

Finland's public sector balance sheet

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ABSTRACT

We construct comprehensive public sector balance sheets for Finland for 2000–2016 by complementing general government statistics with data on public corporations and pensions. These static balance sheets show that Finland's public sector net worth at end 2016 was –160 percent of GDP, after having registered considerable fluctuations previously, including due to asset holdings' sensitivity to equity valuations. We then expand the analysis to an intertemporal balance sheet by adding present value estimates of future fiscal flows. This allows performing fiscal stress tests and policy experiments. These suggest that Finland's public finances will remain sound if ongoing reform efforts to address aging pressures yield their expected savings. Under this assumption, intertemporal financial net worth (IFNW) of the public sector would exceed 50 percent of GDP – well within the 30–85 percent of GDP range derived in stress tests as the needed buffer to maintain positive IFNW in light of a severe shock.

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1. A Comprehensive View of Public Finances

Public sector balance sheets (PSBS) provide the most comprehensive view of public wealth, yet they are little understood, poorly measured, and only partly managed. Standard fiscal analysis focuses on flows – revenues, expenditures, and deficits – with assessment of stocks largely limited to gross debt. The focus on debt misses large swaths of government activity and can fall victim to illusory fiscal practices. (IMF Fiscal Monitor, October 2018, p. 1)

Most fiscal sustainability analyses focus on gross general government debt. However, broader concepts of government *net worth* have been found to be superior to gross debt: Governments with higher net worth face lower borrowing costs and experience more favourable macroeconomic outcomes in their country.¹

The information supplied by balance sheet measures is also more relevant for policy decisions. The reasons are that the balance sheet approach incorporates assets, on the one hand, and a more comprehensive view of liabilities on the other, by accounting for future pension liabilities. The balance sheet approach can also reveal mismatches between assets and liabilities and thereby improve the identification and management

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of risk. Finally, fiscal stress tests based on a balance sheet can be more comprehensive and give a better view of the resilience of public finances in response to adverse shocks.

Two examples illustrate how the incorporation of assets has favourable effects. First, it allows for better evaluation of public investment decisions. While, *ceteris paribus*, higher investment would impact public debt negatively, it could positively affect net worth. This is because investments both add to the public asset stock and may strengthen future revenues. Second, the balance sheet allows to distinguish between structural and non-structural debt reduction measures. Non-structural measures reduce debt via decumulation of assets (e.g. privatization, running down assets). Structural measures in contrast increase net worth, either by decreasing debt stocks or via the buildup of assets.² Thus, incorporating assets in debt sustainability analyses could discourage ‘creative accounting’, as experienced for instance in the run up to Euro introduction in 1999 when debt reductions were often accompanied by a decumulation of assets (Milesi-Ferretti & Moriyama, 2006).³

The explicit consideration of assets in the analysis largely eliminates creative accounting possibilities resulting from interactions of the assets and liabilities sides of the balance sheet. However, it is important to recognize that other creative accounting possibilities may remain, chiefly those related to valuation of individual liability positions and – under the balance sheet approach – also of individual asset positions. This highlights the importance of a transparent and sound valuation methodology, which in the case of Finland is fortunately in place.⁴

In addition to the inclusion of assets, a more comprehensive accounting of liabilities is equally important. Including also the accounts of financial and non-financial public corporations may reveal additional net assets or unveil a shifting of deficits or debt to public corporations – and thereby outside the realm of standard debt sustainability analyses. Secondly, the balance sheet incorporates obligations related to public and private sector employees’ pensions, which can be large, especially for rapidly-aging developed countries, and should therefore indeed be a core part of the analysis.

While the idea of constructing public sector balance sheets is not recent,⁵ their availability remains scarce. The reason is that ‘the case in favour of developing and using balance sheet information primarily rests on the rigour and precision of the information presented,’ as Warren (2013) points out in his survey – and that data reporting is still largely insufficient. Earlier efforts, including Buiter (1983), Allen, Rosenberg, Keller, Setser, and Roubini (2002), and Traa and Carare (2007) were therefore hampered by data limitations. The advocacy of the IMF’s, 2001 Government Finance Statistics Manual in favour of accrual information and balance sheets had a positive effect. However, only a small number of advanced countries have sufficiently developed their public accounting system to be able to produce balance sheets for the entire public sector; they include Australia, Canada, New Zealand, Sweden, and the UK. To help fill the gap, IMF (2018) provides balance sheet estimates for a broader set of 31 countries, but comprehensiveness and data quality vary.

