credit availability underpins the importance of exposure to cross-border activities of Swedish banks active in Finland.

Spillovers to Finland from International Banks' Exposures
(As of September 2011)

Shock originating from	Magnitude 1/	Deleveraging need 2/	Finnish banks' losses (percent of GDP)	Impact on credit availability (percent of GDP) 3/
Greece	30	0.0	0.0	-0.1
Greece, Ireland and Portugal	30	0.0	0.1	-0.7
Italy	10	0.0	0.1	-0.4
Spain	10	0.0	0.1	-0.9
France	10	0.0	0.2	-3.3
Germany	10	0.0	0.6	-5.1
Sweden	10	0.0	1.9	-56.5
UK	10	0.0	0.4	-2.6
Selected European Countries 4/	10	55.8	3.6	-71.6
US	10	0.0	0.3	-4.4

Sources: RES/MFU Bank Contagion Module based on BIS, ECB, and IFS data.
1/ Magnitude denotes the percent of on-balance sheet claims (all borrowing sectors) that default.
2/ Deleveraging need is the amount (in percent of Tier I capital) that needs to be raised through asset sales in response to the shock in order to meet a domestic banking sector Tier I capital asset ratio of 10 percent, expressed in percent of total assets and asuming no recapitalizations.
3/ Reduction in foreign banks credit to Finland due to the impact of the analyzed shock on their balance sheet, assuming a uniform deleveraging across domestic and external claims.
4/ Greece, Ireland, Portugal, Italy, Spain, France, Germany, Sweden, and the United Kingdom.

16.   **Our contagion estimates indicate potential weaknesses from specific exposures, but *indirect* effects associated with a default in any country are likely to be much larger**. Although the simulations take into account second round deleveraging effects, the results abstract from likely effects on confidence, asset prices, and implications of a potential default by a sovereign or bank for the functioning of the interbank market. Even more importantly, banks' deleveraging would impact GDP, which could also translate into additional further bank losses through an increase in non-performing assets. These effects could potentially be much more damaging than any direct spillover.

E. Conclusion

17.   **Finland differs from other small open euro area countries through its strong trade and financial ties to non-euro area countries**. The Finnish banking sector is dominated by Danish and Swedish banks and the FDI in Finland is mainly from Sweden. Trade is less concentrated on euro area members than is the case for other members of the currency union.

18.   **While global fiscal consolidation and a euro area growth shock have moderate impacts on Finland, downward risk stems from the strong trade and financial ties with Sweden**. Developments in the euro area countries are of more limited relevance to Finland than is the case for other euro area countries. Weaker trade and financial ties with the euro area countries reduce the transmission of shocks to growth in these countries. However, links to Sweden are very strong and shocks to the Swedish growth rate or the Swedish banking sector are likely to have large repercussions in Finland, with 1 percentage point lower growth in Sweden in 2012 dragging down Finnish GDP growth in 2013 by more than ½ percentage point.

F. References

Cerutti, Eugenio, Stijn Claessens, and Patrick McGuire, 2012, "Systemic Risks in Global Banking: What can Available Data Tell Us and What More Dare are Needed?" BIS Working Paper 376, Bank for International Settlements.

Ivanova, Anna and Sebastian Weber, 2011, "Do Fiscal Spillovers Matter?" IMF Working Paper 11/211, Washington: International Monetary Fund.

Poirson, Helene and Sebastian Weber, 2011, "Growth Spillover Dynamics from Crisis to Recovery," IMF Working Paper 11/218, Washington: International Monetary Fund.

Tressel, Thierry, 2010. "Financial Contagion through Bank Deleveraging: Stylized Facts and Simulations Applied to the Financial Crisis," IMF Working Paper 10/236, Washington: International Monetary Fund.

Appendix 1.1. A Measure of the Effect of Global Consolidation on Growth

The representation of the national accounts and behavioral assumptions for government spending, taxes, consumption, investment, exports, and imports can be used to simulate the effect of consolidation on growth. The starting point is the national accounting identity:

$$Y_{t,j} = C_{t,j} + I_{t,j} + G_{t,j} + X_{t,j} - M_{t,j} \tag{1}$$

where $Y_{t,j}$ is real output, $I_{t,j}$ is real investment, $G_{t,j}$ is real government spending, $X_{t,j}$ are real exports and $M_{t,j}$ are real imports, in all cases of country j in time t denominated in a common currency for a sample of N countries. The individual components of output are:

$$
\begin{aligned}
C_{t,j} &= C_0 + c_1\left(Y_{t,j} - T_{t,j}\right), & G_{t,j} &= G_{t,j}^0 + g_1 Y_{t,j} & M_{t,j} &= \mu_j Y_{t,j} \\
I_{t,j} &= I_0 + d_1 Y_{t,j} - d_2 r_{t,j} & T_{t,j} &= T_{t,j}^0 + t_1 Y_{t,j} & X_{t,j} &= \sum_{\substack{i \neq j \\ i=1}}^{I} \omega_{ij} \mu_i Y_{t,i}
\end{aligned}
\tag{2}
$$

where μ_i is the marginal propensity to import of a trading partner i, Y_i is the output of a trading partner i, and ω_{ij} is the weight of imports from country j in total imports of country i. Government expenditures and revenues have a cyclical part and a discretionary element. Substituting definitions (2) in (1) yields:

$$Y_{t,j} = ex_{t,j} + m_j G_{t,j}^0 + \rho_G m_j G_{t-1,j}^0 - m_j c_1 T_{t,j}^0 - \rho_T m_j c_1 T_{t-1,j}^0 + m_j \sum_{\substack{i \neq j \\ i=1}}^{I} \omega_{ij} \mu_i Y_{t,i} \tag{3}$$

Where $ex_{t,j} = C_0 + I_0 - d_2 r_{t,j}$ and $m_j = \left(1 - c_1 - d_1 - g_1 + t_1 + \mu_j\right)^{-1}$ is the expenditure multiplier. Taking the first difference and dividing by real output in *t-1* yields the growth rate:

$$\frac{\Delta Y_{t,j}}{Y_{t-1,j}} = m_j\left(\frac{\Delta G_{t,j}^0}{Y_{t-1,j}} + \rho_G \frac{\Delta G_{t-1,j}^0}{Y_{t-1,j}}\right) - m_j c_1\left(\frac{\Delta T_{t,j}^0}{Y_{t-1,j}} - \rho_T \frac{\Delta T_{t-1,j}^0}{Y_{t-1,j}}\right) + m_j \sum_{\substack{i \neq j \\ i=1}}^{I} \omega_{ij} \mu_i \frac{\Delta Y_i}{Y_{t-1,i}} \frac{Y_{t-1,i}}{Y_{t-1,j}} \tag{4}$$

Equation (4) is a system of *N* linear equations that can be written in matrix notation:

$$\tilde{Y}_t = W\left[A_1 \bar{G}_t - A_2 \bar{T}_t\right] \tag{5}$$

Here $W = (I - B)^{-1}$ is an N-by-N identity matrix, B is a N-by-N matrix, $\tilde{Y}$ is N-by-1 vector of real GDP growth rates, A_1 and A_2 are diagonal N-by-N matrices and $\bar{G}_t$ and $\bar{T}$ are N-by-1 vectors. Country i's contribution to country j's GDP growth is given by evaluating:

$$\tilde{y}_{t,ji} = w^{ji}\left[a_1^{ji} \bar{g}_t^i - a_2^{ji} \bar{t}_t^i\right] \tag{6}$$

The sample of countries includes: Austria, Belgium, China, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Korea, Netherlands, Portugal, Russia, Spain, Sweden, Switzerland, United Kingdom, and the United States. This sample of countries accounts for more than 80 percent of Finnish exports. The fiscal impulse is measured by the change in the cyclical adjusted revenues and expenditures relative to GDP. Details on the other assumptions are provided in Ivanova and Weber (2011).

Appendix 1.2. Contagion Module - A Simulation of Downstream Risk from Defaults[8]

The analysis is based on several rounds of shocks. The first round considers bank losses on assets that deplete their capital partially or fully. The banking sector losses are calculated based on percentage loss assumptions in a particular economic sector (public sector, banking sector, and/or non-bank private sector) of an individual country or group of countries. In the second round, if losses are large enough, a capital ratio is assumed to be restored through deleveraging (loans not being rolled over and selling of assets, assuming no recapitalization). In the third round, banks are assumed to reduce their lending to other banks, causing fire sales, and further deleveraging. Potential bank failures cause additional losses to other banks on the asset and liability sides. Final convergence is achieved when no further deleveraging needs to occur. Methodological details may be described by the following set of equations: [9]

The analysis of the contagion of a crisis across borders and through common lender effects is based on considering a stylized bank balance sheet given by:

$$Assets = Capital + Other\_Liabilities$$

where $Assets = Foreign\_Assets + Domestic\_Assets$. To quantify the effect of a shock on assets, it is assumed that, when facing a loss of LLR percent on its foreign assets, a bank combines asset sales DEL and recapitalization $RECAP$ to maintain a sound capital to asset ratio or CAR. For a given loss on its asset portfolio, the set of possible combinations of deleveraging (asset sales) and recapitalization is given by:

$$Capital - LLR \cdot Foreign\_Assets + RECAP = CAR \cdot \left(Assets - LLR \cdot Foreign\_Assets - DEL\right)$$

Hence, in the absence of a recapitalization of the banking sector, the extent of deleveraging by the financial institutions of a creditor country is given by:

$$DEL = Assets - LLR \cdot Foreign\_Assets - \frac{1}{CAR} \cdot \left(Tier\ I\ Capital - LLR \cdot Foreign\_Assets\right)$$

The process of deleveraging results in a global reduction of cross-border claims by all international banks affected by the shock, either directly or indirectly. For each recipient country, the extent of capital outflows is the aggregation of the deleveraging process by all creditor countries. Additional rounds of deleveraging may take place if shocks are large enough to cause international banks' insolvencies, and if fire sales of assets occur, triggering further losses. The system converges to an equilibrium when no further deleveraging takes place.

---

[8] Prepared by Eugenio Cerutti.

[9] Based on Tressel (2010), and Cerutti, Claessens, and McGuire (2012).

II. ANALYTICAL NOTE 2: MACRO-FINANCIAL LINKAGES[1]

Despite the pronounced output contraction in 2009, the Finnish financial sector has weathered the 2008–09 crisis well. Recent evolution in a fairly comprehensive financial stress index points to an improvement of the financial sector situation in Finland. The financial stress index (FSI) is based on variables related to the banking sector, securities markets and foreign exchange market.[2] Compared with the stress in the 1991 crisis and the 2001 stock market drop, the recent financial crisis appears to have had minor repercussion for the Finnish financial sector.

1.   **However, uncertainty remains high as stress in other European countries has started to increase again and Finland tends to lag**. Stress in the Finnish banking sector tends to co-move strongly with the stress in the Swedish banking sector. The latter has seen a renewed increase in recent months comparable to the increase in stress in Denmark. This indicates that uncertainty remains high and the recovery fragile.
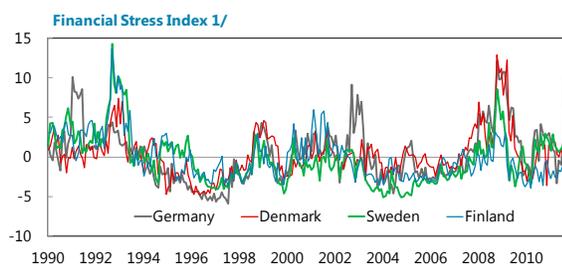
Source: Cardarelli, R., S. Elekdag, and S. Lall (2009), "*Financial Stress, Downturns, and Recoveries*," IMF Working Paper, WP/09/100 and Fund staff calculations.
1/ The financial stress index is a composite of the spread between commercial papers and sovereign bonds, the beta of the banking sector (from a CAPM), the term structure of interest rates, and volatilities in stock returns and the exchange rate. Large values imply higher distress. A value of zero indicates neutral financial conditions.

2.   **While starting from robust positions, several financial vulnerability indicators have deteriorated in Finland in recent years**. Household indebtedness has risen from below 60 percent in the mid-90s to above 100 percent of disposable income in 2010 and is projected to increase further. Although still accounting for less than 1 percent of total loans, non-performing loans have increased from below 500 EUR million in 2007 to 1,250 EUR million in 2009 and have remained broadly unchanged since then. The share of households with debt exceeding 300 percent of disposable income has grown in recent years to 10 percent and accounts now for about 45 percent of total household debt. The debt accumulation has been facilitated by low interest rates and rising housing prices, which have boosted the collateral values.

3.   **Financial variables can affect the broader economy via multiple channels**. Falling house prices and stock market indices worsen the balance sheet position of households and firms and are potential factors limiting consumption and investment growth. The near absence of fixed-rate lending, paired with the increased debt levels, bears an additional risk as debt servicing would become more difficult for the highly indebted households should

---

[1] Prepared by Sebastian Weber and Mika Kortelainen.

[2] The financial stress index (FSI) is a composite of the spread between commercial papers and sovereign bonds, the beta of the banking sector (from a CAPM), the term structure of interest rates, and volatilities in stock returns and the exchange rate. Large values imply higher distress. A value of zero indicates neutral financial conditions. See Cardarelli et al. (2009) and Balakrishnan et al. (2009).

interest rates increase. To analyze these channels in more detail and quantify the corresponding effects, we make use of three econometric approaches.

4.   **Various models are employed to assess the vulnerabilities of the economy to shocks transmitted via the financial sector**. First, we construct an index that allows us to evaluate the impact of the change in financial conditions on GDP. A VAR analysis is then used to weigh the relevance of various financial sector variables for economic activity. Second, we analyze the potential existence of disequilibrium in the credit market, namely whether there is a buildup of excess demand or supply of credit. Finally, the implications of possible deleveraging and possible renewed contraction in housing prices for overall output are evaluated with the help of another VAR analysis, which links output and credit to financial sector variables.

A.   Financial Conditions and their Effect on Output

5.   **A VAR analysis is used to decompose the contribution of various financial indicators to economic activity**. The overall financial condition index (FCI) is the sum of the cumulative impulse responses of real GDP to each of the financial variables. The latter variables include the house price index, the short term interest rate (LIBOR), the stock price index, the banking sector risk (measured by the corresponding beta estimated in a CAPM), and the real effective exchange rate. The value of the overall FCI reflects the overall contribution of financial conditions to GDP. Additionally, the impulse responses are standardized such that a change in the index by one unit can be interpreted as an (annualized) change in GDP growth by 1 percentage point.

6.   **The evolution of the FCI implies a strong negative impact of financial conditions on GDP in 2009**. The FCI's deteriorating trend from 2007Q2 to 2009Q2 suggests a significant contribution to the cumulative reduction in GDP over the two years due to the deterioration in financial conditions. In 2009Q2 the index stood at -6 down from 4 in 2007Q2. However, the negative impact was short lived and financial conditions returned to a positive contribution to growth in 2010Q1.

Financial Conditions Index, 2000Q1-2011Q4
(Percentage points of y/y real GDP growth)

Sources: Cardarelli, R., S. Elekdag, and S. Lall (2009), "*Financial Stress, Downturns, and Recoveries*," IMF Working Paper, WP/09/100 and IMF staff calculations.
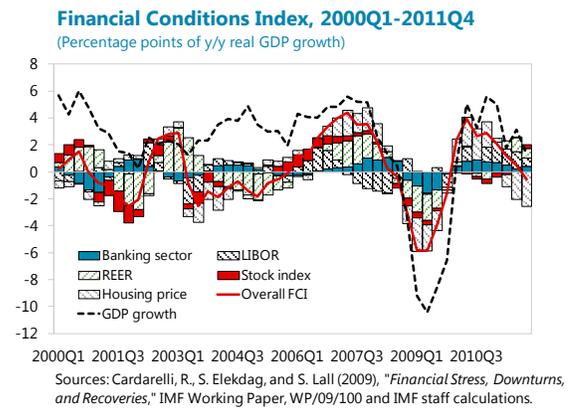
7.   **The negative contribution to growth in 2009 was mainly due to falling housing prices, banking sector stress, and worsening competitiveness**. The deterioration in financial conditions was initiated by a hike in interest rates, which was followed by a fall in equity prices. Higher interest rates and simultaneous declines in the prices of financial sector

stocks fuelled the stress in the banking sector via lower asset values and increased costs of refinancing.[3] While the decline in financial conditions was broad-based across the five contributors, the recovery was exclusively based on very low interest rates, which fuelled a renewed increase in housing prices and supported the recovery in the banking sector. Stock market prices remained below pre-crisis levels and the real effective exchange rate provided no significant support to growth.

B. Credit Market Imbalances

8. **Adverse financial conditions can feed into a mismatch of demand and supply in the credit market**. However, the policy implications are very different depending on whether the mismatch is driven by the supply side (credit crunch) or the demand side (credit contraction) of credit. In the case of a credit crunch, banks are constrained in their capacity to provide credit either because of liquidity problems or deleveraging. Thus, there is a case for policy to focus on restoring stability in the financial sector, possibly through direct support to financial institutions. In the event of a credit contraction, households' and firms' demand for credit is weak. In this case, policy should focus on fostering household and firm demand by improving the economic conditions for households and firms.

9. **We estimate a system of equations for the demand for and the supply of credit to the private sector for the period from 2000Q1 to 2011Q3**.[4] The demand for credit is assumed to depend on economic activity, the lending rate, the stock market, and housing prices. The supply of credit is explained by economic activity, total private deposits (as a measure of available resources), and the lending and money market rates. The difference between the residuals of the supply and the residuals of the demand equation can be interpreted as disequilibrium in the credit market. Excess demand that coincides with a flat or falling volume of credit indicates the presence of a credit crunch.

10. **The analysis of demand for and supply of credit is based on two alternative estimation methods**: A two stage least square (2SLS) regression, and a maximum likelihood

---

[3] To identify the relevance of the different factors in the VAR, a Choleski decomposition of the variance-covariance matrix is required. The Choleski decomposition is obtained by ordering output first, followed by the price level, the house price index, the real exchange rate, the banking sector risk, the interbank rate, and the stock market index. The conclusions are robust to changes in the ordering.

[4] The model is described in Maddala and Nelson (1974) and a different variant has been applied to Finnish data earlier by Pazarbasioglu (1997). The credit data refers to the loans to the private sector.

(ML) method. In both estimation methods, we apply a disequilibrium concept[5] for the observed quantity (credit). Specifically, an excess demand for credit is expected to increase prices (lending rate) and have a positive effect on the supply of credit and vice versa. The difference between these arises as the ML method is based on a system of equations while the 2SLS method estimates the demand and supply equations separately. We apply the 2SLS estimates as initial values in the ML estimation.

Credit Market Disequilibrium Estimation Results

	Two-stage least square		Log-likelihood	
	Demand	Supply	Demand	Supply
Output	1.45***	1.84***	1.66***	1.38***
Deposits		1.21***		0.95***
Lending rate	-0.06***		-0.08***	
Interest margin		0.11**		-0.03
Inflation		-0.02**		-0.01
Volatility		-0.17**		-0.25***
Stock market (t-6)	0.24***	0.02	0.23***	-0.02
Housing prices (t-1)	0.77***		0.55*	
Standard error	0.04	0.04	0.05	0.04

Significance level: *** 1 percent, ** 5 percent, and * 10 percent.

11.   **The estimation results suggest that the credit market is broadly in equilibrium, although the latest numbers suggest a move to tighter conditions**. The excess supply of credit—which preceded the 2008–09 crisis—came to a halt in 2008Q4 as volatility increased, the interest margin shot up, and the growth of total deposits came to a halt. As the interest rate margin started easing, both demand and supply of credit started declining in tandem, leaving the credit

Finland - Excess Supply/Demand for Credit
(Percentage by which demand exceeds supply)

Source: Fund staff calculations.

---
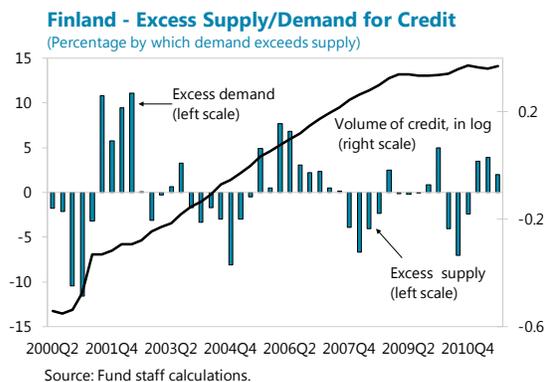
[5] In equilibrium, the model would be as follows:

$$Q_t = D(x_t^D, p_t) + u_{it}$$
$$Q_t = S(x_t^S, p_t) + u_{2t}$$

where both quantity and price are the same in both the demand and supply equations. Instead of this, we estimate the following disequilibrium model with both 2SLS and ML methods:

$$D_t = D(x_t^D, p_t) + u_{it}$$
$$S_t = S(x_t^S, p_t) + u_{2t}$$
$$Q_t = \min(D_t, S_s)$$
$$p_t - p_{t-1} = \gamma(D_t - S_t) + u_{3t}$$

Excess demand has an effect on the price changes in the disequilibrium model.

market conditions relatively unchanged in 2009. A mild revival in deposit growth and a further decline in the interest margin led to an easing in the supply of credit. However, the worsening macro-financial outlook and the increase in inflation have contributed to a slight excess demand for credit in the first quarters of 2011.

12. **Survey data on corporate finance suggest that firms remain cautious in their investment plans**. The recently published corporate finance survey describes the financing situation of about 1000 firms in 2010. The study indicates that the financial problems that firms faced during the financial crises gradually alleviated in 2010. Credit margins have been lifted somewhat during 2010. This has happened although the demand for credit is subdued as firms are still cautious with their investment plans.

C. Housing Sector Developments, Credit, and Growth

13. **House prices have continued their rising trend at a moderate pace**. From 2003Q1 to 2007Q3, nominal house prices grew at an average annual rate of 7 percent. Prices dropped a cumulative 5½ percent from 2008Q2 to 2009Q2 but exceeded the 2008Q2 high already two quarters later—in 2009Q4—by 2¾ percent. After this temporary acceleration, nominal house price growth appears to have leveled-off with an average q-o-q growth rate of ¾ percent in the last four quarters of 2011. Growth in house prices was flat in mid-2011.

14. **Real house prices and the price-to-rent ratio have reached the pre-1991 crisis peak values**. Real house prices are at similar levels as in the boom period in 1990, which was followed by a full-fledged housing and banking crisis. The price-to-rent ratio recovered quickly from the temporary low in 2008Q4 and stands now 16 percent above the temporary low and for the first time close to 5 percent above the 1989Q4 peak value. In comparison with international developments, real house prices in Finland are well in line with the secular trend to higher cost for housing relative to other goods.

15. **However, a widely employed affordability measure suggests that the level of housing prices is not excessive**. Measured by the price-to-income ratio, the increase in housing prices has exceeded income increases only marginally in recent years. Compared to its lowest level since 1970Q1—in 1993Q3 after the housing bust—the price-to-income ratio has increased by about 27 percent. Since 2000Q1, the price to income ratio has increased by 1½ percent.

16. **Lending to households accounts traditionally for the largest share of credit to the private sector**. Household—primarily mortgage—lending accounts for about 60 percent of total lending to the private sector and has been increasing in recent years. Banks are thus dependent on returns from the mortgage lending business and developments in the housing sector.

Finland: Housing Price Indicators
(index: 2005=100)

Sources: OECD and Fund staff calculations.