This paper’s objective is to add Finland to the list of countries with comprehensive public sector balance sheets, given its remarkable data availability for almost all required balance sheet components, and to assess based thereon the country’s fiscal sustainability. We first construct static balance sheets for Finland’s public sector for 2000–2016. This allows us to analyse changes in public sector static net worth during the time of the global financial crisis and the following decade-long economic stagnation in the country as well as the impact of mismatches between assets and liabilities. To assess

the future sustainability of public finances, we expand, in a second step, the analysis towards an intertemporal balance sheet. This includes, in addition to the readily-observed assets and liabilities of today captured by the static balance sheet, the net present values of all future revenues and expenditures. The intertemporal balance sheet allows us to perform various stress tests to assess the sustainability of public finances in the long run. This type of analysis is quite novel, even when compared to the countries for which public sector balance sheets do exist. The stress tests allow us to derive the suggested size of a prudent buffer that Finland would need to withstand a severe shock.

Our results suggest that Finland's fiscal position is solid but stress the importance of continuing reforms and using opportunities for the early rebuilding of buffers.⁶ Static public sector net worth for Finland is negative at some –160 percent of GDP. The intertemporal balance sheet shows that Finland's future fiscal balances are sufficiently strong to compensate for this, but only if reform implementation continues as planned. Especially the health and social services reform will be important to address future spending pressures from population aging. If it yields the envisaged long-run savings of 1½ percent of GDP annually, intertemporal financial net worth (IFNW) would exceed 50 percent of GDP and therefore be well within the 30–85 percent prudent buffer range suggested by stress tests.

In light of numerous risks – macroeconomic, but also related to the savings potential of the health and social services reform itself – policymakers would be well advised to use any other opportunities, especially economic upswings, to make early headway in rebuilding buffers. Using these opportunities would be prudent also because the intertemporal balance sheet necessarily involves many assumptions (e.g. in constructing the future fiscal path) in order to provide the most comprehensive view on public finances. It is therefore subject to considerable uncertainty, unlike the static balance sheet.

The paper proceeds as follows. Section 2 briefly presents the data collected as well as the composition and evolution of Finland's public sector balance sheet. Section 3 covers the construction of the intertemporal public sector balance sheets that include projections of future revenues and expenditures. Section 4 examines the robustness of Finnish public finances to a large shock and, based thereon, derives the size of a prudent buffer needed to withstand a large shock with positive IFNW. Section 5 concludes.

2. Finland's Static Public Sector Balance Sheets for 2000–2016

2.1. Data

Constructing a public sector balance sheet is data intensive. Even for an advanced country like Finland with very good data reporting, it required gathering and consolidating data from various sources, including Bank of Finland (*various years*), Finnish Centre for Pensions (*various years*), Finnish Ministry of Finance (2015, 2016, 2017a, 2017b), Finnish Prime Minister's Office (*various years*), and IMF (2017). In addition, we relied on extensive assistance from the Finnish authorities. While data on general government accounts, including non-financial assets, were readily available from Statistics Finland, data on public corporations had to be gathered from individual corporations' balance sheets going back to 2000.⁷ While the data cover over 90 percent of the assets of nonfinancial public corporations owned by the central government, local government-owned corporations could not be

covered due to data constraints. Estimates of pension liabilities were taken from the ETK Finnish Centre for Pension and extended forward and backwards.

The working paper version of this paper discusses the underlying data more extensively (Brede & Henn, 2018, Annex I).

2.2. Finland's Static Public Sector Balance Sheet

Figure 1 and Table 1 present the public sector balance sheet for Finland at end 2016, showing a static net worth of –160 percent of GDP. Assets, as well as the incorporation of public corporations, and pension liabilities play a large role in determining public sector net worth in Finland, as they are quite sizable. Therefore, both gross and net debt measures are quite deceptive as measures of fiscal sustainability.

Gross debt at end 2016 may be seen to paint a more positive picture, registering at 75 percent of GDP at end 2016. Maastricht debt, which features a narrower definition, was lower at 63 percent of GDP.⁸

The picture painted by net debt is even more positive. It was –53 percent of GDP at end 2016, i.e. there was a positive net asset position. This results from large stocks of financial assets – given that pension funds are considered part of general government – being included in net debt, while associated pension liabilities (301 percent of GDP) are not included. General government net debt measures also neglect the government's non-financial assets (75 percent of GDP) and the state-owned enterprise (SOE) sector (net worth of 10 percent of GDP).