Nominal Housing Price Growth
(y/y percent change)

Sources: OECD and Fund staff calculations.
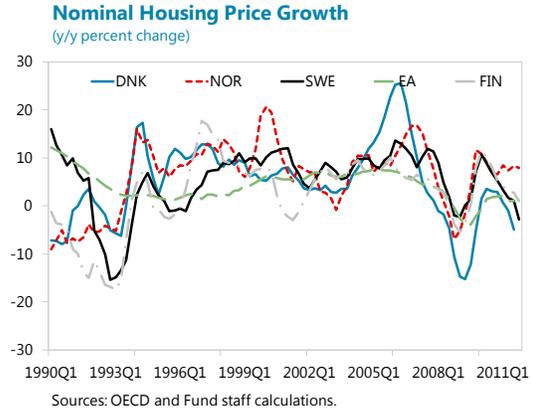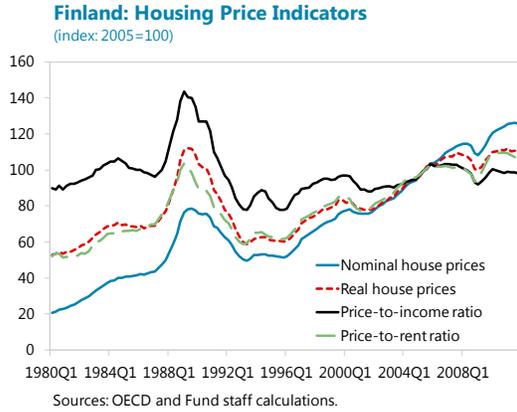
17.   **A high sensitivity of output to the housing market indicates that disruptions in the credit or housing market and deleveraging can be important sources of risk**. Thus, it is important to assess the strength of the relationship between housing prices, credit, and output. Several VAR models are estimated to capture the transmission of shocks to economic activity.

Finland: House Prices and Output Developments
(logs)

Sources: National authorities, OECD, and Fund staff calculations

Finland: Credit to Households and Output Developments
(logs)

Sources: National authorities and Fund staff calculations
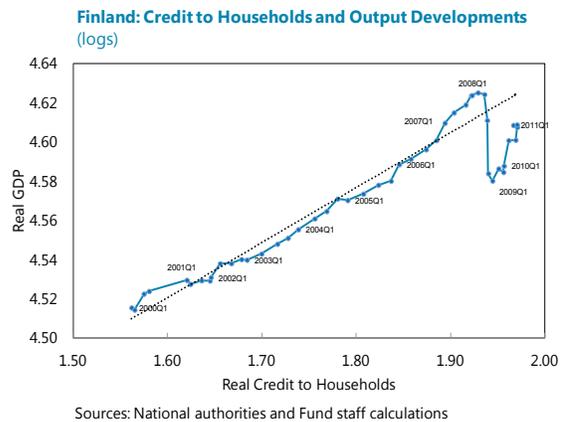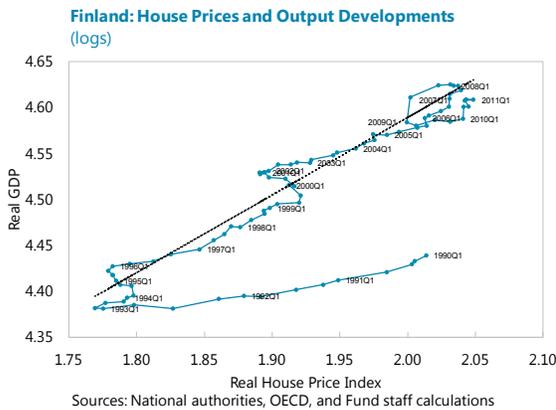
18.   **The VAR analysis points to a robust relationship between credit and output growth**. We use quarterly data for the period from 2000Q1 to 2011Q3 to estimate four VAR models. The basic model (1) includes real GDP, real credit to the private sector, and housing prices. The framework is extended in model (2) to include also the interest rate as a relevant transmission channel. Model (3) controls additionally for the overall price level. Finally, model (4) contains, with the return on financial sector equity, a measure of banking sector health to assess the feedback loops between banks, households, and the overall economy.

19.   **A deleveraging implied by a reduction of credit by 5 percent could lower output by 1 to 2 percent within two years**. A negative 5 percent shock to credit causes housing prices to fall initially by 1 percent and by 2½ to 3 percent after 2 years. The lowered credit availability and collateral value reduce output by 1 to 2 percent within the horizon of 2 years.

20.   **A shock to housing prices could affect output markedly in the short-run**. Results suggest that a negative 5 percent shock to housing prices—comparable to the house price drop of the recent crisis in 2009—causes a contraction of credit by 2½ percent, and a fall in output by 3½ percent as a consequence, within one year for model 3.[6] However, after 2 years, output exceeds initial output by 1½ percent as housing prices recover and credit stops declining. According to model 4, output recovers less quickly as housing prices and credit remain depressed for a longer period. Banking sector returns decline substantially in the short run, contributing to the decline in credit provision.

Impulse Responses from the VAR Analysis

	Model				Model				Model				Model
	1	2	3	4	1	2	3	4	1	2	3	4	4
Impact of a maximum drop in housing prices by 5 percent on:													
	GDP				Housing prices				Credit				Banks
- after 2 quarters	-2.6	-3.1	-3.0	-2.9	-4.7	-5.0	-5.0	-5.0	0.0	0.0	-0.1	-2.1	-16.6
- after 1 year	-4.7	-4.7	-3.6	-3.3	-4.4	-3.3	-2.5	-2.5	-2.0	-2.2	-2.4	-5.2	-4.3
- after 2 years	-2.1	-0.6	1.4	-0.3	-0.3	1.4	2.2	-1.1	-4.6	-3.6	-2.7	-4.2	-0.1

	Model				Model				Model				Model
	1	2	3	4	1	2	3	4	1	2	3	4	4
Impact of a maximum drop in credit by 5%													
	GDP				Housing prices				Credit				Banks
- after 2 quarters	-0.1	-0.1	-0.3	-0.1	-1.1	-0.9	-0.8	-0.5	-4.9	-4.9	-4.8	-2.6	3.3
- after 1 year	-0.5	-0.2	-0.5	-0.1	-2.4	-1.4	-1.2	-0.3	-3.6	-3.5	-3.9	-2.7	2.1
- after 2 years	-1.4	-1.1	-1.7	-1.5	-2.7	-2.6	-2.5	-2.2	-3.4	-2.9	-2.9	-2.0	-12.3

D. Conclusion

21.   **The Finnish financial sector has weathered well the financial crisis**. While indices of bank stocks and housing prices declined, and output dropped by a record close to 8½ percent, growth of credit to the private sector remained positive, non-performing loans remained well below international standards, and capital buffers of Finnish banks remained robust. There is a significant co-movement between financial variables and the real sector. While this has contributed to negative feedback loops between equity prices, output, and credit, the fall in interest rates has buffered the adverse consequences.

---

[6] Model 1 implies a larger impact since the housing price response and the credit response are more persistent in this model. This suggests that it is necessary to control for the overall inflation and other variables.

22.   **While fundamentals remain strong, risks have started to rise**. Household debt has been rising continuously in the last decade, the share of highly indebted households has more than doubled, non-performing loans have hardly declined since they peaked in 2010, and real housing prices are at historic highs. These developments have made the private sector more exposed to a potential price shock in the housing market and—in conjunction with the high proliferation of variable rate loans—to a rise in the interest rate level.

E.   References

Balakrishnan, Ravi, Selim Elekdag, Stephan Danninger, and Irina Tytell, 2009, "The Transmission of Financial Stress from Advanced to Emerging Economies," IMF Working Paper 09/133, Washington: International Monetary Fund.

Cardarelli, Roberto, Selim Elekdag and Subir Lall, 2009, "Financial Stress, Downturns, and Recoveries," IMF Working Paper 09/100, Washington: International Monetary Fund.

Maddala, G. S. and Forrest D. Nelson, 1974, "Maximum Likelihood Methods for Models of Markets in Disequilibrium", *Econometrica*, Vol. 42, No. 6, pp. 1013–1030.

Pazarbasioglu, Ceyla, 1997, "A Credit Crunch? Finland in the Aftermath of the Banking Crisis," IMF Staff Papers No. 44, pp. 315–327, (Washington: International Monetary Fund).

Roca, Paulo, 2010, "Macro-Financial Linkages," in Finland: 2010 Article IV Consultation IMF Country Report No. 10/273, (Washington: International Monetary Fund).

III. ANALYTICAL NOTE 3: POTENTIAL OUTPUT ESTIMATES[1]

A. Introduction

1. **Finland has suffered an output collapse in 2009, which was stronger than the drop during the banking crisis in 1991**. GDP growth collapsed in 2009, reducing output by

8.4 percent compared to 6 percent in 1991. For the second time in more than three decades, Finland experienced a severe recession: from 2008Q3 until 2009Q2, quarterly growth was negative and the cumulative (peak-to-trough) output loss reached around 10 percent. The crisis in 1991 lasted much longer than the recent crisis, which in turn implied also a higher cumulative output loss. From 1990Q1 until 1993Q1, output contracted by about 12½ percent of GDP.

Finland - Growth Contributions
(Percent)
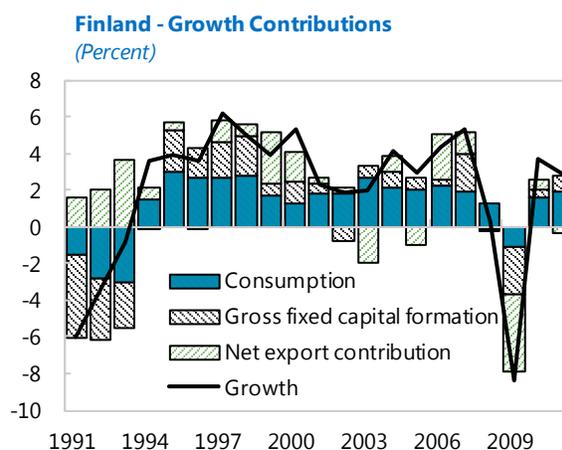
Sources: National authorities and Fund staff calculations.

2. **This time the economy recovered much faster, as the external nature of the shock and the absence of a *domestic* banking crisis facilitated the fast recovery**. The crisis in 1991 was followed by a severe contraction of domestic demand, which the positive net external contribution could not offset. The 2008–09 crisis, instead, was largely due to the collapse of external demand. Domestic demand fell only temporarily and was largely dominated by a drop in investment demand (see also AN1).

3. **However, output remains below its pre-crisis trend**. If the economy were to continue growing at its 2010 growth rate of 3.7 per annum, it would still need another 2 quarters to merely reach the level of output attained in 2008Q2 (i.e. by 2012Q3). Returning to the output level implied by the pre-crisis trend path would require an acceleration of growth beyond the currently projected growth rate. To the extent that this is not realized, the crisis implies a permanent output loss.

4. **Estimates of *potential* output can help identify the implications for relevant policies going forward**. Given the depth of the recession, it is crucial that the economy grows robustly for a sustained period of time to minimize the permanent output loss. This will be more difficult if the economy has also suffered losses to potential output. Restoring demand is insufficient in this case and appropriate supply side measures need to be taken as well. Studies of recoveries of previous recessions arising from financial crises suggest that

---

[1] Prepared by Sebastian Weber and Mika Kortelainen.

recoveries are slower, on average, than those following other types of recessions
(IMF 2009a) as was also evident in 1991.

B. Methods

5.   **Estimating the level of potential output is especially difficult in the aftermath of
a recession**. Estimates of potential output are always subject to considerable uncertainty
since potential output is not directly measured. In the immediate aftermath of a recession, this
uncertainty is increased even further. The frequently employed filtering techniques are
subject to the end-point problems and are therefore less suited for computing output gaps at
the end of the sample period.

6.   **Three different methods are employed to assess prospects for potential output
growth**. A standard HP filter, a production function approach (PF), and a multivariate
approach (MV) are used. While the HP filter is a univariate approach and uses only the
information derived from real GDP, the production function approach derives potential
output from capital, labor, and total factor productivity (TFP) trends, which, in turn, are
determined using an HP filter. Both these approaches are, however, subject to the end-period
problem. The multivariate approach instead models the joint behavior of output,
unemployment, capacity utilization, inflation, and inflation expectations. The MV approach
can be thought of as using a reduced form model, estimated on data for Finland using
Bayesian techniques, to infer the levels of potential output and the NAIRU that would be
consistent with these observations.[2]

C. Results

7.   **The estimates of the output gap following the crisis are larger than for other
advanced economies**. The output gap is estimated to have been as large as -5 to -7¼ percent
in 2009 (Figure 3.1). Estimates for Germany, the Netherlands, Belgium, and France of other
studies that apply the MV approach range from -3 to -4 percent (Benes et al. 2010,
IMF 2011, IMF 2012). However, it should also be noted that in 2009 the decrease in real
GDP has been more severe in Finland (-8.4 percent) than in the other countries (-3½ percent
in the U.S., -4.3 percent in EU-27, and -5½ percent in Japan, according to Eurostat).

8.   **Potential output growth has been lowered temporarily by about 2 percentage
points**. Both the MV and PF approaches suggest a drop in the potential output growth of
about 1 to 3 percent, while the HP filter suggests a much lower drop.[3] The drop is largely
accounted for by the fall in the contribution of labor to potential output growth, which fell

---

[2] Details of the approach can be found in Benes et al (2010). The technical details of the model and its assumptions are presented in an appendix.

[3] Results are based on a smoother value of 100 for annual data.

from 1 percent in 2008 to -½ in 2009. The fall in capital from ¾ to ¼ percent accounts for the remaining ½ percent. Total factor productivity (TFP) instead remained relatively unchanged in 2010 after a trend decline since 2000 from 2¼ percent to below 1 percent contribution to growth.

9.   **A moderate recovery of potential output growth is projected**. The production function approach indicates that potential output growth gradually recovers to 2 percent. The multivariate approach, which suggests a somewhat lower drop, implies a similar recovery path. The HP filter, which implies the lowest short-term impact on potential output growth suggests that potential growth remains depressed at around 1½ percent—to some extent a result of the end-period problem. Compared to the 1991 crisis, potential output growth has held up fairly well in the recent crisis and the output gap is expected to narrow quicker.

Finland - Contribution to Potential Output Growth
(Percent)

- Capital contribution to growth
- TFP contribution to growth
- Labor contribution to growth
- Potential growth (lambda=100)

Sources: Fund staff calculations based on production function approach.
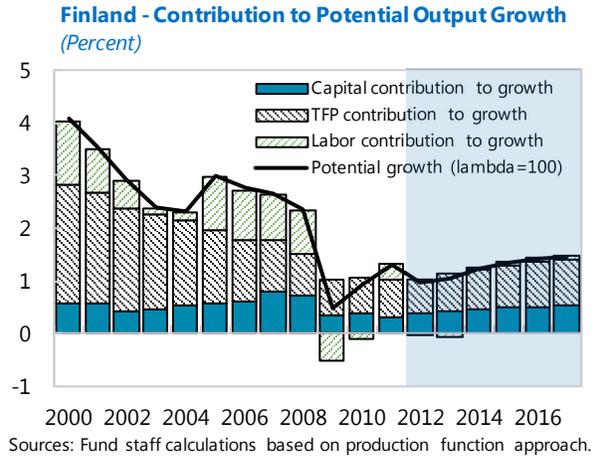
Figure 3.1. Potential Growth and Output Gap Estimates

Finland - Potential Output Growth
(percent)

- MV approach
- HP-filter
- Production function
- Production function (1991 crisis)

Source: Fund staff calculations

Finland - Output Gap
(percent)

- MV approach
- HP-filter
- Production function
- Production function (1991 crisis)

Source: Fund staff calculations.
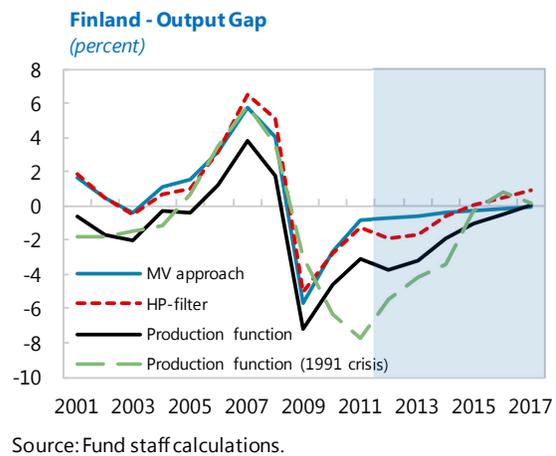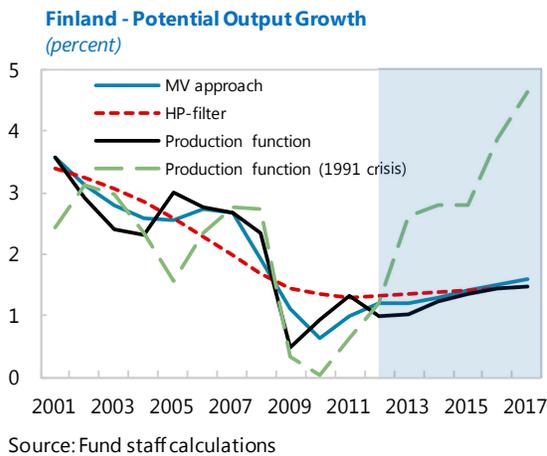
10.   **Results suggest a closing of the output gap by 2017**. The multivariate approach provides the fastest narrowing of the output gap, reaching -1 percent already in 2011 (Figure 3.2). The production function approach implies a more gradual closing, reaching -1 percent only by 2015. The HP filter lies between the two. The difference is due to a lower MV potential growth forecast for 2011 compared to the forecast underlying the production function approach.

11.   **All estimates imply a permanent output loss**. An estimate of the permanent output loss can be computed as the difference between the potential output path implied by the estimated potential output growth rates of the three models and a counter-factual output path that could have prevailed in the absence of the crisis. The counter-factual path is chosen by using the 2007 potential output growth value from the production function as starting point and the predicted value for 2017 as end-point. Growth rates for the other years are constructed by linear interpolation. The permanent loss of output under this calculation ranges from 6½ (HP) over 7½ percent (MV) to 8 (PF) percent. While these values are substantial, they are well below the estimate implied by the 1991 crisis using a similar procedure for the production function approach, which yields a loss of 14¾ percent.

D. Prospects

12.   **A declining labor force and limited advances in TFP growth are likely to be the main obstacles to potential output growth in the medium run**. The Ministry of Finance expects a decline in the labor force of 70,000 by 2015 (MoF, 2011). This will depress the contribution from labor to potential output growth. To alleviate the reduction in available workers, better use of the existing work force is needed. Furthermore, there appears to be a trend decline in the contribution from TFP since 2000, which, if trends continue, is likely to weigh down potential output in the years ahead.

13.   **The contribution of capital to growth is likely to recover only slowly as uncertainty of the—primarily international—economic environment delays investment.** Investment is largely driven by the performance of the export sector. The expected trade slowdown for 2012 and the uncertain outlook for Europe, is likely to retard firms' investments. This implies that the capital stock is likely to recover only slowly, which is reflected in the still depressed gross capital formation to GDP ratio of 21 percent in 2011—close to 2 percentage points of GDP below the pre-crisis peak of 23 percent in 2007. Furthermore, the decline was mostly accounted for by a reduction in investment in machinery and equipment and non-residential construction.

Finland - Employment Rate of Older Workers
(percent of population aged 55-64)
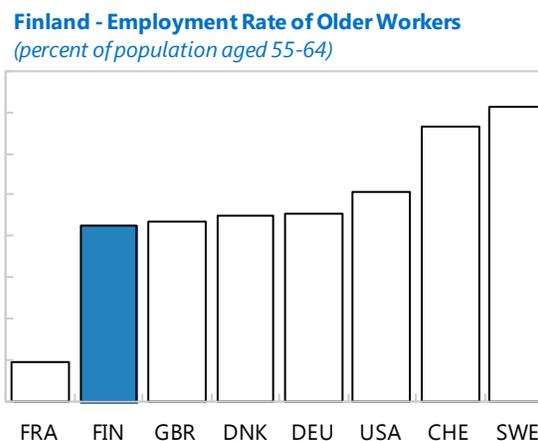
Source:s OECD and Fund staff calculations.

Figure 3.2. Output Gap, Potential Growth, and NAIRU 1/

Output Gap and Inflation
(percent, Y/Y)
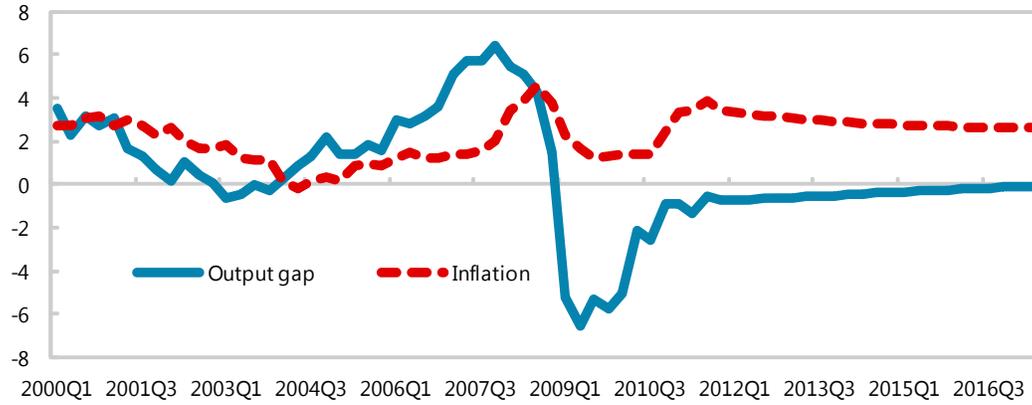
Actual and Potential Output Growth
(percent ,Y/Y)
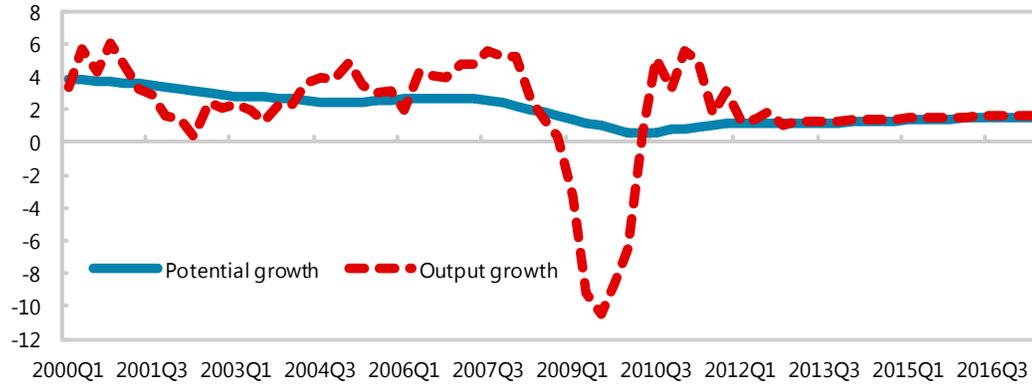
Unemployment and NAIRU
(percent of labor force)
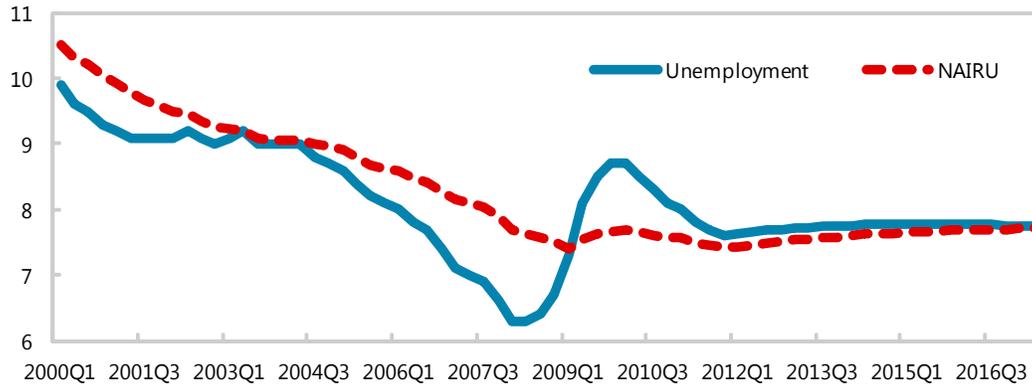
Source: Fund staff calculations.
1/ Estimates of the potential output, output gap and NAIRU are based on the multivariate approach.

E. Policies to Promote Growth

14. **Labor force participation has to be enhanced further to compensate for the declining work force in the medium run**. Female labor force participation is relatively high in Finland in comparison with the OECD average, while the male participation rate falls below the OECD and European averages. This is partly due to early retirement. To maintain robust support from labor to potential output growth, the effective retirement age should be increased and employment of older workers made more attractive.