We now briefly discuss the elements of the Finland's balance sheet in some more detail.⁹

Non-financial assets stood at 75 percent of GDP at end 2016. The value of general government non-financial assets divides quite evenly into three parts (Brede & Henn, 2018): (i) buildings, including schools, hospitals, prisons, agencies; (ii) other structures, including roads, rail, power lines, sewage; (iii) other real assets, including chiefly land, but also machinery and intellectual property.

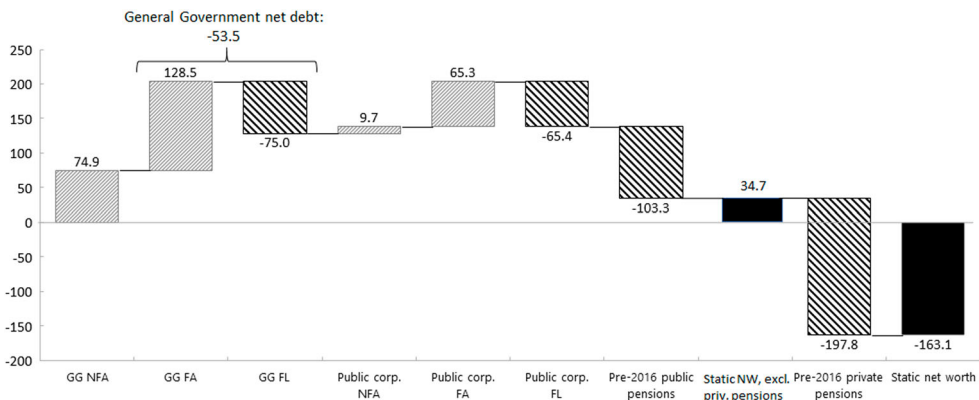


Figure 1. Static Public Sector Net Worth, 2016 (Percent of GDP). Sources: Finnish Authorities and IMF Staff calculations.

Notes: GG = General Government; NFA = Non-financial Assets; FA = Financial Assets; FL = Financial Liabilities.

Table 1. Finland: Public Sector Balance Sheet, Dec 31, 2016 (Percent of GDP).

	General Government					Public Corporations				Public Sector
	Central Government	Social Security Funds	Local Government	Consolidation	Total	Non-financial	Financial	Central Bank	Consolidation ^a	Total
Assets	52.8	90.9	62.3	-2.8	203.4	17.9	20.2	36.9	-23.3	255.1
Nonfinancial	24.4	0.7	49.8	0.0	74.9	9.6	0.0	0.1	0.0	84.6
Financial	28.3	90.0	12.4	-2.8	127.9	8.3	20.2	36.9	-23.3	170.5
Liabilities	59.7	304.9	14.3	-2.8	376.1	11.9	19.8	33.7	-23.3	418.2
Financial ^b	59.7	3.8	14.3	-2.8	75.0	11.9	19.8	33.7	-23.3	117.1
Pension liabilities ^c		301.1			301.1					301.1
To public employees		103.3			103.3					103.3
To private employees		197.8			197.8					197.8
Net Worth	-6.9	-214.0	48.0		-172.7	6.0	0.4	3.2		-163.1
Net Worth, excl. all pensions liabilities	-6.9	87.1	48.0		128.4	6.0	0.4	3.2		138.0
Net Financial Worth	-31.3	-214.7	-1.8		-247.6	-3.6	0.4	3.1		-247.7

Note: Net Financial Worth (NFW) = Financial assets - Liabilities. Net Worth (NW) = Net financial worth + Nonfinancial assets.

Sources: Statistics Finland, Eurostat, Bank of Finland, Finnish Center for Pensions, Financial Statements of Corporations listed in Table 1, author's calculations.

^aThe consolidation on the public sector level is an approximation based on available information in the financial statements of the public corporations. The consolidation relates equity, loans and deposits. The consolidation of non-financial public corporations with general government accounts relates to equity held by the general government according to their shareholdings. On the financial corporations, MuniFin and Finnvera reported explicitly on the interactions with government units, in particular with loans that had to be consolidated. Information on central banks accounts interacting with general government units that have to be consolidated was obtained from Statistics Finland.

^bMaastricht debt of 63.1 percent of GDP in 2016 varies from the 75 percent financial liabilities figure as the former inter alia excludes financial derivatives and accounts payable.