Finland: Unemployment
2007-2011 annual & 2011M1-2012M3 monthly
(thousands)

Total unemployed, left

Long-term unemployed (> 2 year), right

Sources: Finland Ministry of Employment and the Economy and Fund staff calculations.
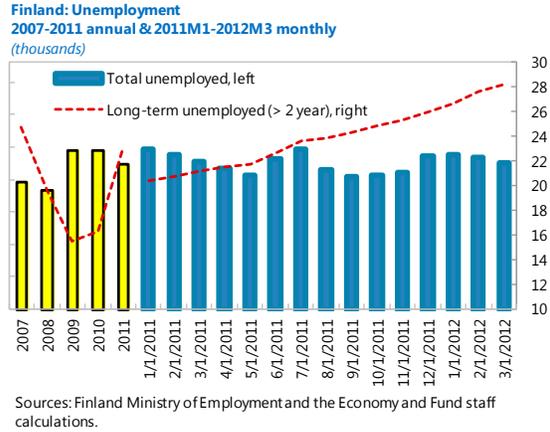
15. **Incentives to seek work should be improved**. The OECD (2010) notes that the implicit tax on further work is still high, which implies that the extra benefits from work relative to using the unemployment or disability benefit "pipeline" are very low. This effect is reinforced by relatively comfortable unemployment and disability benefits. While Finland's average and marginal labor tax wedges have declined in the last 10 years, both wedges still remain well above the OECD average and discourage work.

Finland - Beveridge Curve
(percent of working force)

2010

1961

Unemployment Rate

Vacancy Rate

Sources: OECD and Fund staff calculations.
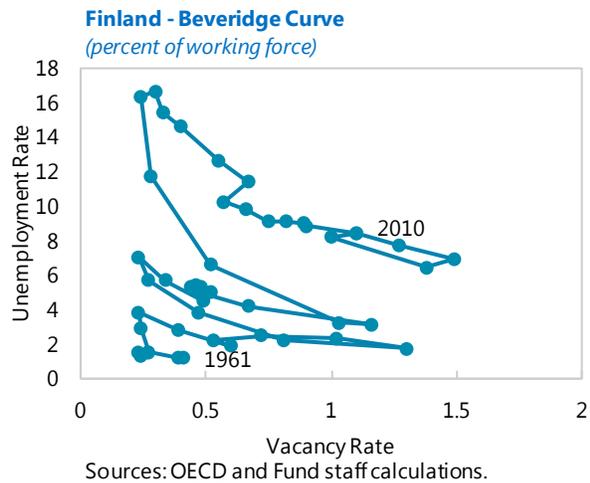
16. **Improving job matching could enhance participation and reduce unemployment**. The Beveridge curve has moved out over the last 20 years, as higher vacancies coexist with higher unemployment. At the same time long-term unemployment has been increasing significantly, indicating that there are obstacles in re-employing separated workers. Hynninen et al. (2009) point out that the matching may be improved by scaling up efficiency in the local labor market offices to the level of best practice. The experience with the increase in the eligibility age for the unemployment

Finland - R&D 2010
(percent of GDP)

1/ Refers to 2009

NOR   GBR   FRA   DEU   USA 1/   DNK   SWE   FIN

Sources: OECD and Fund staff calculations.

pipeline from 55 to 57 years in 2005 and the subsequent fall in the long-term unemployment
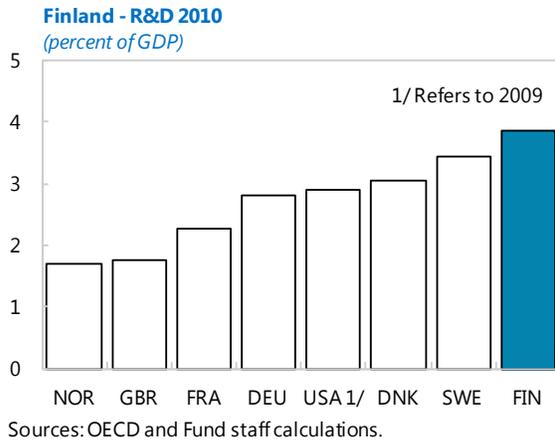
rate for the 55–59 year-olds suggests that the incentive structure plays an important role in reducing matching inefficiencies. Further increases in the eligibility age could increase the employment rate of the older workers. Linking the eligibility age to life expectancy could be a way to implement such a system.

17.   **Initiatives to promote a diversified economy and limit the administrative burden could boost TFP growth**. Finland maintains its role as leader in R&D investment, with investment in R&D equivalent to about 4 percent of GDP. The government's plans to facilitate the administrative process for business and implement a one-stop-shop principle could benefit small and medium size enterprises, promote entrepreneurship and eventually enhance TFP growth.

F.   References

Benes, Jaromir, Marianne Johnson, Kevin Clinton, Troy Matheson, Petar Manchev, Roberto Garcia-Saltos and Douglas Laxton, 2010, "Estimating Potential Output with a Multivariate Filter," IMF Working Paper 10/285, Washington: International Monetary Fund.

Hynninen, Sanna-Mari, Aki Kangasharju and Jaakko Pehkonen, 2009, "Matching Inefficiencies, Regional Disparities, and Unemployment," Labour, vol. 23(3), pages 481-506, 09.

International Monetary Fund (IMF), 2011, "Kingdom of the Netherlands – Selected Issues and Analytical Notes," Washington: International Monetary Fund.

International Monetary Fund (IMF), 2012, "Belgium – Article IV," Washington: International Monetary Fund.

Ministry of Finance, 2011, "Europe 2020 – Strategy: Finland's National Programme Update Autumn 2011."

Organization for Economic Co-Operation and Development (OECD), 2010, "Economic Review Finland", Paris: Organization for Economic Co-Operation and Development.

Appendix 3.1. Details of the Multivariate Model of Potential Output

The approach of the multivariate model of potential output is to treat the unobserved levels of potential output ($\bar{Y}_t$), the NAIRU ($\bar{U}_t$), and equilibrium capacity utilization ($\bar{C}_t$) as latent variables. After specifying a system of economic relationships between observed output, unemployment, capacity utilization, inflation, and long-term inflation expectations, the parameters of the system and the latent variables can be simultaneously estimated using maximum likelihood and the Kalman filter.[1]

There are four main economic relationships. First, an inflation equation relates the level and the change in the output gap to observed annual inflation, $\pi 4$:

$$\pi 4_t = \pi 4_{t-1} + \beta y_t + \Omega(y_t - y_{t-1}) + \varepsilon_t^{\pi 4}$$

where y is the output gap and $\varepsilon^{\pi 4}$ denotes shocks to inflation expectations. A simple random walk extracts inflation expectation shocks from observed inflation expectations, π^{4LTE}:

$$\pi 4_t^{LTE} = \pi 4_{t-1}^{LTE} + \varepsilon_t^{\pi 4LTE}$$

The (unobserved) unemployment gap, u, is related to the output gap by an Okun's law relationship:

$$u_t = \phi_1 u_{t-1} + \phi_2 y_t + \varepsilon_t^u$$

where ε^u is the shock term. Finally, the capacity utilization gap, c, is also related to the output gap:

$$c_t = \kappa_1 c_{t-1} + \kappa_2 y_t + \varepsilon_t^c$$

Given these economic relationships, identification of the gaps is accomplished by relating the gaps to the levels of actual output, unemployment, capacity utilization, and inflation. This is done by estimating equilibrium, or potential, levels for each of output, unemployment, and capacity utilization. The respective laws of motion for potential output, unemployment, and capacity utilization are as follows:

$$\bar{Y}_t = \bar{Y}_{t-1} - \theta(\bar{U}_t - \bar{U}_{t-1}) - \frac{(1-\theta)(\bar{U}_t - \bar{U}_{t-20})}{19} + \frac{G_t^{\bar{Y}}}{4} + \varepsilon_t^{\bar{Y}}$$

---

[1] In practice, Bayesian methods are used to aid the estimation. The system is completed by adding the following equation:
$$y_t = \rho_1 y_{t-1} + \rho_2(\pi 4_{t-1} - \pi 4_{t-1}^{LTE}) + \varepsilon_t^y$$

$$\bar{U}_t = \bar{U}_{t-1} + G_t^{\bar{U}} - \frac{\Lambda}{100} y_{t-1} - \lambda(\bar{U}_{t-1} - U^{ss}) + \varepsilon_t^{\bar{U}}$$

$$\bar{C}_t = \bar{C}_{t-1} + G_t^{\bar{C}} + \varepsilon_t^{\bar{C}}$$

where, in each equation, the *G* term is a damped autoregressive process, meaning that the trend rate of change itself is stochastic. The system is completed by three measurement equations, which are given by the definitions of the (log) output, unemployment, and capacity utilization gaps:

$$y_t = Y_t - \bar{Y}_t$$

$$u_t = U_t - \bar{U}_t$$

$$c_t = C_t - \bar{C}_t$$

The following assumptions are made about steady-state levels:

Table Appendix 1.1: Steady-State Calibration Values

Variable	Mnemonic	Value
Trend growth	$G_{ss}^{\bar{Y}}$	2.5
Long-run equilibrium unemployment	U^{ss}	7.7
Labor share of income	θ	0.5

After estimation on Finnish data, the values of the dynamic parameters are:

Table Appendix 1.2. Estimated Parameter Values

Parameter	Posterior
α	0.881
β	0.100
ρ_1	0.904
$\rho_2/100$	0.049
κ_1	0.280
κ_2	1.134
φ_1	0.701
φ_2	0.085
τ	0.023
Δ	0.498
Ω	0.205
Λ	3.119

IV. ANALYTICAL NOTE 4: MACROECONOMIC DELEVERAGE SCENARIOS[1]

A. Introduction

1.   **This paper uses the IMF's Global Integrated Monetary and Fiscal (GIMF) model to study the possible effects of rapid bank deleveraging on the various regions of the global economy**. Against this background, the paper then examines the implications for Finland, and whether domestic fiscal policy can mitigate the spillovers to domestic growth from such deleveraging.

2.   **The GIMF model—described in detail in Kumhof et al. (2010)—as used in this paper is a six-region dynamic structural general equilibrium model of the global economy, with optimizing behavior by households and firms, and full intertemporal stock-flow accounting**. Frictions in the form of sticky prices and wages, real adjustment costs, liquidity constrained households, and finite planning horizons of households, give the model certain key properties—notably, an important role for monetary and fiscal policy in economic stabilization. The regions that we calibrate the model to are Finland, Rest of euro area, USA, Japan, Emerging Asia, and Rest of World. Model calibration includes inter alia matching the trade flows, great ratios, and fiscal shares.

3.   **The results indicate that deleveraging has a substantial adverse impact on global growth, with the euro area hardest hit**. The strong initial fiscal position of Finland could provide some cover from the worst spillover effects of deleveraging, sparing it from the need to further tighten fiscal policy. However, in an extreme stress scenario where Finland is not spared, the resulting fiscal tightening leads to an improvement in its fiscal and external balances, notwithstanding a marked contraction in GDP.

B. The Model

4.   **The assumption of finite horizons separates GIMF from standard monetary DSGE models and allows it to have well-defined steady states where countries can be long-run debtors and creditors**. This allows users to study the transition from one steady state to another where fiscal policy and private saving behavior play a pivotal role in both the dynamic adjustment to and characteristics of the new steady state.

5.   **There are two types of households, both of which consume goods and supply labor**. First, there are overlapping-generation households that optimize their borrowing and savings decisions over a twenty year planning horizon. Second, there are liquidity-constrained households, who do not save and have no access to credit. Both types of

---

households pay direct taxes on labor income, indirect taxes on consumption spending, and a lump-sum tax.

6.   **Firms, which produce tradable and nontradable goods using capital and labor, are managed in accordance with the preferences of their owners, finitely-lived households**. Therefore, firms also have finite planning horizons. The main substantive implication of this assumption is the presence of a substantial equity premium driven by impatience. Firms are subject to nominal rigidities in price setting as well as real adjustment costs in labor hiring and investment. They pay capital income taxes to governments and wages and dividends to households.

7.   **There is a limited menu of financial assets**. Government debt consists of nominally non-contingent one-period bonds denominated in domestic currency, and is only held domestically. Banks offer households one-period fixed-term deposits, their source of funds for loans to firms. These financial assets, as well as ownership of firms, are not tradable across borders. Optimizing households may, however, issue or purchase (and the US government may issue) tradable U.S.-dollar denominated nominally non-contingent one-period bonds. Uncovered interest parity does not hold, due to the presence of country risk premiums. The premiums create deviations, both in the short run and the long run, between interest rates in different regions, even after adjustment for expected exchange rate changes. Equity is not traded in domestic financial markets; instead, households receive lump-sum dividend payments.

8.   **There is a financial sector as described in Bernanke et al. (1999), which incorporates a procyclical financial accelerator, with the cost of external finance facing firms rising with their indebtedness**.

9.   **As GIMF is multi-region, encompassing the global economy, all bilateral trade flows are explicitly modeled, as are the relative prices for each region, including exchange rates**. These flows include the export and import of intermediate and final goods. They are calibrated in the steady state to match flows observed in the recent data. International linkages are driven by the global saving and investment decision, a by-product of consumers' finite horizons. This leads to uniquely defined current account balances and net foreign asset positions for each region. Since asset markets are incomplete, net foreign asset positions are represented by nominally non-contingent one-period bonds denominated in U.S. dollars. Along with uncovered interest parity, and long-term movements in the world real interest rate, the magnitudes of the international trade linkages are the main determinant of spillover effects from shocks in one region onto other regions in the world.

10.   **Fiscal policy is conducted using a variety of fiscal instruments related to spending and taxation**. Government spending may take the form of consumption or investment expenditure or lump-sum transfers, to either all households, or targeted towards liquidity-constrained households. Revenue accrues from the taxes on labor income and

capital, consumption taxes, and the lump-sum tax, mentioned above. Government investment spending augments public infrastructure, which depreciates at a constant rate over time. When conducting monetary policy, the central bank uses an inflation-forecast-based interest rate rule. The central bank varies the gap between the actual policy rate and the long-run equilibrium rate to achieve a stable target rate of inflation over time.

C. Deleveraging Scenarios

11.   **The deleveraging scenarios estimate the global macroeconomic impact of a shock to credit growth resulting from the sovereign debt distress in the euro area**. More bank capital is needed to deal with a partial meltdown of the euro area sovereign bond markets. In the last fall, the European Banking Authority estimated that there is a need to build up an EU capital buffer of 114.5 billion euros to meet a 9% Core Tire I threshold (see ECB, 2011). This build up of the capital buffer is achieved either fully or partially via loan book retrenchment. Based on this figure, ECB (2011) estimated that GDP growth would decrease by 1.6– 3% in the short-run. The ECB estimates are used to calibrate the effect on economic activity in the GIMF model. In specific, the higher costs of borrowing, for both firms and households, are used to replicate the GDP impacts individually for each region in GIMF. The increased borrowing costs are then imposed in all regions to capture the full global impact. Moreover, it is assumed that the fiscal distress also requires further fiscal austerity in the euro area.

12.   **Two scenarios are considered, based on the assumed severity of spillovers to Finland**. In the first "stress" scenario, Finland dodges the bullet and is able to partially avoid increases in both sovereign and corporate spreads and abstains from further fiscal austerity. In the second "extreme stress" scenario, Finnish spreads widen more substantially, forcing additional fiscal retrenchment.

13.   **In the stress scenario we assume that the increased fiscal distress increases sovereign spreads by an additional 100 basis points for two years after which they return to baseline gradually**. Furthermore, we assume a temporary increase in the country risk premium by 25bps. In addition, the increased concerns about the fiscal sustainability enforce additional fiscal tightening, defined as one percentage point of GDP improvement in the fiscal balance in the euro area for three years followed by a gradual return to the baseline. For Finland, however, we assume that the additional need for further fiscal austerity is only 20 percent of that in the euro area, given its strong initial fiscal position and low public debt.

14.   **The decline in credit is calibrated to increase corporate spreads by 500 basis points**. Although this is a sudden increase in the borrowing costs which fades away as time passes by it hits the private sector investments hard. For Finland, however, we assume that the pressure from the credit spreads is only 20 percent of that in the euro area.

15.   **Financial market spillovers are assumed to be two-thirds of the magnitude observed in the aftermath of Lehman Brothers Holdings Inc. bankruptcy**. This is so because the historical evidence suggests that the euro area shocks may have smaller effect than those emanating from the United States. The increase in euro area corporate spreads is transmitted to the U.S. with correlation coefficient 0.4, 0.2 to Japan, 0.45 to emerging Asia and 0.5 to remaining countries.

16.   **In the second "extreme stress" scenario we assume that Finland is unable avoid the demands for further austerity and that both sovereign and corporate spreads increase in unison with the euro area**. This means that Finland acts as any other euro area country and no credit is given to a relatively good fiscal stance.

17.   **In both scenarios the shocks for each region are then imposed simultaneously in all regions to generate the global impact**. Furthermore, it is assumed that in the first two years the policy interest rates are constrained from falling below the zero lower bound in the euro area (including Finland), the United States, and Japan. The paths for several key macro variables are presented in Figure 4.1.

D. Model Predictions

18.   **The macroeconomic impacts of these shocks to bank credit are significant**. In the stress scenario GDP in the euro area falls by 4 percent at its trough and inflation falls by 1½ percentage points. In Finland, GDP falls by 2 percent at its trough while the inflation rate falls 1 percentage points. The next most affected region is the United Sates, were GDP declines by close to 1¾ percent and inflation falls one percentage point. The impact on Japan and Emerging Asia are only slightly smaller to the magnitude in the United States although the shock to bank capital in these countries is much smaller. This reflects that Japan and Emerging Asia are more open and the shock in the rest of the world has a larger impact through trade and the fact that the zero lower bound on interest rates is a binding constraint in Japan. In the Rest of the World, GDP falls by roughly 1½ percent. However, there will be a large divergence across the countries contained within this region. In those with strong banking and trade ties with the euro area, such as the United Kingdom, Norway, Sweden, Russia, and eastern European countries outside the euro area, the impact is likely to be between the impact in the euro Area and the United States. Other countries contained within this block, would likely have impacts similar to or smaller than those simulated for Asia.

19.   **In the extreme stress scenario GDP falls by 4 percent and inflation falls by 1½ percentage points both in the euro area and in Finland**. Given the small share of Finland in the global economy, the only differences are with regard to the Finnish economy, as domestic Finnish policy has negligible impact externally. With stronger adverse spillovers and correspondingly tighter fiscal policy, Finland's fiscal position and external balance are projected to improve, notwithstanding the more severe growth shock.

E. References

Bernanke, B. S., M. Gertler, and S. Gilchrist, 1999, "The Financial Accelerator in a Quantitative Business Cycle Framework", in John B. Taylor and Michael Woodford, eds., Handbook of *Macroeconomics, Volume 1c*, Amsterdam: Elsevier.

European Central Bank (ECB), 2011, Box 1 Quantifying Deleveraging Effect from Recapitalizing EU Banks, ECB Risk Analysis Report, European Central Bank, December.

Kumhof, M., D. Laxton, D. Muir and S. Mursula, 2010, "The Global Integrated Monetary Fiscal Model," IMF Working Paper, WP/10/34, Washington: International Monetary Fund

.

Figure 4.1. Deleveraging Scenarios

___ Stress Scenario
___ Extreme Stress Scenario
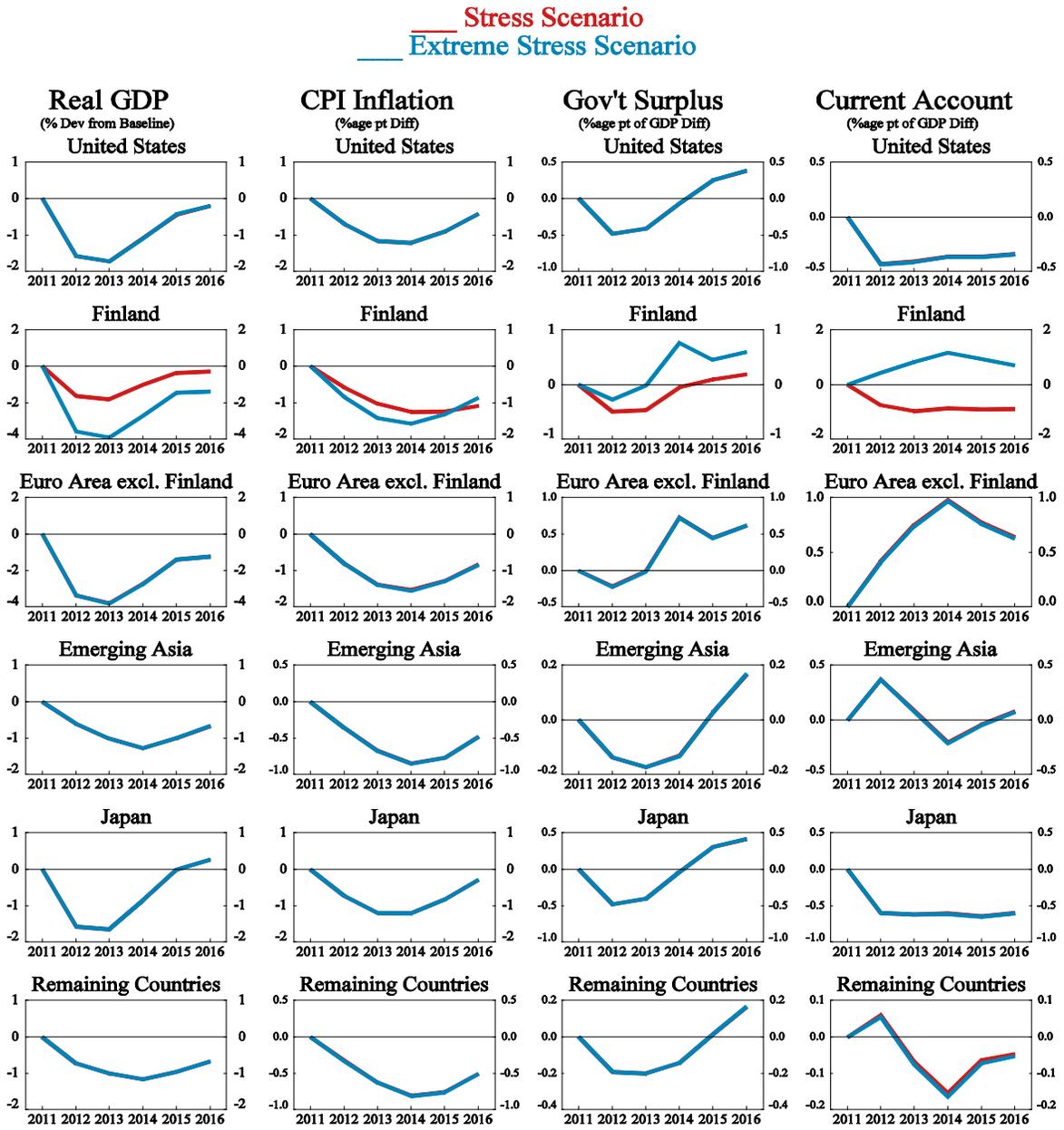
V. ANALYTICAL NOTE 5: BASEL III AND THE FINNISH FINANCIAL SYSTEM[1]

This note reviews the challenges for Finnish banks in the context of the revised prudential requirements prompted by Basel III and potential funding risk associated with the ongoing euro area sovereign debt crisis. Though Finnish banks have maintained access to financial markets so far, a worsening of the crisis could impact the Finnish financial sector. Against this background, a banking sector stress test shows that while Finnish banks have ample capital, liquidity risk remains a concern.

A. Implementing Basel III Recommendations—Challenges for Finnish Banks

1.   **New capital, liquidity, and leverage requirements will involve reviewing Finnish banks' business models and finding additional funding resources**. Basel III requirements—enforced in the EU through a directly applicable regulation and a directive—will take effect gradually from 2015. These new requirements will likely impact Finnish banks' business models, whether banks are mostly active in retail operations or perform more sophisticated transactions. With the large spectrum of business models in the banking system, the requirements will necessitate the mobilization of larger, more stable, long-term resources.

2.   **Finland's traditional business model is likely to be substantially impacted by the leverage ratio requirement**. The leverage ratio, defined as the debt-to-equity ratio, is a risk-insensitive metric. Hence, it is likely to penalize financial institutions that have low-risk but high-volume traditional loans—typically, local banks with traditional mortgage lending, banks that pool resources for other banks, and mortgage credit institutions. In particular, the equity capital of Finnish banks is likely to fall short of the required increase in capital. Moreover, the leverage ratio could create incentives for riskier loans over more conventional lending given Finland's squeezed profit margins.

3.   **The introduction of liquidity ratio requirements is likely to weigh on Finnish banks' profitability**. Two liquidity ratios will be gradually introduced from 2015.[2] Both ratios set mandatory thresholds, which recent evidence suggests are above current levels in Finnish banks. As a result, the new thresholds will require a significant effort by banks to increase both the level and quality of liquid assets, with more substantial precautionary liquidity buffers for larger Finnish banks than for smaller ones. For example, the largest Finnish banks are below the net stable funding ratio (NSFR) requirement, with end-2010 levels between ½ and ¾ of Basel III required highly liquid assets. Smaller banks need to increase their liquid assets by a much narrower margin. In addition, the Finnish monetary authorities may be compelled to accept larger classes of assets as collateral and provide

---

[1] Prepared by Michelle Hassine.

[2] The two ratios are (i) the Liquidity Coverage Ratio (LCR), which targets that banks hold sufficient high-quality, unencumbered assets to survive a 30-day period of acute stress; and (ii) the Net Stable Funding Ratio (NSFR), which is intended to promote more medium- and long-term funding by establishing a minimum acceptable amount of stable funding.

emergency liquidity assistance to local branches of foreign-owned banks to avoid a bank run if foreign parent banks siphon away liquidity held by their subsidiaries in Finland.

4.   **In addition, counterparty credit risk is likely to strain balance sheet flexibility of Finnish banks**. Finnish banks are highly interconnected with other Nordic financial institutions, with derivative operations concentrated in a few entities. Hence, new procedures on counterparty credit risk can have significant importance for Finnish banks. With the implementation of Basel III, all credit risk must go through a Central Counterparty Clearing House (CCP), which currently requires a zero Exposure at Default (EAD), instead of being over-the-counter (OTC). Furthermore, banks must hold additional capital based on the credit risk that goes through the CCP. In turn, these additional capital buffers could strain the business model of certain banks. For example, Nordea Group opted to centralize all its financial derivative operations in its Finnish subsidiary. Hence, the additional required capital buffers would involve beefing up core capital of Nordea Finland to match counterparty risk.

5.   **As the definition of core capital in Basel III excludes several key instruments for Finnish banks, securing additional long-term funding may prove challenging**. Basel III requires that capital meets own-funds criteria and thus has greater loss-absorbency capacity. As a consequence, the revised definition of core capital excludes minority interests at the group level and investment in insurance companies—important for Finnish banks as many groups moved recently towards integrating insurance. Supplementary cooperative capital of banks will also undergo stricter accounting treatment. Accordingly, the implementation of Basel III will require that Finnish banks supplement their capital with long-term instruments. Additionally, as mentioned, assets that carry counterparty risks, such as OTC derivatives, will have higher capital requirements.

6.   **Some Finnish banks will need to increase their capital holdings to abide by the new requirements under Basel III**.
Basel III will include new requirements both at the micro prudential and macro prudential levels, aimed at increasing the share of loss-absorbing capital instruments. At the micro level, capital will have to reach 10.5 percent of Risk-Weighted Assets (RWA). At the macro level, an extra capital charge applies if found necessary by the authorities when banks are deemed systemically important financial institutions (SIFIs). In addition, the banking sector is subject to countercyclical common equity buffers of up to 2.5 percent of RWA, updated on the basis of aggregate national credit growth. At end-2011, not all Finnish

Basel III Capital Requirements
(Percent of Risk-Weighted Assets)

Systemic banks. Extra capital charge still to be determined.	Macro Level. Additional Requirements.
Variable countercyclical buffer of up to 2.5 percent met with Common Equity.	
Conservation buffer of 2.5 percent met with Common Equity.	Micro Level. New Capital Benchmark.
Tier 2 capital. Min. 2.0 percent on top of Tier 1 capital.	
Non equity Tier 1. Min. 1.5 percent on top of Common Equity.	
Common shares + retained earnings. Min. 4.5 percent.	

13.0
10.5
8.0
6.0
4.5

Source: European Commission.

banks fulfilled the forthcoming new capital requirements, suggesting a need to strengthen capital with high-grade loss absorbing instruments.

B. Funding Risk Associated with Increasing Capital

7. **When seeking funding in the transition to Basel III, Finnish banks must navigate international financial markets amidst the euro area sovereign debt crisis**. Currently, financial markets continue to have a positive view of Finnish banks, and banks still retain full access to international markets, reflecting a confirmed AAA sovereign rating. However, market sentiment can rapidly change amidst the continuing euro area sovereign debt crisis. In particular, market analysts[3] point to Finnish banks' high reliance on wholesale funding, weaker profitability, and a more fickle investor base, mainly made up of institutional investors, than in other Nordic countries. These factors render the banks prone to risks of severe medium-term deterioration given the worsened economic outlook in the euro area.

5-year CDS Spreads, 2008–12
(Basis points)

— Austria
— Belgium
— Finland
— France
— Germany
— Netherlands

Sources: Datastream and Fund staff calculations.
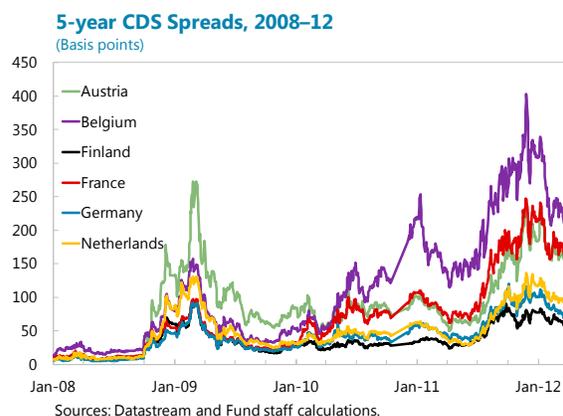
8. **So far Finnish banks have maintained access to international markets**. Although Finnish banks benefit from solid retail deposits, they rely on sizeable amounts of wholesale funds, in particular in the form of covered bonds. However, with a Tier 1 capital ratio at 13.0 percent, compared to an EU27 average at 10.9 percent at end-June 2011, Finnish banks maintain higher capital ratios than their European peers. Hence, Finnish banks are currently considered a safe investment option and have been able to find sufficient funding on international markets. This was true even at times of the most severe financial stress during the euro area sovereign debt crisis.

Finland: Issuances on International Markets, 2008–12
(Billions of euros)

▨ Sovereign, local authority
■ Medium-term note
▥ Covered bonds
■ Investment Grade
— Total non-sovereign

Sources: Dealogic and Fund staff calculations.
1/ At end-February. Not annualized.
Preferred shares are zero.
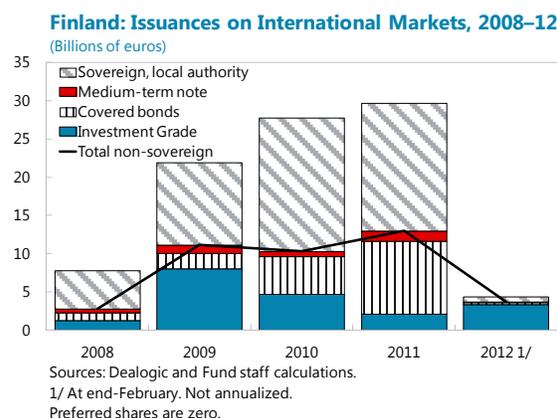
9. **However, with a weak investor base and low profitability, Finnish banks are vulnerable to a significant economic slowdown**. Fierce competition for households' business has contributed to erosion of bank profitability, prompting the FIN-FSA to warn that

---

[3] Moody's, Standard and Poor's, Fitch, and JP Morgan Cazenove were surveyed.

the extremely low interest rates charged would affect profitability and boost consumer indebtedness.[4] Moreover, market analysts find that the Finnish wholesale funding market remains deprived of a solid core investor base. Further financial sector tensions in the euro area could prompt investors to shift away from euro-related assets into safer, non-euro assets, thereby rendering funding more problematic for Finnish banks.

C. Stress Tests of the Finnish Banks

10. **The need to increase capital and, in particular, liquidity buffers is also essential in case of a severe economic slowdown**. To examine the Finnish banking system's performance in case of a protracted worsening of the economic outlook over 2012–15, the Finnish authorities have conducted a top-down stress test based on end-December 2011 data. The stress scenario involves a shock to external trade, which adversely impacts corporations, with attendant increase in bankruptcies and unemployment rates. Simultaneously, financial conditions deteriorate, with equity prices declining by a cumulative 50 percent and Euribor rates remaining below 1 percent. This prompts a decline in household consumption and contraction in housing prices by a cumulative 22 percent over the period. The scenario assumes unchanged accounting methods under Basel II and unchanged capital base and excludes managerial decisions to realize the asset portfolio in response to the shock. On the basis of first round effects measured on banks' balance sheets, the exercise provides aggregate results for the entire banking sector as well as separately for the seven largest banks.

Selected Stress Test Macroeconomic Assumptions
(In percent)

	Baseline			Adverse scenario				Deviation		Memo
	2011	2012	2013	2012	2013	2014	2015	2012	2013	2009
Real GDP growth	2.9	0.4	1.8	-6.4	-2.0	-2.0	-1.0	-6.8	-3.8	-8.4
Real export growth (goods and services)	-1.1	-1.7	4.4	-19.7	-5.0	-1.0	0.0	-18.0	-9.4	-21.5
Real investment growth	13.8	0.7	2.6	-12.6	-4.0	-2.0	-1.0	-13.3	-6.6	-21.7
Real consumption growth	2.4	0.6	1.3	-1.4	-1.0	-0.5	0.0	-2.0	-2.3	-1.6
Unemployment rate	7.8	7.9	8.0	9.8	10.9	12.5	14.0	1.9	2.9	8.2
HICP inflation	3.3	2.3	2.2	0.7	0.8	0.7	0.6	-1.6	-1.4	1.6
3-month Euribor	1.4	1.2	1.6	0.7	0.7	0.8	0.8	-0.5	-0.9	1.2
Equity price growth		4.0	5.0	-30.0	-5.0	-7.5	-7.5	-34.0	-10.0	15.4
Yield on 10-year Finnish government bond	1.8	3.6	3.9	4.0	4.3	4.3	4.4	0.4	0.4	3.7
House price growth	2.8	3.0	2.0	-7.0	-5.0	-5.0	-5.0	-10.0	-7.0	7.9

Note: The stress test does not include the insurance arm of the Finnish financial system.

11. **The baseline scenario confirms that the banking sector remains adequately capitalized through end-2013, albeit with some dispersion in individual results**. On aggregate, the Finnish banking sector has a 12.7 percent Tier 1 capital both in 2012 and 2013 under continuing mild growth conditions.

---

[4] The FIN-FSA Annual Report for 2011 notes that 94 percent of all housing loans are priced on the basis of floating rates.

12.   **On aggregate, banks are resilient to shocks and maintain ample capital buffers, but concerns arise for individual banks and the macro consequences**. In spite of the assumed severe and protracted shock, the Finnish banking sector has a 9.5 percent Tier 1 capital ratio in 2015 after contracting by a cumulative 4 percentage points of RWA over four years but remains above the Basel II minimum requirement.

13.   **Liquidity provisions may be insufficient and leave banks vulnerable**. The authorities also conducted an attendant, albeit separate, liquidity test exercise subjecting the largest six banks to the conditions of the Liquidity Coverage Ratio (LCR).[5] The exercise showed that only one bank would overcome the added stress to its liquidity buffers, keeping about 90 percent of its pre-crisis liquidity intact. The remaining five banks would suffer substantial depletion of their liquidity buffers. While this does not entail immediate use of emergency liquidity assistance, it suggests that banks would need to rely on additional collateral and higher-grade investment assets to restore pre-crisis liquidity conditions. Overall, liquidity shortage could lead banks to record possible losses on forced sales of top portfolio assets.

14.   **Recent evidence suggests that cross-border macro-financial linkages have become more complex and extensive**. In fact, Finnish subsidiaries serve increasingly as financing hubs to their foreign parent banks in accessing financial euro markets. Further, subsidiaries are supporting more actively their parent companies through short-term funding, which reached 12.5 percent of Finnish banks' asset at end-January, compared to 6.3 percent a year earlier.

Finland: Aggregate Stress Test Results, 2011-15

	Baseline			Adverse scenario					
	2011	2012	2013	2011	2012	2013	2014	2015	Change (2011-15)
Total income (percent change from previous year) 1/	3.0	4.0	6.0	3.0	-17.5	-3.5	-21.6	-5.1	-47.9
Profitability (operating profit after taxes, percent of own funds, RoE)	8.4	8.2	8.8	8.4	1.4	-1.7	-9.1	-8.5	-16.9
Tier 1 capital (percent of risk-weighted assets)	13.6	12.7	12.8	13.6	12.6	12.0	10.7	9.5	-4.0
Tier 1+2 capital (percent of risk-weighted assets)	14.2	13.7	13.8	14.2	13.1	12.4	10.9	9.6	-4.6
Memorandum item:									
Risk-weighted assets (billion euros) 2/	147.8	162.3	167.3	147.8	159.3	164.1	169.0	174.1	17.8

Sources: Bank of Finland, FIN-FSA, and Fund staff calculations.

1/ Change (2011-15) computed as the sum of the 2012-15 growth rates.

2/ Change (2011-15) denotes the percentage change over the period.

---

[5] The LCR is a Basel III liquidity requirement that becomes enforceable on January 1, 2015. The LCR measures the available liquid resources through a 30-day stress situation of a combined idiosyncratic and market-wide shock.

VI.   ANALYTICAL NOTE 6: FROM SHORT-TERM VULNERABILITIES TO LONG-TERM SUSTAINABILITY[1]

With a rapidly aging population, Finland needs to address its long-term fiscal challenges. At the same time, the turmoil in the euro area sovereign debt markets has led to increased focus on debt sustainability and associated short-term vulnerabilities. First, this note will present Finland's short-term fiscal position and challenges in an international context. Second, the note quantifies the long-term fiscal challenges by estimating the sustainability gap and examines the optimal pace of consolidation under quadratic preferences.

A.   Finland's Short- and Medium-Term Vulnerabilities in Perspective

1.   **Finland's public deficit continued to narrow in 2011 but the turmoil in other euro area periphery countries put renewed focus on underlying vulnerabilities**. After a strong rebound in 2010, growth remained buoyant in the first half of 2011. In addition, though Finland was subject to the Excessive Deficit Procedure, the 2010 general government deficit came in below the Stability and Growth Pact (SGP) ceiling at 2¾ percent of GDP, only marginally worse than in 2009. In 2011, the continued recovery in combination with fiscal adjustment measures facilitated a further narrowing of the deficit, which reached 0.8 percent of GDP. However, the escalating tensions in the euro area sovereign debt markets in 2011 led to contagion and growth spillovers throughout the region, and the turmoil spread to more sovereigns, which previously had been very liquid. Financial markets showed how underlying vulnerabilities quickly can increase financing pressures.

Assessing Short- and Medium-Term Vulnerabilities

2.   **Fiscal vulnerabilities should be monitored closely, but they are manageable in Finland**. The euro area sovereign debt turmoil has shown how markets swiftly can put pressure on countries, and spreads and funding costs can increase rapidly. In turn, this quickly increases rollover risks, thereby aggravating the crisis. This section provides an overview of a few short- and medium-term fiscal vulnerability indicators for advanced countries, following Schaechter et al. (2012), which we then apply to Finland. We conclude that with the benefit of a generally conservative fiscal stance prior to the crisis and fiscal consolidation as the recovery resumed, Finland's short- and medium-term vulnerabilities are comparatively low.

Methods

3.   **We assess fiscal vulnerabilities from several different angles and horizons including both public debt and financial market indicators**. First, to assess the sovereign debt rollover risk we compute two indicators: (i) the governments' gross funding needs (GFN) for 2012 as an indicator of short-term vulnerabilities; and (ii) the average amount of the end-2011 stock of debt that needs to be annually repaid and/or refinanced in the future. This provides an indicator of longer-horizon vulnerability. Second, we compute two government default risk indicators: (i) one based on sovereign Credit Default Swap (CDS) spreads; and (ii) one based on relative asset swap (RAS) spreads. Third, we evaluate fiscal vulnerabilities associated with growth and interest rate shocks through a simple partial equilibrium model. Last, we decompose the movements in Finnish 10-year government bond yields in order to identify the main drivers of changes in the yield. The appendix contains detailed information on the underlying assumptions and methodologies.

4.   **The level of gross funding needs in the current year is a measure of how vulnerable countries are to changes in market sentiment**. With large fiscal deficits from the 2008–09 global crisis and the subsequent euro area crisis, many advanced countries will be issuing large amounts of net debt in 2012. In addition, a significant amount of maturing debt will need to be refinanced. With frazzled financial markets, this could be associated with increased financing and rollover risk. Rapid increases in funding costs can quickly put severe pressure on countries with high gross funding needs. Therefore, we compute the gross funding needs (GFNs) as the sum of the projected 2012 general government deficit and government debt maturing in 2012, both in percent of GDP. In addition, based on the ratio between the stock of end-2011 general government debt and the average debt maturity, we compute the average amount of debt that needs to be annually refinanced or repaid in the current and future years. A country is more exposed to financing pressures the higher the stock of debt and the lower the average maturity of debt.

5.   **Two high-frequency financial variables reflect investors' concerns about fiscal sustainability and risk**. Sovereign CDS spreads measure the direct cost of seeking insurance against sovereign default and are quoted as a percentage of the notional amount insured. Therefore, we create a CDS indicator, which is computed as the average of 5-year sovereign CDS spreads during April 19—May 2, 2012. Furthermore, Alper et al. (2012) consider the RAS spread indicator, which is the spread between 10-year government bond yields and the 10-year fixed interest rate arm in interest rate swap contracts. This indicator allows for a comparison of risk premia attached to various government bonds. In fact, as both rates are denoted in local currency, the RAS spread indicator abstracts from currency risk and is therefore comparable across countries also outside the euro area. We thus compute a RAS indicator as the average of daily RAS spreads during April 19—May 2, 2012. One note of caution is necessary, however, in the use of these types of indicators as recent experience has shown that spreads for countries with significant public finance problems can remain low well into the path to a crisis and then surge suddenly.

6.   **The sensitivity of general government debt to shocks captures how an adverse economic outlook would affect the debt to GDP ratio**. First, we compute general government debt based on the debt accumulation equation, where debt is expressed as a function of debt in the previous period, the growth-adjusted interest rate, and the primary balance in the current period. Second, using the debt accumulation equation we project an alternative debt path under the assumption of either (i) a 1 percentage point lower real and nominal GDP growth rate or (ii) a 1 percentage point higher nominal interest rate. Both shocks are assumed to persist during 2012–17. Hence, we evaluate the effect on the debt-to-GDP ratio relative to the no-shock scenario in 2017—the end of the projection period.

7.   **A decomposition of changes in Finnish bond yields can help identify the main drivers of Finnish yields**. To better understand the fluctuations in Finnish bond yields, we decompose the changes in the 10-year bond yield using a 16-country vector autoregression (VAR) on weekly data. Using several different VAR specifications, we then compute the average contribution to the change in the Finnish yield from movements in other countries' bond yields.

Findings

8.   **Sovereign debt rollover risk in Finland is lower than in a number of other advanced countries**. Gross funding needs (GFNs) are indeed substantial for some countries. However, owing to below average debt (in percent of GDP) maturing in 2012, Finland's GFNs are below the advanced country sample average (Figure 6.1). And though the average number of years to maturity in Finland is below that of several of its peers, total public debt of around 50 percent of GDP places Finland below the median country in the sample with respect to the level of the estimated stock of end-2011 debt that needs to be annually repaid and/or refinanced.

9.   **Market risks in Finland are also comparatively low**. The CDS indicator puts Finland among the least vulnerable countries in the advanced country sample (Figure 6.2). However, recent fluctuations show that Finland is not immune to the escalating tensions in euro area debt markets, though spreads have remained below their September 2011 peak. Similarly, the RAS indicator places Finland in the low-spread group of advanced countries. Here, a negative RAS spread indicates that investors assess government paper as less risky than the flow of funds exchanged between big commercial banks as part of the interest rate swaps (Schaechter et al., 2012).

10.   **With a comparatively low baseline level, Finland's gross debt is among the least affected by shocks**. Staff projects baseline general government gross debt at around 50 percent of GDP in 2017. However, with the turmoil in the euro area sovereign debt markets, the economic outlook is subject to greater-than-usual uncertainty. The analysis suggests that if growth were to average just below 1 percent per year during 2012–17 instead of the current projection of 1¾ percent per year, public debt would increase by more than

10 percentage points of GDP by 2017. Recent turbulence has, however, increased the volatility of growth. Thus, a shock twice as large would raise debt above 70 percent of GDP by 2017. This would still place Finland well below the European average debt level, though it would breach the Maastricht debt criterion. The impact of a 100 basis point shock to the nominal interest rate would be smaller (Figures 6.3–6.4, Table 6.1).

11.   **The VAR analysis shows that movements in Finnish bond yields are driven largely by their German equivalents but points to vulnerabilities from other countries**. The adjacent text chart shows the average contribution to the changes in the Finnish government bond yield, resulting from several different VAR specifications. Indeed, downward movements in Finnish yields are highly associated with downward changes in German and U.S. yields. However, the main determinants also point to sources of vulnerability from real-financial linkages and spillovers from other countries, as increases in yields in Greece, Ireland, and Portugal or Spain are associated with upward pressure on Finnish yields. Nonetheless, domestic factors in Finland continue to work in Finland's favor.

Decomposing Finnish Government Bond Yield, 2007–12
(Contribution to changes in government bond yield, basis points)

Legend:
- France
- Germany
- Greece, Ireland, Portugal
- Italy
- Netherlands
- Spain
- United States
- Own
- Others
- Finnish 10 year bond yield (RHS)

Sources: Bloomberg and Fund staff calculations.
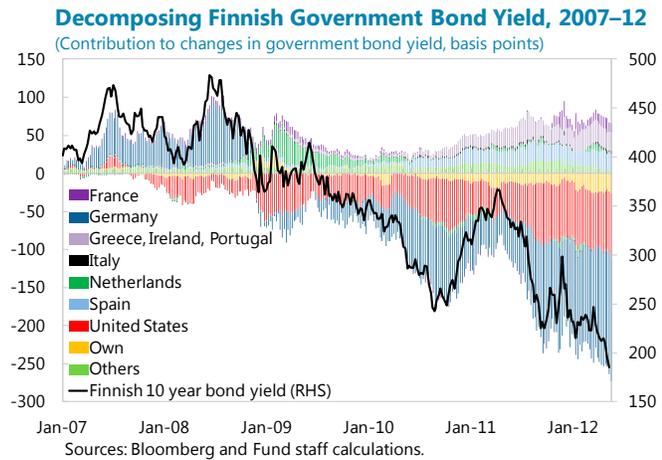
With Short-Term Vulnerabilities in Mind, What is the Appropriate Fiscal Stance?

12.   **With relatively low short- and medium-term fiscal vulnerabilities, short-term fiscal policy should pay due attention to the growth momentum**. Euro area periphery countries with high vulnerabilities and immediate funding pressures have no choice but to continue fiscal consolidation in order to calm markets and restore prospects for fiscal sustainability. However, short-term fiscal consolidation should be limited where possible, while fiscal adjustment in the medium and long term remains on the agenda (IMF, 2012). Countries with credible medium-term fiscal consolidation plans should allow automatic stabilizers to work fully so as not to have strong negative spillovers on near-term growth and possibly consider some discretionary stimulus. As Finland falls in the second

Finland: General Government Balances, 2007–17
(Percent of potential GDP)

Legend:
- Output gap
- Headline (percent of GDP)
- Structural
- Structural primary 1/
- Primary balance 1/

Sources: DataInsight, Finland Ministry of Finance, Statistics Finland, and Fund staff calculations.
1/ Adjusted for interest expenditure.
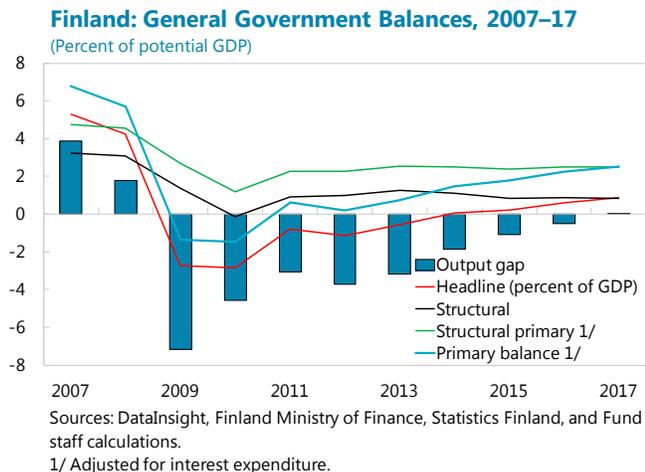
category, authorities should be careful to avoid too rapid a consolidation of public finances. With a rapidly aging population and an associated sustainability gap (see below), the speed of consolidation therefore involves a careful balancing act.