^cThese refer to existing pension liabilities only, i.e. depict the present value of future pension payments relating to work performed until end 2016.

Financial assets are large (170 percent of GDP) in light of Finland's partially funded pension system. They are also skewed toward equities, because two-thirds of pension funds' total of 90 percent of GDP in financial assets are invested in equities. Central and local government together hold another 40 percent of GDP in financial assets through equity participation in firms. Public sector static net worth is thereby considerably affected by equity price fluctuations and their effect on asset valuations.

The analysis considers the six largest non-financial and three largest financial SOEs owned by the Central Government (aside from the Bank of Finland which is incorporated separately in the analysis). Individually, they all exhibit positive net worth. Public corporations contribute almost 10 percentage points of GDP to public sector wealth, two thirds of which is accounted for by non-financial SOEs. The composition of SOEs' financial assets is skewed towards loans and debt securities, driven by the financial sector SOEs.

Existing pension liabilities (301 percent of GDP) are particularly important items of the public sector balance sheet. They comprise the present value of all future pension payments related to work performed up until 2016,¹⁰ i.e. they relate to only work that has already been performed in the past. In Finland, pension schemes for both public and private sector employees are administered by the government.¹¹ Both these pension claims represent *statutory* obligations, i.e. they are imposed by law on the Finnish government.¹² This implies that payout rules could be altered through legislative action, albeit at a political cost. The 2017 pension reform ensures that pension contributions going forward will completely finance any further accrual of further pension liabilities. However, this was not the case in the past, explaining the *existing* pension liabilities figure of 301 percent of GDP.

2.3. Evolution of Finland's Public Sector Net Worth Since 2000

There are valuable insights to be gained from analysing the evolution of public sector net worth over time relative to exclusively considering public debt. Here we focus on the evolution of public sector net worth before, during, and after the global financial crisis (GFC). We decompose changes in public sector net worth into effects due to fiscal balances, investment, and valuation changes for both the general government and public corporations; changes in public pension liabilities; and a denominator effect resulting from changes in nominal GDP over time. This allows us to identify the main drivers and risk exposure of Finland's fiscal balance sheet over the past 16 years, summarized in [Figure 2](#).¹³

From 2000 to 2007, public sector net worth increased considerably from 25 to 63 percent of GDP driven by fiscal surpluses and – even more so – by net positive asset valuation changes which are not typically included in fiscal sustainability analyses. Valuation changes increased net worth by 47 percent of GDP and fiscal surpluses contributed another 25 percent of GDP. These two components far outstripped a rise in the present value of nominal public pension liabilities of 28 percentage points of GDP. Finally, new public investment exceeded depreciation, thereby also making a small positive contribution to net worth.

Detailed data, illustrated in Brede and Henn (2018), are useful to further break down changes in net worth into those caused by transactions and by valuation changes. Fiscal surpluses before 2007 found their reflection in a strengthening financial asset

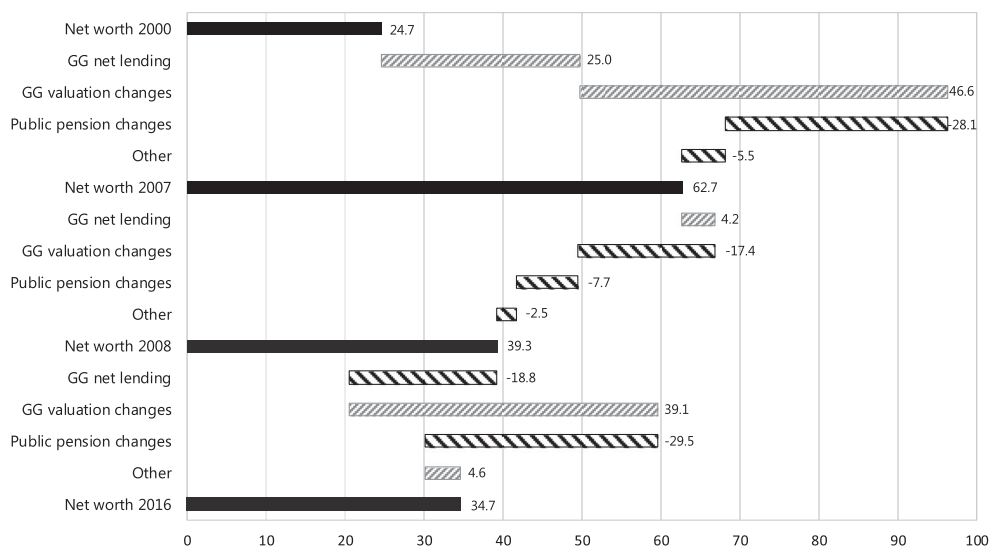


Figure 2. Evolution of Static Net Worth excl. Private Pensions, 2000–2016 (Percent of GDP). Sources: Finnish authorities and IMF Staff calculations.