13.   **With a still negative output gap, fiscal consolidation should be carried out at cautious speed**. With a general government deficit of -¾ percent of GDP in 2011 and 2011 output around 3 percent below potential as suggested by the production function approach, the general government structural balance is in a slight surplus and the structural primary surplus is just above 2 percent of GDP. However, this mainly reflects the 3 percent of GDP surplus in employment pension funds, while the central government balance is showing a structural deficit. Nonetheless, while fiscal adjustment is necessary, a level of output below potential underlines that Finland should pursue fiscal consolidation at a moderate pace.

B.   Long-Term Sustainability

14.   **On the back of manageable short-term vulnerabilities, this section assesses long-term fiscal sustainability in Finland and examines the optimal pace of consolidation**. The estimates of aging pressures from the European Commission's (EC's) Sustainability Report 2009 (EC, 2009), which are still the latest estimates from the EC, are incorporated in the analysis, as well as the implications of the recent movements in the fiscal position. The sustainability gap is evaluated from a starting point of 2012, and thus incorporates only those consolidation measures that were implemented through 2011. We conclude that the sustainability gap as of 2012 is significantly smaller than that estimated for 2010 in the 2010 Staff Report (IMF, 2010a), though still substantial. Measures to help erase the sustainability gap are briefly discussed. In addition, an inter-temporal model is calibrated to Finland and used to shed light on the optimal fiscal consolidation path given quadratic preferences over the sustainability and output gaps.

15.   **ECFIN's baseline estimates of aging pressures for Finland are in the mid-range in comparison with other European countries.** From 2007 to 2060, aging pressures are estimated to add 6.4 percent of GDP to fiscal expenditures in Finland, moderately above the median of 5.3 percent of GDP across the European Union. The increase for Finland is composed of increased pension expenditure of 3.3 percent of GDP, higher long-term care expenditure of 2.6 percent of GDP, higher health-care expenditure of one percent of GDP, and reduced education and unemployment-benefit expenditures of 0.3 and 0.2 percent of GDP, respectively.

Change in Expenditure Due to Aging, 2007–60
(Percent of GDP)

Aging-Related Expenditure: Different Scenarios, 2008–60
(Percent of GDP)

Sources: DG ECFIN: The 2009 Ageing Report, and Fund staff calculations.

Sources: DG ECFIN: The 2009 Ageing Report and Fund staff calculations.
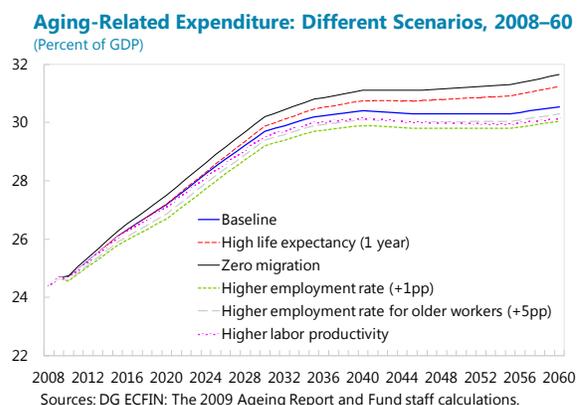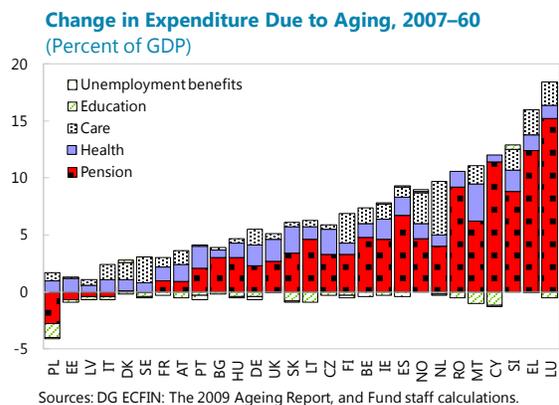
16. **These baseline estimates are sensitive to the underlying assumptions used**. A variety of alternative scenarios run by ECFIN suggest that the increase in aging related expenditures could vary between 5.8 and 7.4 percentage points of GDP, with the worst case being one of zero immigration, while a scenario with higher employment rate is the best case. As long-run estimates are inherently subject to substantial error margins, our estimate of the sustainability gap should be interpreted as a baseline estimate subject to a sizeable confidence band.

Estimating the Fiscal Sustainability Gap

17. **The sustainability indicator used is based on the general government intertemporal budget constraint**. This is consistent with the S2 sustainability indicator used in the EC's sustainability reports. The starting point for this analysis is the equation defining the evolution of public debt:

$$B_t = B_{t-1}(1+r) - P_{t-1} \tag{1}$$

Where B_t, r, and P_t, represent the debt stock at the beginning of period t, the discount rate, and the primary surplus in period t, respectively. Dividing equation (1) by GDP gives the following equation:

$$b_t = b_{t-1}\left(\frac{1+r}{1+g}\right) - p_{t-1}\left(\frac{1}{1+g}\right) \tag{2}$$

Here, b_t and p_t represent the debt-to-GDP ratio at the beginning of period t and the primary surplus-to-GDP ratio in period t, respectively, and g represents the growth rate of GDP, assumed to be constant for algebraic simplicity. Solving equation (2) forward and imposing the no-Ponzi-scheme condition yields the government inter-temporal budget constraint:

$$b_t = \left(\frac{1}{1+r}\right)\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^{j} p_{t+j} \tag{3}$$

For any given fiscal stance (e.g. the current structural primary fiscal balance) and given the outlook for growth and other expected exogenous changes such as demographic changes and depletion of natural resources, a "passive" path for the primary surplus over an infinite horizon can be estimated. On that basis, the sustainability gap in stock terms (which is the total inter-temporal debt in present value terms) is given by:

$$V_t = b_t - \left(\frac{1}{1+r}\right)\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^{j} p_{t+j} \tag{4}$$

The sustainability gap in flow terms—hereafter simply called the sustainability gap—(which is defined as the constant change in the primary balance in percent of GDP such that the sustainability gap in stock terms is zero) is thus derived as:

$$S_t = (r-g)\left[b_t - \left(\frac{1}{1+r}\right)\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^{j} p_{t+j}\right] \tag{5}$$

18.   **Staff's updated estimate of the sustainability gap is about 1¾ percent of GDP lower than that in the 2010 Staff Report**. Stronger than anticipated fiscal performance in 2010 led to a broadly stable headline fiscal balance compared to 2009, whereas staff had anticipated a deterioration of around 1½ percent of GDP. This improvement reduced the buildup of public debt. Also, revisions to staff's estimated output gap imply that the estimated level of the structural primary balance is higher than before. Taking these factors into account, as well as the structural tightening of one percent of GDP in 2011, we find that the estimate of the sustainability gap has declined to 4¼ percent of GDP, well below the previous estimate of 6 percent of GDP in the 2010 Staff Report. The sustainability gap could turn out to be smaller than estimated if the external current account balance deteriorates as a rising number of retirees draw down their accumulated pensions, raising consumption-based tax revenues over the long run as a share of output. However, we have not taken this into account in our calculations because the size of this effect is quite uncertain.

19.   **Absent corrective measures, net public debt is projected to rise to over 200 percent of GDP by 2060 in view of the still substantial sustainability gap**. The primary balance is projected to decline by 4¾ percentage points of GDP to a deficit of 4¼ percent of GDP, while the overall fiscal deficit deteriorates by 15 percentage points of GDP to 14¾ percent of GDP as interest payments consume an ever-increasing share of fiscal expenditure. In contrast, immediate full adjustment implies that net debt remains on a gradually declining path through 2060.

20.   **While immediate full adjustment on the scale required is implausible, delaying adjustment requires a higher long-run primary surplus target to ensure sustainability**. Staff estimates that phasing in the adjustment over a 10-year period, with uniform adjustment each year, requires structural measures totaling 4½ percent of GDP for sustainability. In comparison, delaying the onset of adjustment for 10 years would require structural measures totaling 4¾ percent of GDP for sustainability. In general, slower adjustment is associated with a higher public debt path.

21.   **Other commonly-used sustainability indicators generally show smaller gaps, but do not satisfy the intertemporal budget constraint**. In particular, the European Commission defines another indicator, S1, as the constant change to the primary balance in percent of GDP such that the public gross debt to GDP ratio is 60 percent of GDP in 2060. The IMF's Fiscal Affairs Department sometimes uses an indicator (which we will call S3 here for brevity) defined similarly as the constant change to the primary balance in percent of GDP such that the public gross debt to GDP ratio is 60 percent of GDP in 2030. S1 and S3, however, generally do not satisfy the intertemporal budget constraint as they do not address what happens beyond the respectively envisaged time horizons. For Finland, we estimate S1 and S3 to be 2½ percent of GDP and ½ percent of GDP, respectively. In both cases our estimates indicate that gross debt is on a strongly rising path beyond the respective time horizons used. Thus, we do not focus on these indicators beyond this point.

Measures to Achieve Sustainability

22.   **With an already high revenue ratio, there is little scope for further increases in the tax burden**. Revenue measures should therefore focus on a broadening of the tax base and a shift from labor taxation to consumption and property-based taxation. Reduced labor taxation would help stimulate employment and output, while consumption and property taxes are generally less distortionary than income taxes. In this connection, recent reductions in income tax rates, the increase in VAT rates by one percentage point in mid-2010, and plans to raise energy taxes are steps in the right direction; but more should be done, including by reducing the number of items on reduced VAT rates. In addition, property tax rates are low in international comparison and higher rates would provide municipalities with a more stable source of income, creating scope for reducing municipalities' reliance on highly cyclical corporate taxes.

23.   **Expenditure measures will need to account for the majority of adjustment**. This reflects both the already high revenue ratio and the fact that international evidence generally indicates that expenditure–based consolidations have been more successful. In this regard, the focus will need to be on reducing the impact of aging on fiscal expenditures and on an overhaul of local government—where expenditures have been rising fastest in recent years. Some reduction of the generosity of the social and unemployment benefits system is likely to be needed as part of the fiscal consolidation package. Tuition fees and a reduction of student

grants in favor of loans at the tertiary education level would also be helpful in generating expenditure savings and encourage faster graduation and entry into the work force.

24.   **Measures to directly contain the impact of aging on public finances should be a key plank of efforts to secure sustainability**. In this regard, further pension reform is needed. The decomposition of the projected buildup in pension pressures indicates that the increase arises from a pronounced increase in the old-age dependency ratio, which is projected to be partly offset by tightening of eligibility rules. However, more could be done.

The OECD (2010) notes that the average effective retirement age is about 60 and estimates that raising it to 67 would be sufficient to close the sustainability gap. Such a large increase would be very challenging to achieve, but movement in this direction should be a major focus of adjustment efforts. Other areas where there is scope for savings include lowering the accrual rate for pension benefits—particularly for periods of parental leave, unemployment, and education—and

Decomposing Pension Expenditure Projections, 2010–60

Sources: DG ECFIN: The 2009 Ageing Report and Fund staff calculations.
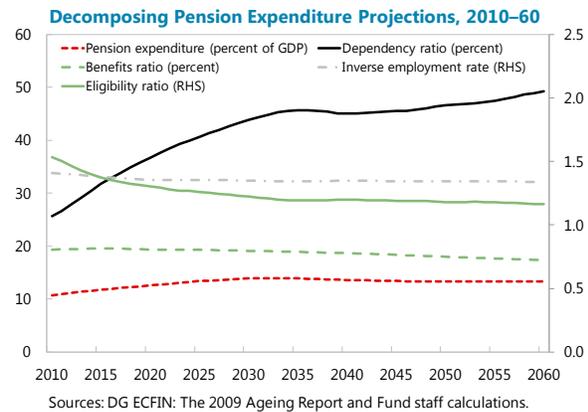
tightening access to early retirement via disability or unemployment. For example, the number of persons on disability pension is estimated at about 9 percent of the labor force, which appears excessive. The authorities do not dispute the need for such measures. Indeed, they have raised the effective retirement age in recent years and the latest agreement with social partners further increases it by four months, while further measures are to be implemented by 2017. Also, from 2010 onward new pensions are adjusted downward by a life expectancy coefficient, helping to reduce the impact of aging on pension expenditure.

25.   **Eligibility, entitlements, and arrangements for old-age care could also be revisited as this is an area where aging pressures will be significant**. The projected increase in long-term care spending for Finland is well above the median for the EU, suggesting that reforms drawing on lessons from other EU countries could yield substantial savings.

26.   **An overhaul of local government is also needed**. Spending at the municipal level has grown faster than in other parts of general government (see AN 7). While some of these spending pressures may have been inevitable given that municipalities are responsible for education, social services, and health care, the OECD (2010) estimates that municipality productivity has declined by about 10 percent over 2000–08. Productivity declines have been most marked in social work and health. Alongside, municipal income tax rates have increased steadily, partially offsetting reductions in central government taxation in recent years. Soft budget constraints have helped encourage fiscal slippages, with buoyant (and highly cyclical) corporate taxation enabling strong expenditure growth in good times.

27.   **There is a need to harden municipal budget constraints and reduce the cyclicality of their revenues, thus strengthening incentives to generate expenditure savings**. The reliance on corporate taxes at the municipal level should be reduced, and the reduction should be offset by higher property taxation or central government transfers. At the same time, a ceiling on municipality income tax rates and restraint in the growth of central government transfers would strengthen incentives for expenditure consolidation at the municipal level. Also, the scope for competitive bidding for the provision of services to municipalities should be broadened to generate cost savings. Finally, there is also scope for efficiency gains through mergers of municipalities as the median population of municipalities is less than 5,000 people.

28.   **Improving the rate of return on public financial assets would also help reduce the sustainability gap**. Liquid financial assets totaled more than 100 percent of GDP in 2010, and substantial portions of these assets are low-yielding, reflecting a cautious investment approach. Given the large stock of assets, an asset management strategy that generates a modest increase in returns could make a significant contribution to closing the sustainability gap.

C. Optimal Fiscal Consolidation Paths

29.   **The pace of consolidation will reflect the balancing of the government's twin stated objectives of reducing both the output gap and the fiscal sustainability gap**. We construct a model to assess the optimal pace of consolidation as follows: the authorities are assumed to care about both the sustainability and output gaps and to prefer that both be zero. However, these objectives are conflicting in that action to close the sustainability gap (fiscal tightening) comes at the expense of widening the output gap, while on the other hand, action to close the output gap (fiscal loosening) increases the sustainability gap. Thus, over an infinite horizon, the authorities' problem can be characterized as choosing a path for the fiscal stance that minimizes the following quadratic objective function:[2]

$$\sum_{t=0}^{\infty} \beta^t \left(\alpha O_t^2 + \gamma S_t^2 \right) \tag{6}$$

Here, O_t, α, γ, and β represent the output gap in percent of GDP in period t, the weight placed by the authorities on closing the output gap, the weight placed by the authorities on closing the sustainability gap, and the authorities' rate of time preference, respectively, with $\beta = 1/(1+r)$.

---

[2] See Kanda (2011) for full details of the model.

30.   **The output gap is assumed to evolve according to the following reduced form equation**:

$$O_t = \lambda O_{t-1} - \xi\left(f_t - f_{t-1}\right) \tag{7}$$

Here, f_t, λ, and ξ represent, respectively, discretionary fiscal measures taken (in percent of GDP) in period t, an autoregressive parameter on the output gap, which determines how long it would take for the output gap to be eliminated through self-repair of the economy rather than fiscal action, and the fiscal multiplier.

31.   **Discretionary fiscal measures are assumed to have no effect on potential growth**. In effect, discretionary measures only affect GDP growth temporarily, with corresponding changes to the output gap. The constant growth rate assumed in the derivation of the sustainability gap is best interpreted as the average of the annual growth rates over the infinite horizon. With the underlying potential growth path unchanged, temporary deviations of annual growth rates have a negligible impact on the average calculated over the infinite horizon. Moreover, since the output gap closes, temporarily low growth rates must be offset by temporarily higher growth rates. Thus, notwithstanding some variation in growth rates, equation 5 would still give a close approximation to the sustainability gap.

32.   **It is necessary to adjust the sustainability gap formula to reflect discretionary actions**. If we adjust equation (5) to take account of discretionary fiscal measures taken in time t in addition to the "passive" evolution of the primary surplus, then we get:

$$S_t = (r-g)\left[b_t - \left(\frac{1}{1+r}\right)\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^j p_{t+j} - \left(\frac{1}{r-g}\right)f_t\right] \tag{8}$$

Some algebraic manipulations then reveal that the sustainability gap evolves as follows:

$$S_t = \left(\frac{1+r}{1+g}\right)S_{t-1} - \left(f_t - f_{t-1}\right) \tag{9}$$

33.   **Equation (9) confirms that in the normal case where the discount rate exceeds the GDP growth rate, delaying actions to ensure sustainability is costly**. The magnitude of the sustainability gap increases over time absent discretionary measures to close it, since the discount rate (which governs the pace of debt accumulation) exceeds the GDP growth rate (which governs the burden of debt relative to GDP).

34.   **The authorities' problem is to choose the size of fiscal measures in time t to minimize the objective function (6) subject to equations (7) and (9)**. Given the quadratic preferences and linear constraints, we know that the optimal fiscal tightening in any time

period is a linear function. We therefore speculate that the fiscal consolidation pace is governed by the following equation:

$$f_t - f_{t-1} = AO_{t-1} + BS_{t-1} \tag{10}$$

Here, $A > 0$ and $B > 0$. Substituting equation (10) into the first-order condition of the authorities' problem and solving for A and B yields:

$$A = \frac{\alpha \xi \lambda}{(\alpha \xi^2 + \gamma)} \tag{11}$$

$$B = \frac{\gamma(1+r)}{(\alpha \xi^2 + \gamma)(1+g)} \tag{12}$$

35.   **Thus, the optimal path for fiscal consolidation depends on the starting values for a number of factors**. Specifically, the optimal consolidation path depends on starting values for the output and sustainability gaps, the fiscal multiplier, the speed of self-correction of output gaps, the discount and GDP growth rates, and the authorities' preferences. For Finland, starting in year 2012, the initial sustainability gap is, as mentioned, calculated at 4¼ percent of GDP, while it is estimated that the (negative) output gap in 2011 was around 3 percent of GDP. λ is calibrated to equal 0.5, implying that absent fiscal measures and ceteris paribus, an output gap of 2 percent of GDP is eliminated after six years via spillovers, confidence effects, monetary policy actions, self repair etc. The fiscal multiplier is taken to be 0.5, as estimated in IMF (2010b) for advanced European countries. The discount rate and GDP growth rate are taken to be 5 percent and 3.5 percent respectively, consistent with EC's (2009) findings.

36.   **Given these estimates, the parameters governing the authorities' preferences are pinned down by "revealed preference."** We renormalize the policy function, without loss of generality, by assuming that $\gamma = 1 - \alpha$, where $0 \leq \alpha \leq 1$. On this basis, the value of α is taken to be that which is consistent with the size of the announced change in the structural primary balance in 2012, given the initial values of the output and sustainability gaps. We focus on 2012 (rather than using the entire path of announced annual tightening over the medium term to pin it down) because measures for 2012 are fully fleshed out and passed by parliament in the 2012 budget. For subsequent years, plans are often less detailed and measures to support envisaged tightening may not be fully in place. On this basis we estimate that $\alpha = 0.9$.

37.   **In general, the optimal consolidation path includes some front-loading of adjustment, but also envisages that full elimination of the sustainability gap takes place over a long horizon**. Quadratic preferences mean that the pressure to act to reduce any of the two gaps under consideration increases in nonlinear fashion with the size of that gap. Thus, if the sustainability gap is large enough relative to the output gap, the optimal immediate fiscal

tightening would be one that trades a substantial reduction in the sustainability gap for some increase in the output gap. Therefore (subject to the weights in the authorities' preferences) the larger the sustainability gap, the more optimal it is to front-load adjustment. Also, the authorities have a very long horizon over which to consider and implement adjustment, and under quadratic preferences they would tend to select a path in which both the output and sustainability gaps trend toward zero, which then pushes back the timing for full sustainability to be achieved.

38. **For Finland, the model predicts an optimal path with fiscal tightening of about one percent of GDP in 2013 and with the pace of adjustment tapering off over time**. Under this scenario, the sustainability gap declines steadily, though the pace of decline drops over time, and it is eliminated in 2034. Because of the delay in achieving sustainability, the total amount of measures needed rises above the sustainability gap to about 4½ percent of GDP.

39. **The preponderance of downside risks to the near-term macro forecast, however, suggests that a more uniform adjustment pace would be advisable**. The model, being deterministic, does not explicitly take forecast risks or shocks into account. With downside risks dominating, and uncertainties unusually large over the near term, this argues for lower adjustment in the near term. A uniform adjustment path, also depicted as the plausible adjustment scenario in Figure 6.5, with a view to close the sustainability gap in 10 years, could be considered plausible, and would require total measures of about 4½ percent of GDP.

D. References

Alper, C. Emre, Lorenzo Forni and Marc Gerard, 2012, "Pricing of Sovereign Credit Risk: Evidence from Advanced Economies during the Recent Financial Crisis," IMF Working Paper 12/24, Washington: International Monetary Fund.

European Commission (EC), 2009, "Sustainability Report 2009," European Economy 9 (Luxembourg, 2009).

Girouard, Nathalie and Christophe Andre, 2005, "Measuring Cyclically-adjusted Budget Balances for OECD Countries," OECD Economics Department Working Paper 434, Paris: Organization for Economic Co-Operation and Development.

International Monetary Fund (IMF), 2010a, "Finland: Staff Report for the 2010 Article IV Consultation," Washington: International Monetary Fund.

———, 2010b, "World Economic Outlook. Recovery, Risk, and Rebalancing," Washington: International Monetary Fund.

———, 2012, "World Economic Outlook. Growth Resuming, Dangers Remain," Washington: International Monetary Fund.

Kanda, Daniel, 2011, "Modeling Optimal Fiscal Consolidation Paths in a Selection of European Countries," IMF Working Paper 11/164, Washington: International Monetary Fund.

Organization for Economic Co-Operation and Development (OECD), 2010, "OECD Economic Surveys: Finland 2010," Volume 2010/4, Paris: Organization for Economic Co-Operation and Development.

Schaechter, Andrea, C. Emre Alper, Elif Arbatli, Carlos Caceres, Giovanni Callegari, Marc Gerard, Jiri Jonas, Tidiane Kinda, Anna Shabunina, and Anke Weber, 2012, "A Toolkit to Assessing Fiscal Vulnerabilities and Risks in Advanced Economies," IMF Working Paper 12/11, Washington: International Monetary Fund.

Appendix 6.1. Methodology for Short- and Medium-Term Vulnerability Indicators

(i) Sovereign Debt Rollover Risks: Gross Funding Needs

Methodology: The Gross Funding Needs is the sum of the projected general government deficit for 2012 and of government debt maturing in 2012, both in percent of GDP.

Data: General government deficit projections and nominal GDP is from the World Economic Outlook (WEO) database, while data on maturing debt in 2012 are from Bloomberg as of end-2011. One caveat of the data involves the difference in debt levels between Bloomberg and WEO data. As the coverage of total public debt from Bloomberg differs from that in the WEO database, data on maturing debt likely do not have the same coverage either. Hence, the results can only be considered approximate.

(ii) Sovereign Debt Rollover Risks: Average Repayment and/or Refinancing Needs

Methodology: The annual average amount of end-2011 debt that needs to be repaid and/or refinanced in the future is computed as the ratio between the end-2011 general government debt in percent of GDP and the average maturity of the government debt.

Data: Data on the general government debt and GDP are from WEO, while the average debt maturity in years is from Bloomberg.