Notes: GG = General Government.

position in general government, more so than through reductions in debt. Meanwhile, public corporations considerably reduced their financial liabilities. Positive valuation changes materialized in non-financial and, particularly, financial assets throughout the public sector. Within financial assets of the general government, equity shares were behind the large valuation gains as equity prices rose prior to the financial crisis. Lastly, the reductions in public sector net worth due to changes in pension liabilities were mainly driven by interest rate effects. These capture that pensions nearing their payment increase in present value. In contrast, pension flows (i.e. new pensions accrued minus pensions paid) balanced out.

During 2007–2008, the experience of the GFC illustrated that – given asset holdings – Finland’s public sector net worth tends to decline faster during crises than its debt increases. This is due to valuation losses which tend to be realized immediately, while cyclical fiscal deficits only increase debt over time. From end 2007 to end 2008, public sector net worth decreased by more than 20 percent of GDP, driven mainly by such valuation losses not covered in conventional assessments of the fiscal position. In contrast, the fiscal balance and investment throughout the public sector still remained positive in 2008. Unsurprisingly, the large negative valuation changes in general government accounts were driven by financial assets, in particular by equity shares losing value when the crisis hit. For public corporations, valuation changes in financial assets and liabilities roughly balanced out on aggregate. Again, valuation effects of pensions nearing disbursement drove the increase in public pension liabilities.

After 2008, the Finnish public sector static net worth has remained broadly stable, despite the notable increase in gross debt. Public static net worth excluding private pensions only slightly declined from 39 percent of GDP at end 2008 to 35 percent of GDP at end 2016. Despite this relative stability, a decomposition of the overall evolution of static

net worth shows the interplay of various sizable factors. First, fiscal deficits decreased net worth by 19 percent of GDP on net: Acquisition of financial assets through pension funds continued (18 percent of GDP), but new debt contraction by general government increased financial liabilities by 37 percent of GDP. Public corporations kept investment and profits positive in the post-crisis years and managed to further reduce financial liabilities and to acquire financial assets. The recovery of financial markets after the financial crisis is displayed in the large positive valuation changes in the account of the general government driven by recovering equity shares. The reduction of public sector net worth due to increasing public pension liabilities is comparable to the pre-crisis period and largely due to pensions nearing their payment period.¹⁴

2.4 Risks and Hedges in Finland's Public Sector Balance Sheet

Valuation changes of financial assets tend to lead to more immediate drops in net worth in crisis situations, if public asset stocks are large as in Finland. In particular, equity shares, which are held predominantly by social security funds, are subject to large valuation changes due to their high sensitivity to financial market conditions. These variations can pose short-run risks to the balance sheet, as valuations of debt liabilities are much more stable. Over the medium to long term, however, equity portfolio valuation has contributed positively to net wealth.

But asset stocks may also stabilize net worth in the period after a large shock. If – as after the GFC – equity prices recover during the post-crisis years, such favourable valuation changes will help offset the impact of post-crisis fiscal deficits.

Mismatch risks can result from asynchronous changes in pension assets and liabilities. Public pension liabilities in nominal terms increase gradually over time, while the corresponding pension fund assets are subject to financial market fluctuations. As discussed, this risk was realized during 2008.

But a natural hedge dampens the effects of interest rate changes on public sector net worth. Low interest rates increase the present value of pension liabilities, as (i) the discount factor decreases and (ii) they coincide with low growth which increases pension liabilities relative to GDP. On the other hand, low interest rates also underpin higher equity and bond prices and thus valuations of pension funds' assets. Finland experienced this effect in post-GFC years, when asset valuations increased amid low interest rates, offsetting increases in pension liabilities.