(iii) Market Perception of Default Risk: Sovereign Credit Default Swap (CDS) spreads

Methodology: We compute the CDS spread indicator as the average of daily CDS spreads during April 19–May 2, 2012.

Data: Daily 5-year sovereign CDS spreads are from Datastream.

(iv) Market Perception of Default Risk: Relative Asset Swap (RAS) Spreads

Methodology: We compute the RAS spread indicator as the average of daily data according to the following formula: $RAS_i = R_i - RSW_i$, where R_i is the yield of 10-year government bonds issued by country i, and RSW_i is the 10-year fixed rate on interest rate swaps in the currency of country i.

Data: Input data are from Datastream.

(v) Fiscal Vulnerabilities to Shocks
Methodology: First we compute the general government debt level as follows:

$$d_t = d_{t-1} \left(\frac{1 + i_t}{1 + \gamma_t} \right) - pb_t$$

Here, d_t is the general government debt in percent of GDP, i_t is the nominal interest rate, γ_t is the nominal GDP growth rate, and pb_t is the primary balance at time t. In turn, the nominal interest rate is compute as the ratio between period t interest payments and period $t\text{-}1$ general government debt.

Due to country-specific factors, this debt accumulation equation may lead to a debt projection that differs from the baseline debt projection from WEO. Hence, we compute an adjustment factor as the difference between the WEO debt projection and the projection from the debt accumulation equation in the no-shock scenario.

The first shock assumes that annual real and nominal GDP growth is 1 percentage point lower than in the baseline projection during 2012–17. As this is a partial equilibrium analysis, the GDP deflator and potential output are assumed unaffected by the shock. The primary balance in the shock scenario is then computed as

$$pb_t = pb_t^{WEO} + \varepsilon \Delta og_t$$

where pb_t^{WEO} is the baseline primary balance from WEO, ε is the semi-elasticity of the budget balance with respect to the output gap, and Δog_t is the change in the output gap from the baseline to the shock scenario.

To compute the debt under the shock scenario, the debt accumulation equation is then rerun, using the shock-modified primary balance and nominal GDP data, while the nominal interest rate, i, is assumed unchanged. Finally, the debt adjustment factor from above is added for consistency with the baseline debt-to-GDP ratio.

The second shock assumes the nominal interest rate is 100 basis points higher than in the baseline during 2012–17. Real and nominal GDP, the output gap, and the primary balance are assumed unaffected relative to the WEO baseline. Debt under the shock scenario is then computed as above and compared to the WEO baseline.

Data: The underlying data on debt, nominal and real GDP, the primary balance, and interest payments are from the WEO database in local currency units. The semi-elasticity of the budget balance with respect to the output gap is from Girouard and Andre (2005).

(vi) Decomposition of Changes in the Government Bond Spread
Methodology: We estimate a vector autoregression (VAR) with weekly data on 10-year government bond yields for 16 countries. The decomposition of the changes in the Finnish bond yield is computed based on the average impulse response and structural errors from 48 different Choleski orderings of the data in the VAR.

Data: The weekly data on 10-year government bond yields are from Bloomberg. The data cover 16 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, United States of America, and United Kingdom.

Table 6.1 Finland: Public Sector Debt Sustainability Framework, 2007–17

(In percent of GDP, unless otherwise indicated)

	Actual					Projections						Debt-stabilizing primary balance 9/
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
1 **Baseline: Public sector debt 1/**	35.2	33.9	43.5	48.4	48.5	**51.2**	**52.4**	**52.2**	**51.6**	**50.6**	**49.5**	**-0.2**
o/w foreign-currency denominated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2 Change in public sector debt	-4.5	-1.2	9.5	4.9	0.1	2.6	1.2	-0.3	-0.6	-1.0	-1.1	
3 Identified debt-creating flows (4+7+12)	-8.4	-5.3	5.3	1.1	-2.2	-0.1	-1.4	-2.5	-2.3	-2.6	-2.7	
4 Primary deficit	-6.8	-5.7	1.3	1.5	-0.6	-0.2	-0.7	-1.5	-1.8	-2.3	-2.5	
5 Revenue and grants	52.7	53.6	53.4	52.7	53.2	53.3	53.9	54.1	54.2	54.4	54.5	
6 Primary (noninterest) expenditure	46.0	47.9	54.7	54.2	52.6	53.1	53.2	52.6	52.4	52.1	52.0	
7 Automatic debt dynamics 2/	-1.6	0.4	4.0	-0.4	-1.6	0.1	-0.7	-1.0	-0.5	-0.4	-0.2	
8 Contribution from interest rate/growth differential 3/	-1.6	0.4	4.0	-0.4	-1.6	0.1	-0.7	-1.0	-0.5	-0.4	-0.2	
9 Of which contribution from real interest rate	0.3	0.5	0.9	1.2	-0.3	0.4	0.1	0.2	0.5	0.6	0.7	
10 Of which contribution from real GDP growth	-1.9	-0.1	3.1	-1.6	-1.3	-0.3	-0.8	-1.2	-1.0	-1.0	-0.9	
11 Contribution from exchange rate depreciation 4/	0.0	0.0	0.0	0.0	0.0	…	…	…	…	…	…	
12 Other identified debt-creating flows	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
13 Privatization receipts (negative)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14 Recognition of implicit or contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15 Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
16 Residual, including asset changes (2-3) 5/	3.9	4.1	4.2	3.8	2.4	2.7	2.6	2.2	1.8	1.6	1.6	
Public sector debt-to-revenue ratio 1/	66.7	63.4	81.5	91.8	91.2	96.1	97.3	96.4	95.1	93.1	90.8	
Gross financing need 6/	-1.2	-0.1	7.9	10.9	8.4	7.3	7.0	6.4	6.3	5.8	5.5	
in billions of U.S. dollars	-3.0	-0.2	18.9	26.0	22.3	18.3	18.0	17.3	17.5	16.9	16.5	
Scenario with key variables at their historical averages 7/						51.2	50.7	49.8	48.4	46.9	45.3	0.3
Scenario with no policy change (constant primary balance) in 2012-2017						51.2	53.0	54.0	55.0	56.0	57.2	-0.2
Key Macroeconomic and Fiscal Assumptions Underlying Baseline												
Real GDP growth (in percent)	5.3	0.3	-8.4	3.7	2.9	0.6	1.6	2.5	2.1	1.9	1.9	
Average nominal interest rate on public debt (in percent) 8/	4.0	4.3	3.8	3.3	3.1	2.8	2.7	2.9	3.1	3.4	3.5	
Average real interest rate (nominal rate minus change in GDP deflator, in percent)	1.0	1.3	2.4	2.9	-0.5	0.9	0.3	0.5	1.0	1.3	1.5	
Nominal appreciation (increase in US dollar value of local currency, in percent)	10.3	-6.6	7.2	-9.5	-0.3	…	…	…	…	…	…	
Inflation rate (GDP deflator, in percent)	3.0	2.9	1.4	0.4	3.6	1.9	2.4	2.3	2.1	2.1	2.0	
Growth of real primary spending (deflated by GDP deflator, in percent)	1.5	4.4	4.8	2.7	-0.1	1.5	1.8	1.5	1.7	1.3	1.6	
Primary deficit	-6.8	-5.7	1.3	1.5	-0.6	-0.2	-0.7	-1.5	-1.8	-2.3	-2.5	

Sources: GlobalInsight, IMF World Economic Outlook, Statistics Finland, and Fund staff calculations and projections.

1/ Indicate coverage of public sector, e.g., general government or nonfinancial public sector. Also whether net or gross debt is used.

2/ Derived as $[(r - \pi(1+g) - g + \alpha\varepsilon(1+r)]/(1+g+\pi+g\pi))$ times previous period debt ratio, with r = interest rate; π = growth rate of GDP deflator; g = real GDP growth rate; α = share of foreign-currency denominated debt; and ε = nominal exchange rate depreciation (measured by increase in local currency value of U.S. dollar).

3/ The real interest rate contribution is derived from the denominator in footnote 2/ as r - π (1+g) and the real growth contribution as -g.

4/ The exchange rate contribution is derived from the numerator in footnote 2/ as $\alpha\varepsilon(1+r)$.

5/ For projections, this line includes exchange rate changes.

6/ Defined as public sector deficit, plus amortization of medium and long-term public sector debt, plus short-term debt at end of previous period.

7/ The key variables include real GDP growth; real interest rate; and primary balance in percent of GDP.

8/ Derived as nominal interest expenditure divided by previous period debt stock.

9/ Assumes that key variables (real GDP growth, real interest rate, and other identified debt-creating flows) remain at the level of the last projection year.

Figure 6.1. Gross Funding Needs

Gross funding needs in 2012
(As of end-2011, percent of GDP)

Countries (left to right): Norway, Korea, Luxembourg, Switzerland, Australia, Sweden, Slovenia, Finland, New Zealand, Germany, Austria, Iceland, Malta, Ireland, Slovak Republic, Czech Republic, Denmark, United Kingdom, Netherlands, France, Belgium, Portugal, Canada, Spain, Israel, Italy, United States, Cyprus, Greece, Hong Kong SAR, Japan

Repayment or refinancing needs
(Average amount of end-2011 debt stock that needs to be annually repaid or refinanced, percent of GDP)

Countries (left to right): Luxembourg, Australia, United Kingdom, Sweden, Slovenia, Denmark, Switzerland, Czech Republic, Iceland, New Zealand, Slovak Republic, Korea, Finland, Austria, Netherlands, Spain, Malta, France, Israel, Germany, Canada, Belgium, Italy, Norway, Ireland, Portugal, United States, Greece, Cyprus, Japan, Hong Kong SAR

Sources: Bloomberg, IMF World Economic Outlook (WEO) database, and IMF staff calculations.
Note: Total debt from WEO differs from total debt in Bloomberg. The difference is assumed to have a maturity of longer than one year and not to affect the average debt maturity.

Figure 6.2. Market Perception of Sovereign Default Risk

5-year CDS spreads 1/
(Basis points)

6910

Norway, United States, Switzerland, Sweden, United Kingdom, Australia, Finland, Germany, Japan, Netherlands, Denmark, Austria, France, Belgium, Italy, Ireland, Portugal, Greece

5-year CDS spreads
(Basis points)

Austria
Finland
Netherlands
Germany
Sweden
France

RAS spreads 1/
(Percentage points)

18

Norway, Australia, Sweden, Denmark, Germany, Switzerland, United Kingdom, United States, Finland, Japan, Netherlands, Austria, France, Belgium, Italy, Ireland, Portugal, Greece

RAS spreads
(Percentage points)

Austria
Finland
Netherlands
Germany
Sweden
France

Sources: Datastream and Fund staff calculations.
Note: Daily data do not include weekends.
1/ Average over April 19-May 2, 2012.

Figure 6.3. Impact of Shocks

General government debt in 2017 following a 1 percentage point negative growth shock
(Percent of GDP)

■ Change, percentage points
■ Baseline

Australia, Sweden, Luxembourg, Switzerland, Norway, Denmark, Finland, Austria, Germany, Canada, Netherlands, Belgium, France, United Kingdom, Spain, Ireland, United States, Italy

General government debt in 2017 following a 1 percentage point nominal interest rate shock
(Percent of GDP)

■ Change, percentage points
■ Baseline

Australia, Sweden, Luxembourg, Switzerland, Denmark, Norway, Finland, Austria, Germany, Canada, Netherlands, Belgium, France, United Kingdom, Spain, Ireland, United States, Italy

Sources: IMF World Economic Outlook and Fund staff calculations.

Figure 6.4. Public Debt Sustainability: Bound Tests 1/ 2/
(Public debt in percent of GDP)

Baseline and historical scenarios

Baseline

50

Historical

45

**Interest rate shock (in percent)**

Baseline:	0.9
Scenario:	1.8
Historical:	2.6

52

Baseline

50

I-rate
Shock

Growth shock
(in percent per year)

Baseline:	2.0
Scenario:	0.1
Historical:	1.9

71

Growth
Shock

50

Baseline

Primary balance shock (in percent of GDP) and
no policy change scenario (constant primary balance)

Baseline:	1.8
Scenario:	0.2
Historical:	3.5

57

PB shock

57

Baseline

50

No policy change

Combined shock 3/

Combined
Shock

57

50

Baseline

Real depreciation and
contingent liabilities shocks 4/

Contingent
Liabilities
Shock

59

30 percent
depreciation

50

Baseline

50

Sources: International Monetary Fund country desk data, and Fund staff estimates.

1/ Shaded areas represent actual data. Individual shocks are permanent one-half standard deviation shocks. Figures in the boxes represent average projections for the respective variables in the baseline and scenario being presented. Ten-year historical average for the variable is also shown.

2/ For historical scenarios, the historical averages are calculated over the ten-year period, and the information is used to project debt dynamics five years ahead.

3/ Permanent 1/4 standard deviation shocks applied to real interest rate, growth rate, and primary balance.

4/ One-time real depreciation of 30 percent and 10 percent of GDP shock to contingent liabilities occur in 2012, with real depreciation defined as nominal depreciation (measured by percentage fall in dollar value of local currency) minus domestic inflation (based on GDP deflator).

Figure 6.5. Fiscal Sustainability, 2011–60

(Percent of GDP)

Primary Balance

- Immediate full adjustment
- Plausible adjustment 1/
- No measures
- Delayed adjustment
- Optimal adjustment

Overall Balance

- Immediate full adjustment
- Plausible adjustment 1/
- No measures
- Delayed adjustment
- Optimal adjustment

Public Net Debt 2/

- Immediate full adjustment
- Plausible adjustment 1/
- No measures
- Delayed adjustment
- Optimal adjustment

Sources: ECFIN: The 2009 Ageing Report and Fund staff calculations.

1/ The plausible adjustment scenario is that of uniform adjustment over a 10-year period.

2/ Net debt is defined as gross debt minus liquid financial assets.

VII. ANALYTICAL NOTE 7: FISCAL RULES IN PERSPECTIVE[1]

Fiscal rules can be beneficial for a number of reasons. First, they can help build buffers during economic expansions to be used when the cycle turns. Second, in an uncertain environment with volatile financial markets, fiscal rules can help build and maintain credible and sound medium-term public finances. Third, on the back of a fiscally costly recession and with a rapidly aging population, fiscal rules can be helpful in closing the sustainability gap. With the background of the 2008-09 crisis and the euro area debt turmoil, this note will discuss the strengths and weaknesses of Finland's fiscal rules framework. In addition, simulations will show how fiscal balances would have developed in Finland and its peers had various fiscal rules been in place prior to the crisis.

A. Finland's Fiscal Accounts and Recent Developments

1.   **Despite a sharp worsening during the 2008–09 crisis, the general government deficit in 2011 was among the lowest in the European Union**. After a decade of surpluses on general government accounts, the more than 4 percent of GDP fiscal surplus in 2008 sharply turned around as revenues collapsed with the 8.4 percent real GDP decline in 2009. Nonetheless, due to a strong bounce back in economic activity in 2010, the deficit remained contained below the 3 percent of GDP Maastricht criteria. As the government stepped up fiscal consolidation in 2011, the deficit narrowed further and was well below the euro area average of more than 4 percent of GDP.


General Government Balances and Debt, 2011
(Percent of GDP)

Sources: World Economic Outlook and Fund staff calculations.
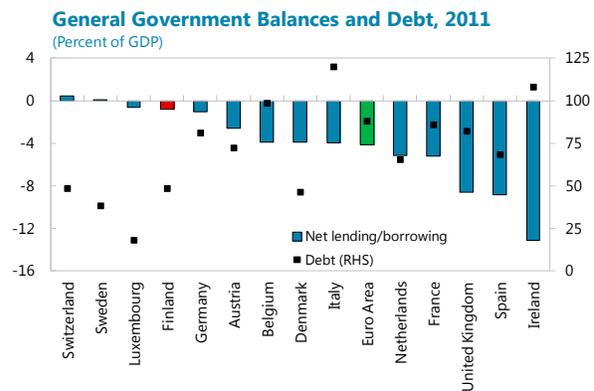
2.   **However, the existing fiscal framework has not prevented rapid public expenditure growth outside the central government**. While the spending limits have served Finland well in containing central government spending, other subsectors of the general government have behaved quite differently (Figure 7.1). With the spending limit constraints, central government nominal expenditure growth remained contained at less than 2 percent per year during 1996–2008. However, nominal expenditures grew strongly in local governments, averaging more than 5½ percent per year. In particular, in addition to rising costs associated with general public services, local government spending on social protection and health care services has increased rapidly. Nonetheless, the local governments' deficit has remained contained at less than 1 percent of GDP with the Local Government Act

---

[1] Prepared by Lone Christiansen.

stipulating at least a balanced budget over four years.[2] On the contrary, the central government deficit deteriorated sharply when the 2008–09 crisis hit, further worsening to 5.6 percent of GDP in 2010.

3.   **General government spending growth has also been rapid compared to other advanced European countries**. During the last decade, annual average real expenditure growth in Finland has outpaced that in Denmark, Sweden, and the euro area (Figure 7.2). In fact, Finland has now outpaced the size of government in Sweden, where most indicators of compliance with the fiscal rules framework over-performed relative to the one percent surplus target[3] (IMF, 2011a). Overall, the relatively rapid expenditure growth suggests that Finland has room to modify the current framework, in particular to avoid a build-up of vulnerabilities as the increase in aging costs becomes more pressing.

General Government Expenditure
(Percent of GDP)
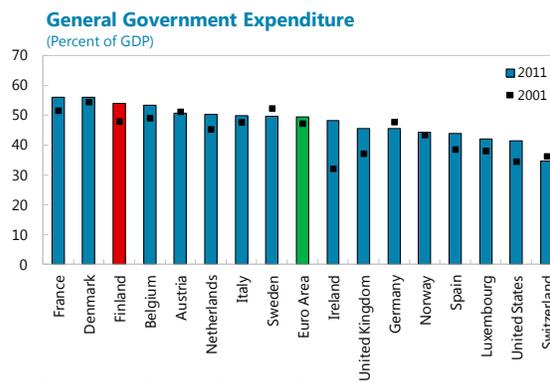
Sources: World Economic Outlook and Fund staff calculations.

4.   **Recently, the euro area sovereign debt market turmoil has led to the decision to further strengthen national frameworks**. At the end of the summer of 2011, the confidence crisis in the euro area escalated and spread to countries that previously had been untouched, while rising borrowing costs swiftly put pressure on public accounts. As a result, part of the outcome of the Euro Summit in October 2011 was a commitment by euro area countries to carry out additional measures: (i) adoption of structural balanced budget rules, preferably at the constitutional or equivalent level; (ii) reinforcement of national fiscal frameworks, not least by formulating national budgets based on independent growth forecasts; (iii) taking into account recommendations adopted at the EU level on the conduct of economic and budgetary policies; (iv) consultation of the Commission and Member States before adopting any major fiscal or economic policy reform plans with potential spillover effects; and (v) commitment to stick to the recommendations regarding the implementation of the Stability and Growth Pact (European Council, 2011a).

5.   **The commitment to reform euro area member states' fiscal framework will have direct implications for countries' budgetary processes**. In December 2011, further details

---

[2] "If the balance sheet of the current year is not estimated to show accumulated surplus, the financial plan must be in balance or show a surplus during the planning period of maximum four years. If the deficit of the balance sheet cannot be covered during the planning period, decisions shall be made in connection with the preparation of the financial plan, on the specified actions to be taken *(action plan)* to cover the deficit during a coverage period *(coverage obligation)* separately agreed upon by the council." (http://www.kuntaportaali.org/k_perussivu.asp?path=1;161;279;280;37558;60393;60415).

[3] Only the backward looking 10-year net lending average was marginally below the 1 percent surplus target in 2010.

were agreed. In particular, the European Council (2011b) agreed to a new Fiscal Compact, including that the annual structural deficit must not exceed 0.5 percent of nominal GDP. While fiscal frameworks in some countries already include some form of structural balance rules, several countries will have to make adjustments or amendments to these. For example, though over-the-cycle rules in principle target the medium-term structural balance, they also allow for temporary procyclical policy. In addition, some countries, including Finland, will need to set up independent fiscal councils to provide the macroeconomic framework for the budget formulation process. At the same time, while credible medium-term debt reduction plans remain a priority, countries must be careful not to jeopardize growth, in particular in light of a weak near-term outlook and prevailing downside risks. For Finland, however, staff estimates that due to the around 3 percent of GDP surplus in employment pension funds, a structural deficit limit of 0.5 percent of GDP has generally not been binding since euro adoption.

B. Spending Limits and Other Rules: the International and the Finnish Experience

6.   **Fiscal rules have been increasingly important across countries**. The IMF (2009) found that, as of early 2009, 80 countries within the Fund membership had national and/or supranational fiscal rules in place that covered at a minimum central government. This is a sharp increase from only seven countries with fiscal rules in 1990. At the same time, many countries have moved from only one rule to a combination of rules in order to address sustainability objectives, and 18 percent of advanced countries had independent fiscal bodies assessing the budget.

7.   **Some countries within the European Union have seen substantial changes in their fiscal frameworks**. Though some countries have strengthened their frameworks, the 2008–09 global financial crisis also resulted in some weakening. The United Kingdom suspended its golden and sustainable investment rules at the end of 2008 (IMF, 2010). In Finland, having performed comparatively well in relation to fiscal rules elsewhere in Europe before the crisis, the European Commission's fiscal rules index weakened from 2007 to 2009—a period in which the target of reducing central government debt was abandoned and the government allowed an exemption from the central government deficit limit of 2½ percent of GDP—indicating that the fiscal goals were not apt for a crisis situation. The

Fiscal Rules Index, 2000–10

Sources: European Commission, May 2012, and Fund staff calculations.
http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm

Netherlands and Sweden are examples of countries similar to Finland with strong fiscal frameworks as of 2010 (see Box 7.1 for additional information on fiscal rules in selected European countries).

Finland's Fiscal Framework

8.   **The main pillar of the Finnish fiscal rules framework is the spending limits system but other targets are often also included**. The current framework dates back to the reformed central government spending limits system, which was introduced in the context of the 2003–07 parliamentary term, albeit with some more recent modifications. Government Programs (GP) have typically also included other benchmarks such as targets on the central government balance and the debt ratio. For example, during the 2003–07 parliamentary term, the upper bound for the central government deficit was set at 2¾ percent of GDP, which was lowered to 2½ percent of GDP in the subsequent term. The current GP targets a central government deficit of no more than 1 percent of GDP by 2015 and that the central government debt-to-GDP ratio is put on a declining path (Box 7.2).

9.   **Though the spending limits have never been exceeded, additional targets have shown to be less significant**. In particular, with the sharp contraction in revenue, the central government deficit limit was exceeded in both 2009 and 2010. And though the severity of the recession justified the departure from the deficit limit, it did also suggest a soft attitude toward the rule. Currently, staff estimates that the GP specified measures fall short of the 2015 central government deficit limit by about ½–1 percent of GDP. Albeit the GP states an annual review of the progress toward the targets, the lack of specific plans at this stage may jeopardize the credibility of the targets. In addition, existing fiscal rules have been rather ineffective at closing the sustainability gap, suggesting that a further strengthening of the system could be beneficial.

10.   **The Finnish spending limits focus on containing central government spending, leaving a substantial share of general government expenditure outside the ceilings**. The central government spending limits are set in real terms for the four-year parliamentary term, allowing for annual adjustments in the nominal value due to price changes. According to the Finnish Ministry of Finance, the spending limits cover 37 percent of overall public spending and 75 percent of central government on-budget expenditure, compared to more than 50 percent of overall spending in Sweden (MoF, 2011). Spending outside the limits includes identified cyclical expenditure items, interest on central government debt, VAT expenditures, financial investments and expenditure, and local government expenditure. Importantly, the spending limits allowed full room for automatic stabilizers to work during the 2008–09 global financial crisis.

11.   **The Finnish spending limits are not required by the constitution but enjoy strong political support**. Specifically, the spending limits are determined as part of the government coalition agreements. Nonetheless, their effectiveness in containing central government spending has added to political support for the rule, and Finnish governments have a strong track record in adhering to the system. However, adherence to the spending limits framework was not fully tested in the context of economic stimulus during the crisis as

the stimulus measures were partly targeted on expenditure outside the spending limits as well as on the revenue side.

C. The Effect of Fiscal Rules

12. **Fiscal rules can help enhance the credibility of the government's medium-term fiscal objective and thus buttress consolidation plans**. In particular, fiscal rules can entrench fiscal discipline (Debrun and Kumar, 2007a). Also, the European Commission concluded that the strength and coverage of fiscal rules in EU countries were associated with an increased likelihood of successful fiscal consolidation, though the link is weak when considering expenditure rules only (EC, 2007). An IMF study found that on average during large adjustments, debt reduction was larger in countries with fiscal rules (IMF, 2009). In general, debt rules and various types of budget balance rules help move toward sustainability but do not constrain spending and, hence, the size of government. On the contrary, expenditure rules are helpful when the objective is to constrain the size of government, while economic stabilization can be supported also through balanced budget rules over the cycle. Therefore, the choice of rule depends to a large extent on the objectives and preferences of the government.

Properties of Different Types of Fiscal Rules Against Key Objectives 1/

Type of fiscal rule	Objectives		
	Debt sustainability	Economic stabilization	Government size
Overall balance	++	-	0
Primary balance	+	-	0
Cyclically adjusted balance	++	++	0
Balanced budget over the cycle	++	+++	0
Public debt-to-GDP ratio	+++	-	-
Expenditure	+	++	++
Revenue			
Revenue ceilings	-	-	++
Revenue floors	+	+	-
Limits on revenue windfalls	+	++	++

Source: IMF (2009).
1/ Positive signs (+) indicate stronger property, negative signs (-) indicate weaker property, zeros (0) indicate neutral property with regard to objective.

13. **A structural balance rule could usefully complement an expenditure rule but is subject to several challenges**. A structural balance rule allows automatic stabilizers to work by adjusting the required budget balance for the economic cycle. Not only will a structural balance rule be needed from the perspective of the new European Fiscal Compact, it can also help the economy on the right path in a decade with a rapidly aging population. At the same time, the expenditure limits can prevent an unintended long-term increase in the size of government. However, there are several challenges associated with the practical implementation of structural balance rules as estimating the output gap and, hence, the

sustainability gap and the structural balance target is subject to considerable uncertainty. Therefore, forecasters should take the approach of using conservative estimates of potential output growth in order to avoid overestimating the structural balance during periods of rapid economic growth, which would tend to produce loser fiscal rules.

Simulating Hypothetical Budget Balances

14.   **To account for the difficulties in estimating potential output, the simulations in this note are based on several different structural balance rules**. Specifically, in addition to an expenditure rule, the analysis covers four rules related to a cyclically adjusted budget balance target: a simple and an augmented structural balance rule and a simple and an augmented growth-based rule (Box 7.3). For simplicity, the focus is on general government finances, and the simulations produce hypothetical paths of the general government balance in percent of GDP for each of the various rules. This shows in a cross-country setting how different fiscal rules would have affected the fiscal balance and compares the simulated outcome of using each rule to the actual history.

15.   **The two structural balance rules require an estimate of the output gap**. In the case of the simple structural balance rule, the actual budget balance under the rule arises from the target budget balance, b^*, after adjusting for the output gap. In the baseline simulations, b^* is set in order to reach a predetermined level of debt to GDP by a certain future data (see Box 7.3 and the appendix for details). The augmented version of the rule accounts additionally for the level of the budget balance ratio in the previous period, thereby accelerating the adjustment toward the target.

16.   **The growth rate rules target the structural balance but adjust for real GDP growth rather than the output gap during the adjustment period**. Given the difficulty in obtaining accurate output gap estimates, this approach is a useful and simple alternative. After setting a medium-term balance target, the simple growth-based rule allows for deviations from the target when growth falls below the trend level of growth. However, without further adjustment, the rule would require a larger balance during times of a negative but closing output gap where growth would be temporarily high. Hence, an augmented form of the rule allows for a gradual adjustment toward the medium-term budget balance target. This has the advantage of allowing for countercyclical policy under the rule while being independent of contemporaneous potential output estimates.

17.   **The expenditure rule sets a ceiling for real expenditure**. Expenditure rules can be very effective in reducing the tendency to increase public spending during periods of rapid growth (IMF, 2011b). For simplicity and cross-country comparison in the simulations, the rule is applied to general government spending and not only to certain parts of central government spending. The ceiling is set to grow with either long-term real GDP, estimated as the historical annual average growth rate over 1970–2002 or, alternatively, by applying the medium-term estimated potential growth rate from the growth rate rule above. It is then

translated into nominal expenditure using the GDP deflator. As the rule does not set any limits on revenue, the simulations use actual revenue for computing the budget balance. In practice, if a country implements expenditure rules in combination with structural balance rules, it will be important that expenditure limits are set to comply consistently with the targets under the structural balance rule.

18.   **The rules differ in how the budget balance is affected in case of macroeconomic shocks**. The adjacent text chart shows how the budget balance is affected by a growth shock under various structural balance rules (see appendix for details), where growth at time *t-1* is set equal to real GDP growth in 2010. The rules are then assumed to be implemented in period *t+1* when an adverse growth shock hits. The simple structural balance rule provides the slowest adjustment to the long-run surplus target, while the augmented growth rule allows for some degree of cyclicality during the downturn but then enacts more rapid adjustment.

Responses of Rules to a Large Adverse Growth Shock 1/
(Hypothetical budget balances, percent of GDP)

Sources: World Economic Outlook and Fund staff calculations.
1/ At t-1, potential real GDP growth, g*, is set equal to actual real GDP growth, g, in 2010, and it is assumed that real GDP, y, in 2010 equals potential real GDP, y*.
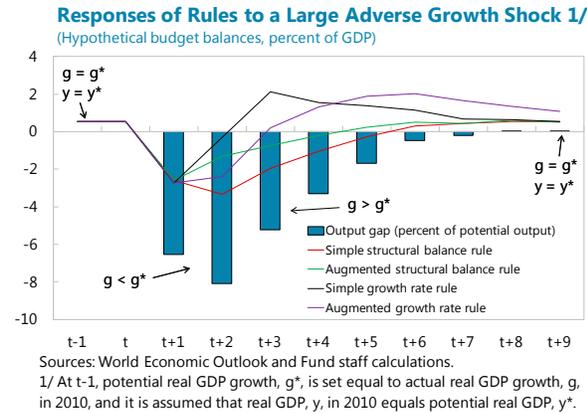
Simulation Results

19.   **The simulations suggest substantial cross-country differences in performance relative to the rules in recent years**. The simulations assume the implementation of the rule in 2003 when Finland's spending limits system was revised. Hence, actual data in 2002 for the respective countries are used as initial conditions, and the budget balance is computed over time assuming each of the rules one by one had been in place over the horizon. Until 2009, Finland's budgetary stance fell within the range given by the various rules (Figure 7.3). However, after the global economic and financial crisis, the budget balance fell below that implied by all the rules. The budget balance in the Netherlands, which has seen a similar deterioration, declined markedly below that implied by the various budget balance rules. On the contrary, Sweden's actual budget balance has fared well relative to what the rules would imply. In particular, the expenditure rules for Sweden would by themselves have implied a more lax fiscal stance than the actual balance provided.

20.   **The recent Finnish budget balance developments are most closely associated with rules that target a relatively low medium-term balance**. In order to explore the sensitivity of the results for Finland, Figure 7.4 shows the development of the budget balance under different assumptions for the medium-term budget balance target. Indeed, several rules tend to generate a path for the budget balance similar to the actual historical developments when the budget target is set at a relatively low level. For example, the fiscal balance under the augmented growth-based rule follows closely that of the actual fiscal balance when the

budget balance target is set at 1.5 percent of GDP or lower. However, this level is well below the 4 percent of GDP surplus, which the Ministry of Finance has estimated as required for long-term sustainability of public finances (MoF, 2012).

21.   **The effect of the various rules is also sensitive to the degree of counter-cyclical policy**. For example, the rules above allow only for the automatic stabilizers to work (for Finland: $a = 0.48$). However, during the crisis, the government undertook substantial fiscal stimulus. Hence, to allow for more active countercyclical policy, the semi-elasticity, a, in the structural balance and growth-based rules is allowed to vary. Figure 7.5 shows the paths for the simulated budget balance under different assumptions for the parameter a, and for varying the parameter e in the case of the augmented growth-based rule. Indeed, as a approaches 1, the fiscal balance worsens further in 2009, consistent with fiscal stimulus—the Ministry of Finance estimates that more than 1½ percent of GDP in fiscal stimulus measures were provided in 2009 and 2010.

D. Improving the Finnish Fiscal Framework

22.   **The current Government Program incorporates several Ministry of Finance recommendations to improve the spending limits framework**. For example, as recommended by the Ministry of Finance Spending Limits Working Group, the non-cyclically sensitive central government contribution to expenditure arising from the National Pension Act is now included under the ceilings. In addition, the GP includes a formal commitment not to use tax subsidies to circumvent the spending limits, and the spending limits are neutral with regard to changes between tax subsidies and expenditure of equal magnitude. Nevertheless, some shortcomings persist.

Long-Term Sustainability

23.   **One shortcoming of the Finnish fiscal rules relates to the absence of explicit consideration of the sustainability gap**. Hence, improvement in the rules should aim at closing the sustainability gap. It is important at the same time that any fiscal rule for Finland be sufficiently flexible to allow the automatic stabilizers to work. Setting a near-term target for the overall central government balance is too constraining during severe economic downturns. To strengthen the framework, the authorities could therefore consider extending the horizon for the spending limits to include a four-year rolling window as in Sweden or an augmented growth-based balance rule as suggested in the simulations. In addition, the anticipated increase in expenditure related to population aging suggests that a rule that targets a medium- to long-term balance consistent with debt sustainability would be desirable. With the recent stress in the euro area related to market concerns about debt sustainability, a strengthening of the system in this direction will also serve as an additional positive signal to markets. In the short term, however, it will be important that any rule implies a structural balance outcome in accordance with the European Fiscal Compact. However, given the surplus in employment pension funds, a goal of closing the sustainability gap would likely coincide with a structural balance well above the Fiscal Compact deficit limit.

Local Government Spending

24. **Another shortcoming relates to the coverage of the spending limits, which leaves substantial room for expansion**. For example, as recommended by the Ministry of Finance working group on the Spending Limits System (MoF, 2011), consideration could be given to bring the central government's off-budget funds into budget finances and then encompass them within the spending limits. But even more importantly, the rapid expenditure growth in local governments suggests these should be covered in a strengthened framework. To accomplish this, the authorities could move toward a spending limits framework for the local government sector, in particular with a focus on basic municipal services. An alternative approach includes medium-term expenditure ceilings at the municipal level. However, as each municipality mainly considers its individual tax revenue, this would require substantial guidance and coordination from the central government level in order to lead to a consistent framework for the local government sector as a whole.

25. **Local government obligations include general social spending**. Local governments are responsible for the majority of public social and health care spending as well as education expenditure, with the exception of spending related to universities. Hence, with the rapidly aging population and its associated upward pressure on expenditure related to health and social care, improving the local government revenue and expenditure framework is becoming particularly pressing.

26. **A complement to including local governments under the spending limits is to smooth their revenue stream to strengthen long-term planning**. Though changes to the framework should address the main fiscal challenge for local governments, namely how to contain expenditure growth, improving the revenue base can indirectly strengthen expenditure restraint through better ability to plan. Local government revenue derives from the municipal income tax (close to 50 percent of total revenue), corporate tax, real-estate tax, central government transfers, and operating income. The income and corporate taxes are

Local Government Finances, 2006–11
(Nominal, annual percent change, unless otherwise indicated)

Sources: Finland Ministry of Finance and Fund staff calculations.

highly cyclical in nature. Hence, with strong revenue growth during economic expansions, expenditures are likely to fluctuate procyclically, leading to the necessity of difficult spending cuts when the cycle turns. Hence, a larger role for a more stable revenue source such as real estate taxes could indirectly help spending restraint. In fact, property taxes in percent of GDP in Finland are low in international comparison (OECD, 2010). Additionally, corporate tax revenue and associated cyclical fluctuations could be transferred to the central government and substituted for a cyclically adjusted and more predictable transfer from the central government to the municipalities.

27.   **Any reform of the fiscal framework for local governments should also address the deteriorating productivity**. Total productivity in local governments has been on a declining trend over the last decade with the productivity decline averaging 1 percent per year during 2003–08. According to Ministry of Finance estimates (MoF, 2010), addressing this decline can greatly contribute to closing the sustainability gap. To this end, additional mergers of municipalities that lead to a larger population base for basic services would pave the way for efficiency improvements. This can help concentrate a high level of expertise, benefitting people also in low density areas.

Local Government Productivity, 2001–08
(Annual percent change)

Legend:
- Input (shown as negative)
- Output
- Total productivity

Sources: Statistics Finland and Fund staff calculations.
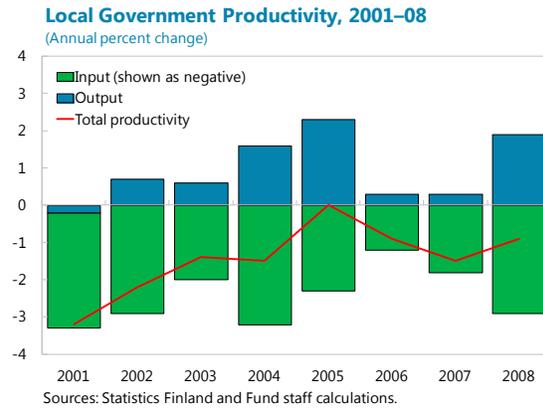
Additional Factors that Can Help Obtain the Goals

28.   **To limit procyclical policy under the rule, additional fiscal space should be used for debt payoff rather than fiscal stimulus**. For example, in order to maintain the net asset position, revenue from the sale of shares should be used for debt payoffs and not for additional spending as currently allowed in the GP. In addition, the GP implicitly allows for pro-cyclical fiscal policy above and beyond the spending limits in the case of revenue windfall or expenditure shortfalls following faster-than-projected growth and a "clear reduction in the central government debt-to-GDP ratio before 2015."

29.   **The Finnish fiscal framework could benefit from an independent fiscal council**. In general, such a council could provide macroeconomic forecasts for budgeting and assess the adequacy of the spending limits set by the government to avoid a fiscal stance that is too lax or based on overly optimistic economic forecasts. In addition, it could contribute to greater transparency and credibility (Council of the European Union, 2010). Even without evidence of overly optimistic macroeconomic forecasts in the Ministry of Finance, an independent fiscal council of high intellectual capacity and credentials could improve the transparency of the budgetary process, provide a separate calculation of the sustainability gap, assess the appropriateness of the GP goals and targets, and monitor progress toward the targets during the government term. An independent fiscal council could also analyze the macro framework with a greater focus on risk analysis and the effects of potential downside scenarios. The independence, credibility, and high-level capacity of a fiscal council, however, should be its cornerstones. In this respect, the OECD highlights the case of Sweden where, though the agency is under the Ministry of Finance, its independence and credibility are assured by the stellar reputation of its mainly academic members (OECD, 2010).

E.   Concluding Remarks

30.   **In general, when improving the Finnish fiscal framework, some aspects are particularly desirable**. First, a premium should be given to clarity and simplicity as well as communication and evaluation. For example, too many targets could create inherent conflicts. Second, the implementation of a new rule should be associated with a clearly specified transition phase in order to avoid too rapid adjustment toward the appropriate long-run requirement under the rule. For example, a swift closing of the structural balance gap could lead to a large consolidation need at a time of an already negative output gap. Lastly, while ensuring fiscal sustainability, fiscal rules should also be supportive of countercyclical policy such as, for example, is the case for structural budget balance rules.

Box 7.1. Fiscal Rules in Europe

The Netherlands. The coalition agreement commits the government to budgetary rules at the beginning of the term. Revenues and expenditures are strictly separated. Expenditure ceilings are set in real terms for four years, adjusted for actual price and wage inflation, and cover central government, the social security and labor market sector, and the health care sector, with separate ceilings for each of the three areas. The real revenue framework allows for full automatic stabilization. The coalition agreement includes a medium-term budget balance path, which will require corrective action if deviation from the path is larger than 1 percent of GDP. The Netherlands Bureau for Economic Policy Analysis (CPB) provides independent macroeconomic projections for the government period and monitors the fiscal framework.

Sweden. The framework consists of a general government surplus target of 1 percent of GDP over the cycle; 4-year rolling nominal expenditure limits for central government and the old-age pension system; and a constraint that local governments cannot budget with a deficit—an ex post deficit must be corrected within three years. An independent Fiscal Policy Council assesses whether fiscal policy objectives are being achieved, evaluates economic development in a long-run perspective, and monitors and evaluates the quality of the government's forecasts, including the underlying models.

Switzerland. The debt-brake rule sets central government expenditure ceilings, which aim at balancing the budget over the cycle. They are set annually as one-year ahead ex-ante ceilings that correspond to predicted revenues, adjusted for cyclical factors. Deviations of actual spending outcomes from ceilings are accumulated in a notional account. If the negative balance in that account exceeds 6 percent of expenditures, corrective measures sufficient to reduce the balance below this level within three years is required by law. An escape clause allows Parliament to approve deviations from the rule in exceptional circumstances.

Germany. In 2011, Germany introduced rules for both federal and state governments. The rule limits the federal structural deficit at 0.35 percent of GDP from 2016 (the end of the transition period) and allows for an escape clause that can be invoked by parliament in case of natural disasters or extraordinary emergency situations. The independent Council of Economic Experts issues an annual report with the current economic situation and associated forecasts, and the Joint Economic Forecast reports twice a year on economic developments.

Austria. 4-year rolling fixed nominal spending limit that covers about ¾ of budget expenditure. Cyclical expenditure is covered by a variable ceiling. Unused funds at the end of each year can be carried forward to future years. An independent research council (Austrian Institute of Economic Research – WIFO) delivers economic forecasts for budget planning, and the Government Debt Committee issues annual recommendations to the government on fiscal sustainability. In November 2011, the Austria Cabinet signed off on a draft law to introduce a constitutional debt limit into their fiscal policy framework. The law includes a debt brake to cut the debt level to 60 percent of GDP by 2020. Similar to the German rule, the aim is to keep the structural deficit below 0.35 percent of GDP as of 2017. A two-thirds majority in parliament is required to include the debt-brake rule into the constitution.

Box 7.2. Expenditure Limits and the 2012–15 Government Program

According to the Government Program for the 2012–5 parliamentary term, the spending limits will continue as an important part of the Finnish fiscal framework.

"Any margin created under the spending limits through price adjustments and revenue from the auctioning of emissions rights can be allocated to the repayment of debts and to meeting the strategic objectives set out in the Government Programme."

"The Government is committed to undertake further adjustment measures if indications are that the central government debt-to-GDP ratio is not shrinking and if the central government deficit shows signs of settling at over 1% of GDP. The Government will annually monitor the achievement of these central government objectives and where necessary implement conditional measures that will be applied in equal proportions. The conditional measures include the additional freezing and adjustment of central government expenditure and transfers to local government, further tax increases and the trimming of tax deductions.

The need for additional expenditure and tax adjustments will be reviewed annually starting from the 2013–2016 central government spending limits decision. If there is a clear reduction in the central government debt-to-GDP ratio before 2015, no more than 30% of the improved fiscal position can be assigned to additional expenditure in line with the Government's strategic objectives."

"The Government makes a commitment to observe the spending rule set out in the Government Programme and the first spending limits decision based on that rule. The measures announced in the Government Programme will be implemented during the parliamentary term in line with the spending limits. The spending rule is designed to ensure a prudent and long-term spending policy that promotes economic stability.

The Government observes that central government expenditure as specified in the spending limits is EUR 1,215.5 million less in 2015 than the figure recorded in the technical spending limits on 23 March 2011 (EUR 40,699 billion). In addition to structural adjustments, the overall spending limits level will be revised to reflect changes in price levels.

EUR 200 million will be earmarked annually for supplementary budget needs. If annual expenditure falls below the spending limits even after supplementary budgets, the difference, up to a maximum of EUR 200 million, can be spent the following year on one-off expenditure items, spending limits notwithstanding.

If economic growth is faster than anticipated, the increased revenue and decreased expenditure will primarily be used to reduce central government debt. If there is a clear reduction in the central government debt-to-GDP ratio before 2015, no more than 30% of the improved fiscal position can be assigned to additional expenditure in line with the Government's strategic objectives.

If annual revenue from the sale of shares exceeds EUR 400 million, a maximum of EUR 150 million of the excess can be spent on one-off, infrastructure and skills investments that promote sustainable growth.

Central government revenue from the auctioning of emissions rights can be allocated to one-off climate change and development cooperation expenditure, spending limits notwithstanding. The Government will not use tax subsidies to circumvent the spending limits in any way that clashes with the purpose of the spending rule. The spending limits are neutral with regard to changes between tax subsidies and expenditure of equal magnitude. The spending limits carry no restrictions on the re-budgeting of expenditure, on changes to the timing of expenditure items or on refunds or compensation of revenue collected at an unjustifiably high level during the parliamentary term.

Box 7.2. Expenditure Limits and the 2012–15 Government Program (concluded)

The Government will review the overall situation in transport infrastructure before taking any decisions on new transport projects. The aim is to maintain a steady rate of transport route construction and stable funding from one year to the next, giving due consideration to trends in civil engineering costs. The review will take account of the economic impact of any proposed projects as well as their employment, emissions and regional policy implications.

The central government contribution to pension expenditure incurred by the Social Insurance Institution under the National Pensions Act will be brought under the spending limits system.

The following items are excluded from the spending limits:

- unemployment security expenditure, the central government contribution to the cost of basic social assistance, pay security and housing allowances; however expenditure effects resulting from changes to the criteria for these items are included in the spending limits;

- debt interest payments;

- any compensation payable to other tax recipients as a result of tax changes made by central government (including social insurance contributions);

- expenditure corresponding to technically transmitted payments and external funding contributions;

- expenditure corresponding to revenue from betting and lottery, totalisator betting and transferred earnings from the Slot Machine Association;

- financial investment expenditure;

- appropriations for VAT expenditure. "

Source: Government Program (2011), English language version.

Box 7.3. Structural Balance and Expenditure Rules

Simple medium-term balance rules
There are a number of ways to specify a structural balance rule (IMF, 2009). What they all have in common is that they target the fiscal balance, adjusted for cyclical fluctuations.[1]

Structural balance rule
The simplest structural balance rule included here can be expressed as:

$$b_t = b^* + ay_t^{gap}, \qquad\qquad a > 0.$$

Here, b_t denotes the overall fiscal balance in year *t*, *b** is the medium-term structural balance target, *a* is the semi-elasticity of the budget balance with respect to the output gap, y_t^{gap}. The baseline value of *a* is set at 0.48 for Finland, which Girouard and Andre (2005) estimated as the overall cyclical sensitivity of the budget to the economic cycle. Hence, this value of *a* allows automatic stabilizer to work fully. Detailed assumptions for the countries considered can be found in the appendix.

Growth-based rule
An alternative relationship uses the growth rate of real GDP, g_t, relative to the steady-state growth rate, *g**, in place of the output gap:

$$b_t = b^* + a(g_t - g^*), \qquad\qquad a > 0.$$

This allows reactions to the growth rate rather than the level of GDP but could lead to procyclicality during times of rapid growth and a negative output gap.

Augmented medium-term balance rules
Augmented rules that account for the speed of adjustment can address the inherent cyclicality in the simple rules by either accelerating or delaying the adjustment to the target.

Augmented structural balance rule
In the output gap form above, this would be modified to

$$b_t = b^* + ay_t^{gap} - c(b_{t-1} - b^*), \qquad a > 0, \qquad 0 < c < 1.$$

Here, *c* is the speed of correction to the deviation in the overall balance in the previous year from the target. It reduces the allowed deviation of the overall balance from the target and accelerates the adjustment, while still allowing for some degree of countercyclicality.

Augmented growth-based rule
In the growth rate form, the adjusted rule would instead read

$$b_t = b^* + a(g_t - g^*) + e(b_{t-1} - b^*), \qquad a > 0, \qquad 0 < e < 1.$$

Here, *e* is the speed of correction to the deviation in the overall balance in the previous year from the target. As the adjustment back to the target is delayed, the procyclicality of the rule is reduced.

. **Box 7.3. Structural Balance and Expenditure Rules (concluded)**

Expenditure rule

An expenditure rule can be stipulated in either nominal or real terms. While several countries may not have a specific formula that formally defines the rule, one way to do this is to link expenditure growth to a prudent level of medium-term growth. In this note, we define the expenditure rule in real terms and compute expenditure growth at time t, x_t, under the rule as:

$$x_t = \mu \cdot g^*,$$

where μ is a proportionality parameter that can be set in line with the targeted budget balance. For the present analysis, $\mu = 1$ to allow for cross-country comparison. Hence, the rule does not correct for potential existing imbalances in the starting year.

_____

[1]We follow the approach for the UK in IMF (2010) to determine the structural balance target, b^*. In particular, following Escolano (2010), with an initial debt ratio, d_0, and a target, d^*_N, to be reached N periods later, the constant overall balance, b^*, which can obtain that target can be computed as

$$b^*_N = \frac{-\gamma}{(1+\gamma)((1+\gamma)^N - 1)}((1+\gamma)^N d^*_N - d_0),$$

where γ is the long-run growth rate of nominal GDP. Alternatively, the constant overall balance, b^*, that leads the actual debt ratio to asymptotically converge to the target debt ratio, d^*, as N goes to infinity (if γ is positive) can be expressed as

$$b^* = \frac{-\gamma}{(1+\gamma)} d^*.$$

F. References

Coalition Agreement (CA), 2010, "Freedom and Responsibility," People's Party for Freedom and Democracy (VVD) and the Christian Democratic Alliance (CDA), (Netherlands, September 30).

Council of the European Union, 2010, "National Fiscal Frameworks: Report on the Exchange of Best Practice," Document No. 14614/10, ECOFIN 596, UEM 280, (Brussels, October 7).

Debrun, Xavier and Manmohan S. Kumar, 2007, "The Discipline-Enhancing Role of Fiscal Institutions: Theory and Empirical Evidence," IMF Working Paper 07/171, (Washington:July).

Escolano, Julio, 2010, "A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates," Technical Notes and Manuals, Fiscal Affairs Department, Washington: International Monetary Fund.

European Commission (EC), 2007, "Public Finances in EMU," European Economy 3/2007 (Belgium).

European Council, 2011a, "Euro Summit Statement" (Brussels, 26 October).

———, 2011b, "Statement by the Euro Area Heads of State or Government" (Brussels, 9 December).

Girouard, Nathalie and Christophe Andre, 2005, "Measuring Cyclically-adjusted Budget Balances for OECD Countries," OECD Economics Department Working Paper 434, Paris: Organization for Economic Co-Operation and Development.

International Monetary Fund (IMF), 2009, "Fiscal Rules—Anchoring Expectations for Sustainable Public Finances", IMF Staff Paper (Washington, December).

———, 2010, "United Kingdom: Selected Issues Paper", IMF Country Report 10/337 (Washington, November).

———, 2011a, "Sweden: 2011 Article IV Consultation—Staff Report," IMF Country Report 11/171 (Washington, July).

———, 2011b, "Regional Economic Outlook: Europe. Navigating Stormy Waters," (Washington, October).

Ministry of Finance, Finland (MoF), 2010, "Finland's Public Finances at a Crossroads. Approach to fiscal policy in the 2010s," Economic outlook and economic policy 8b/2010 (Finland, February).

———, 2011, "Developing the Spending Limits System," Budget issues 17b/2011 (Finland, May).

———, 2012, "Economic Survey," Economic outlook and economic policy 18b/2012 (Finland, April).

Organization for Economic Co-Operation and Development (OECD), 2010, "OECD Economic Surveys: Finland," Volume 2010/4, Paris: Organization for Economic Co-Operation and Development.

Prime Minister's Office, Finland, 2011, "Programme of the Finnish Government," (Finland, June 22).

Appendix 7.1. Assumptions Underlying the Fiscal Rule Simulations

Baseline parameters

The structural balance target for each of the four countries is set to lower the 2002 level of general government debt by 20 percentage points of GDP in $N = 10$ years. In turn, this leads to budget targets that are similar to recently announced policies. The long-run nominal GDP growth rate is computed as the sum of the average annual real GDP growth during 1970–2002 and an assumed long-run inflation rate of 2 percent. Specifically, we assume the targets for the general government balances are as follows:

<u>Finland:</u> The 2002 general government gross debt was $D_0 = 41.5$ percent of GDP. Following the methodology in Box 7.3, the constant headline balance that can lower this level by 20 percentage points of GDP in 10 years yields $b^* = 0.5$ percent of GDP. For comparison, if the Government Program target of a 1 percent of GDP deficit in central government was to be reached in 2015, IMF staff projects a corresponding general government budget balance of about 1 percent of GDP.

<u>Netherlands:</u> $D_0 = 50.5$ percent of GDP. $b^* = 0.2$ percent of GDP. For comparison, the 2010 Coalition Agreement states the government will seek the prospect of a balanced budget by 2015 and, thus, comfortably comply with the Stability and Growth Pact (CA, 2010).

<u>Sweden:</u> $D_0 = 52.5$ percent of GDP. $b^* = 0.3$ percent of GDP. For comparison, the fiscal framework includes a general government surplus target of 1 percent of GDP.

<u>Germany:</u> $D_0 = 60.7$ percent of GDP. $b^* = -0.1$ percent of GDP. For comparison, the central government structural deficit must not exceed 0.35 percent of GDP by 2016, while the states must not run a structural deficit by 2020.

Growth shock

The baseline growth rate in time *t-1* is set equal to the actual rate in 2010 and kept constant thereafter. In the shock scenario, the shock happens at time *t+1* when real GDP growth drops by four standard deviations (computed based on growth during 1996–2008) and the rules are implemented. The output gap is then set to close over time.

	t-1	t	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9
Growth assumptions											
Baseline	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Shock	3.7	3.7	-3.1	2.0	7.0	5.8	5.5	5.0	4.0	3.9	3.7
Output gap assumptions											
Baseline	0	0	0	0	0	0	0	0	0	0	0
Shock	0	0	-6.5	-8.1	-5.2	-3.3	-1.7	-0.5	-0.2	0	0

The parameters are set at the baseline values above and the constant potential growth rate, g^*, is put at the 2010 growth rate. The output gap is assumed to be closed at *t-1*. Each rule is applied from *t+1* and onward.

Figure 7.1. General Government and Subsectors, 1995–2011

Consolidated expenditure and revenue
(Billion euros)

Expenditure - Central government
Expenditure - Local government
Expenditure - Social security funds
Expenditure - General government (RHS)
Reveneue - General government (RHS)

Consolidated expenditure and revenue growth
(Nominal, percent change)

Expenditure - Central government
Expenditure - Local government
Expenditure - Social security funds
Expenditure - General government
Revenue - General government

Local government consolidated expenditure
(Real terms, 2000 = 100)

General public services
Health
Education
Social protection
Other

Fiscal balances
(Percent of GDP)

Central government
Local government
Employment pension funds
Other social security funds
General government

Sources: Finnish Ministry of Finance, Statistics Finland, World Economic Outlook, and Fund staff calculations.

Figure 7.2. General Government Real Expenditure and Revenue, 1995–2011
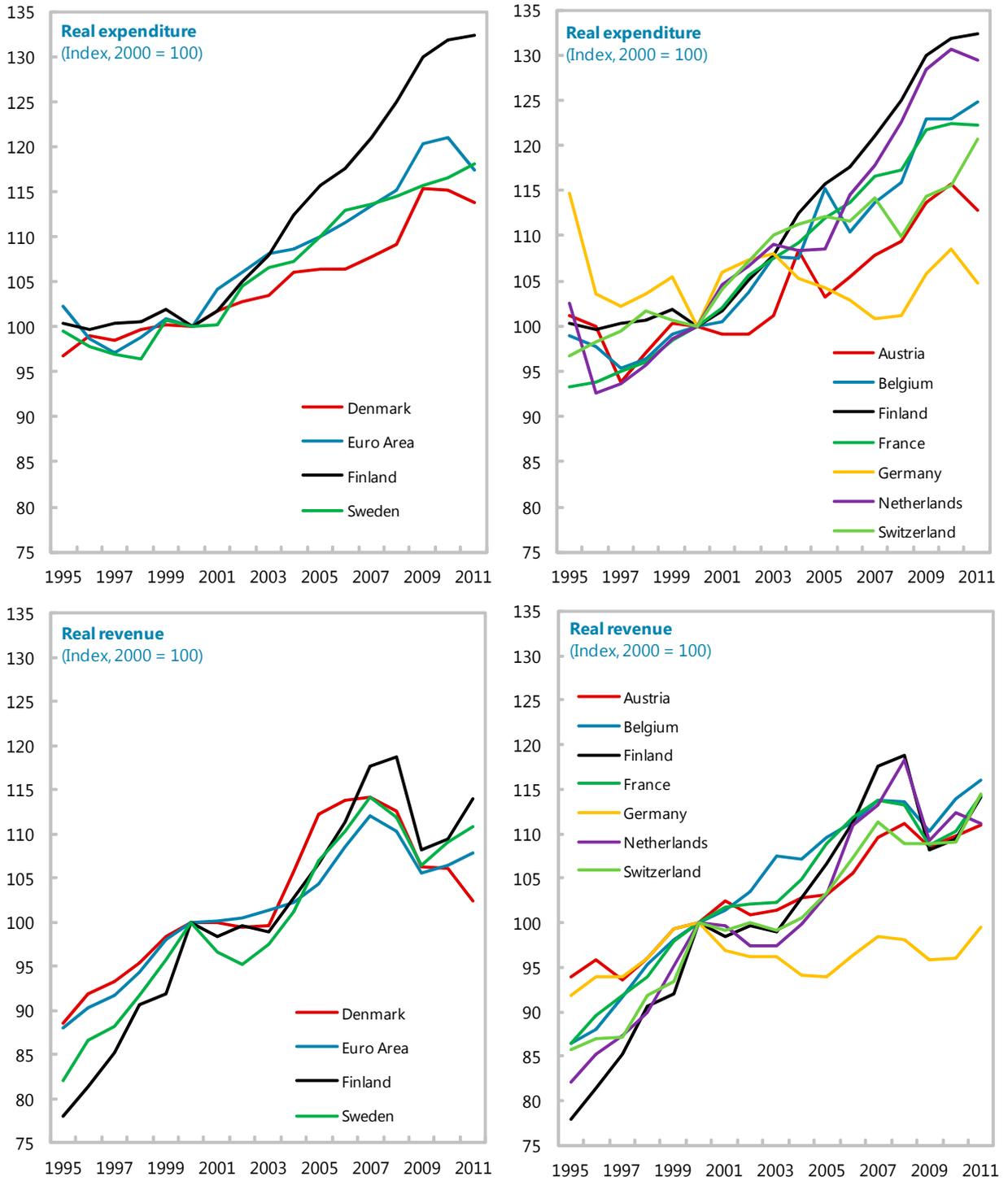
Sources: World Economic Outlook and Fund staff calculations.

**Figure 7.3. The Impact of Fiscal Rules, 2002–11**
(General government balance, percent of GDP)
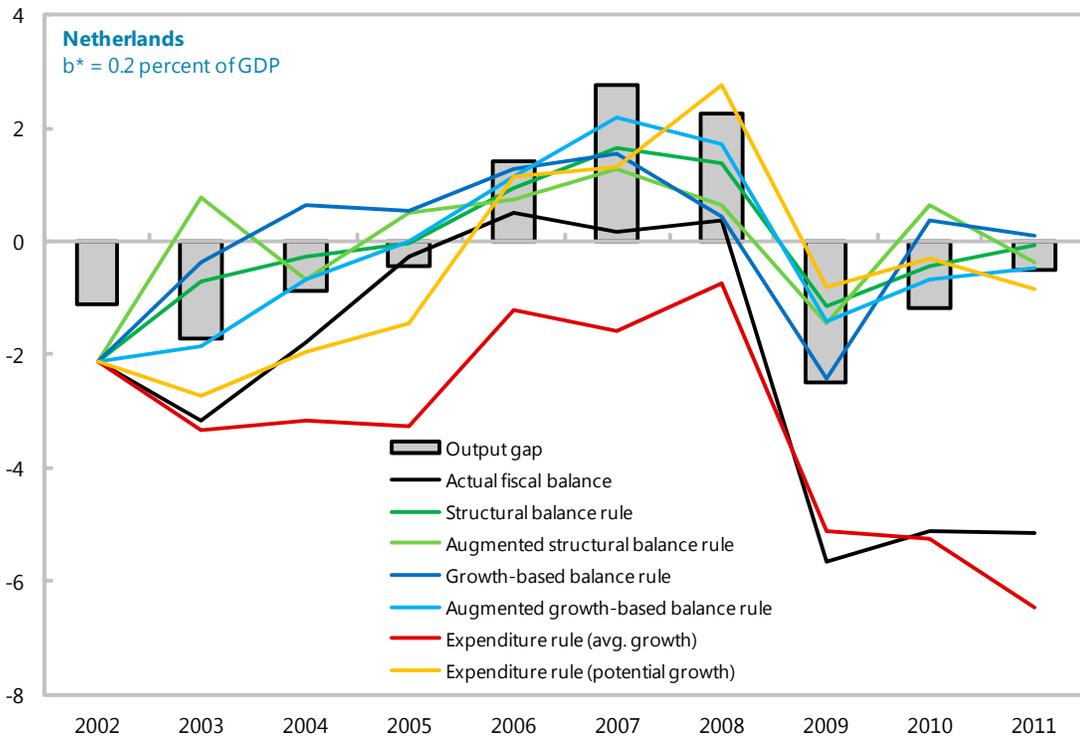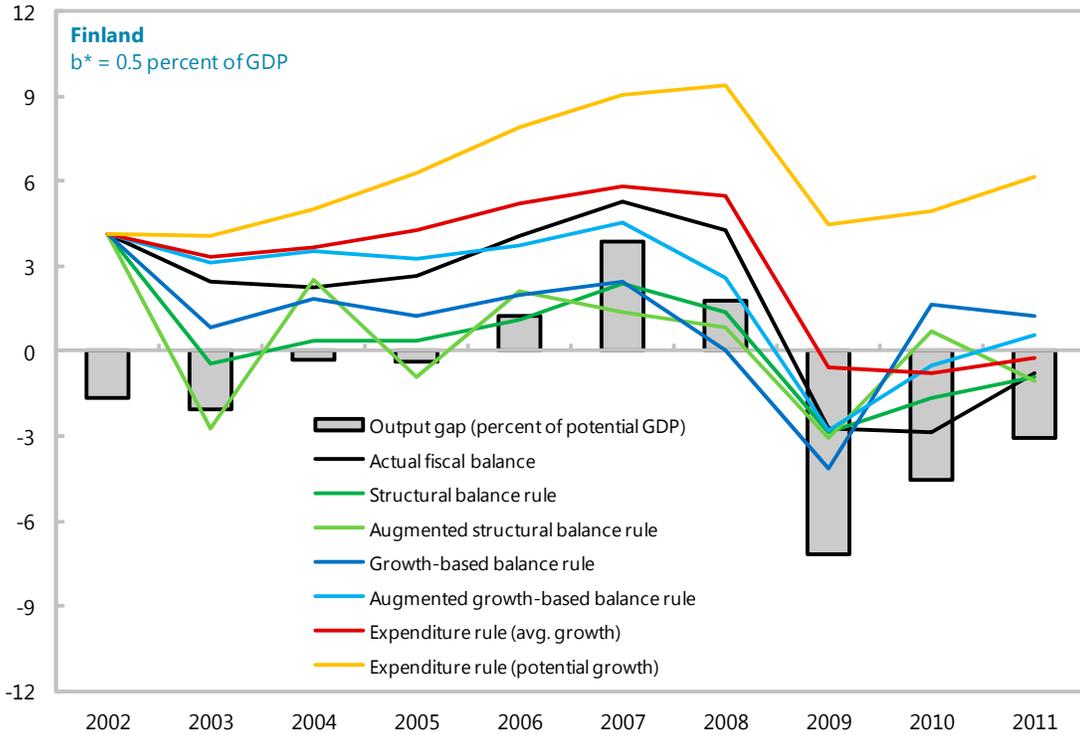
Sources: World Economic Outlook and Fund staff calculations.

Figure 7.3. The Impact of Fiscal Rules, 2002–11 (concluded)
(General government balance, percent of GDP)
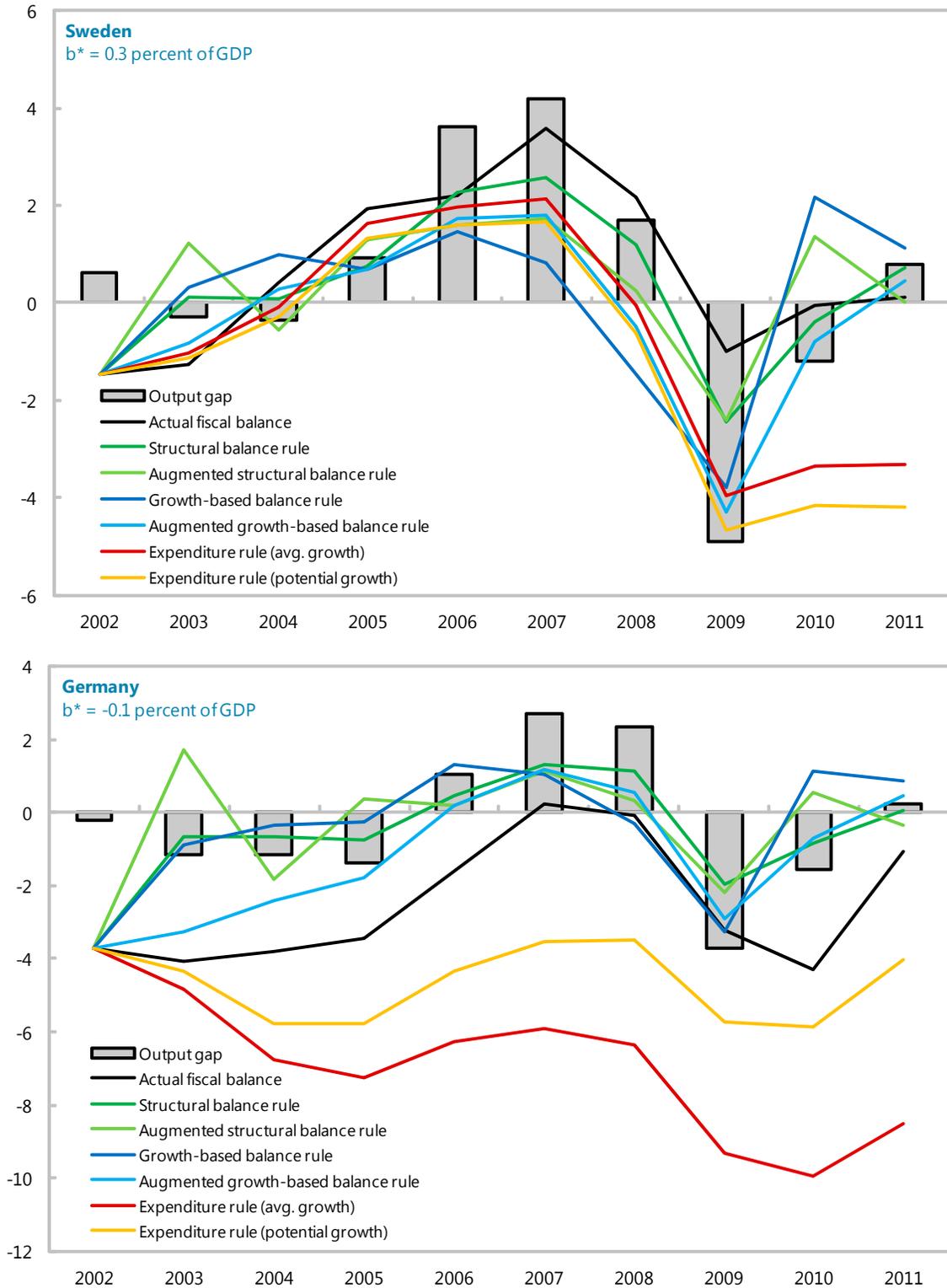
Sources: World Economic Outlook and Fund staff calculations.

Figure 7.4. Finland: Sensitivity Analysis. Budget Target, 2002–11
(General government actual and hypothetical balances, percent of GDP)
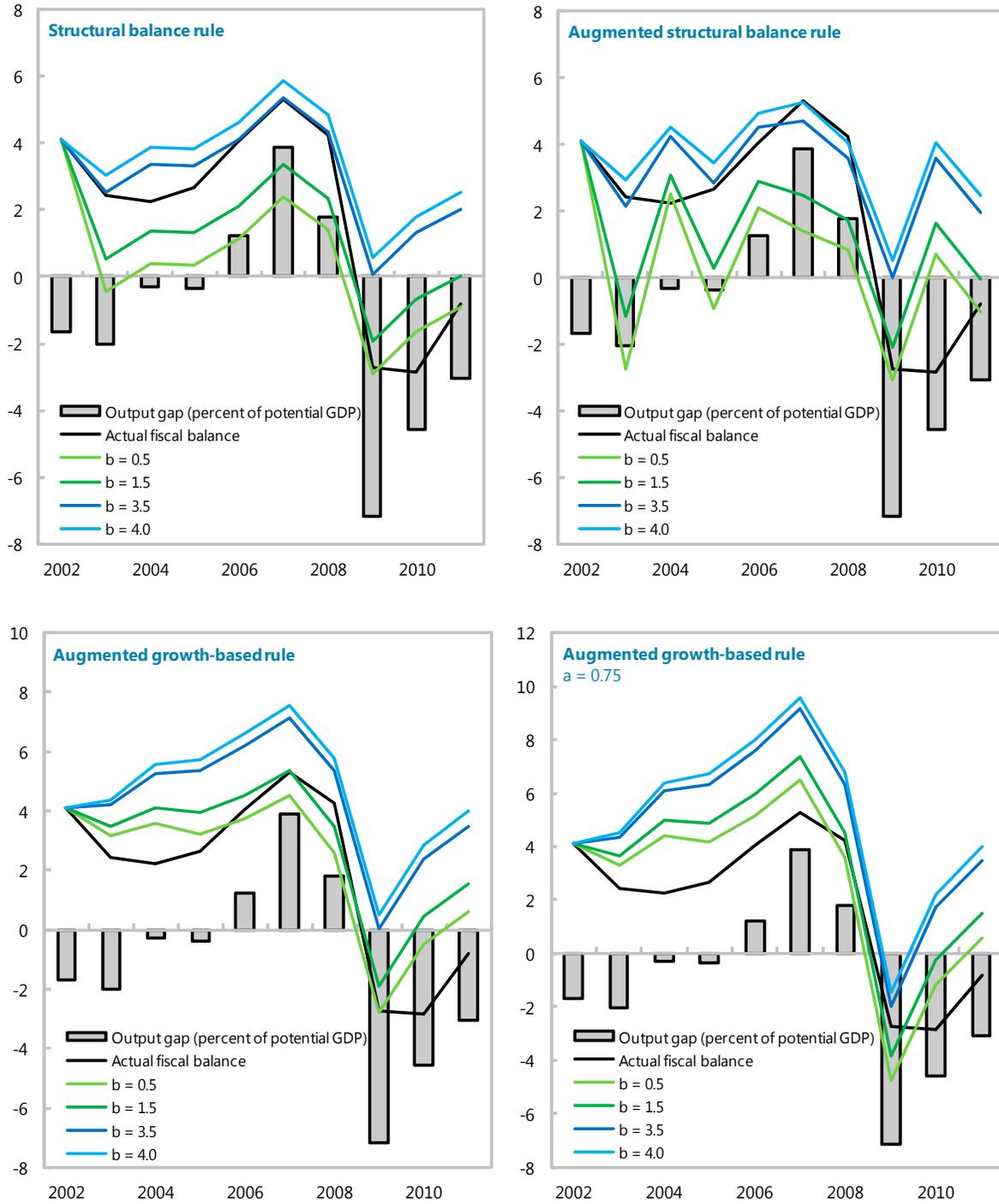
Sources: World Economic Outlook and Fund staff calculations. See the appendix for detailed assumptions.

Figure 7.5. Finland: Sensitivity Analysis. Cyclicality, 2002–11
(General government actual and hypothetical balances, percent of GDP)

Sources: World Economic Outlook and Fund staff calculations. See the appendix for detailed assumptions.