Risks of emergence of hidden deficits in Finnish public corporations seem low, but the stock of government guarantees and implicit liabilities is large and rising. Finland's SOEs have been profitable, maintaining a solid financial position throughout the years, and are subject to regular monitoring. Finland's stock of government guarantees is the highest in the EU and risks are concentrated (e.g. in the shipbuilding sector), although provisioning and risk management seem adequate.¹⁵ Although Finland's banking sector is well capitalized, the relocation of Nordea Group's headquarters to Helsinki in late 2018 than tripled the current size of bank assets under supervision and expand implicit contingent liabilities.

The maturity structure of public debt mitigates interest rate risks. Average maturity of central government debt is 6.5 years. Annual gross financing needs remained below 12.5 percent of GDP throughout 2000–2016 and, looking forward, rollover needs do not exhibit

overly large spikes in any particular future year. Public corporations' financial assets and liabilities could be sensitive to interest rate changes, but historically they have not varied much in value.

The Finnish public sector's exposure to currency fluctuations is small. Around 98 percent of financial liabilities of the general government are issued in euros while the remainder is hedged against currency fluctuations by the Finnish State Treasury.¹⁶ From reviewing the annual financial reports of the public corporations, we can summarize that they also usually hedge their currency exposures and that maturity mismatches are minimal. Exposure to currency risk is thereby essentially limited to financial assets held by social security funds, half of which consist of foreign equity shares.

3. The Intertemporal Balance Sheet

The static sector balance sheet of Section 2 provides a quite comprehensive assessment of the current fiscal situation. However, in order to evaluate medium- to long-term fiscal positions in light of planned reforms and aging populations, an intertemporal balance sheet is needed. To obtain this, we now expand the static balance sheet to include future expenditures and revenues. The intertemporal balance sheet recognizes that the largest asset for a government is its power to raise taxes, but also that future expenditures will need to be financed. The intertemporal balance sheet is subject to considerably more uncertainty than the static balance sheet, given that assumptions need to be made on a future fiscal path and underlying macroeconomic variables. On the upside, however, this allows for simulations of different policy and stress scenarios to gauge their effects on net worth measures.

To devise a long-term fiscal path, the IMF's October 2017 World Economic Outlook (WEO) projections are extended and supplemented by estimates of aging costs. The October 2017 WEO projections for Finland cover the period through 2022. They are updated with medium-term fiscal assumptions of the 2018 budget and, for the purpose of stress testing, supplemented by asset price projections. Long-term projections (beyond 2022) rely on simple growth accounting. They assume that real GDP growth would stabilize at around 1.5 percent. This is derived based on simple growth accounting, using on Statistics Finland's population projections, which illustrate that the size of the 15–64 year-old population would hardly change; a constant labour force participation rate among the 15–64 year-old population; and labour productivity growth of 1.5 percent. Fiscal revenues are assumed to remain constant relative to GDP and the expenditure ratio is assumed to vary only in line with aging costs.¹⁷

Intertemporal financial net worth (IFNW) is our preferred indicator of long-term sustainability of current fiscal policies. Negative IFNW is an indication that fiscal policies will need to eventually be changed to fulfil the intertemporal budget constraint. It could also provoke an adverse financial market reaction, if agents' confidence in such future policy adjustment deteriorates. Compared to net worth, which has been our focus when we analysed the static balance sheet, IFNW excludes non-financial assets. This is preferable, in our view, to avoid double counting, given that most of these non-financial assets facilitate the generation of tax revenues by underpinning economic activity. While some public non-financial assets could be sold without large repercussions to economic activity (e.g. converting a public highway to a private toll

highway), most are difficult or impossible to sell (e.g. in-city roads, sewage infrastructure, land in remote areas). Selling non-financial assets, such as buildings, could be expected to negatively affect a country's institutional framework and lower future tax values (e.g. if it results in worse education via less schools or less rule of law via less courthouses). If buildings were sold and leased back, future expenditures would increase offsetting the initial sales income.

For the medium-term, there are three main assumptions on future fiscal paths: (1) a baseline, (2) a 2018 budget scenario with somewhat slower immediate fiscal consolidation, and (3) a scenario in which all ongoing consolidation efforts would be abandoned. For each of the first two, we add an additional variant (1b and 2b) in which planned health and social services reform is fully implemented as envisaged by the Finnish authorities. This leaves us with the following five scenarios:

(1) *Baseline (Fiscal Position near balance by 2020)*. The baseline scenario is based on the 2017 October WEO projections. It includes fiscal projections which assume that Finland will achieve its medium-term objective of a structural fiscal deficit of 0.5 percent of GDP by 2020.

(1b) *Baseline (Fiscal Position near balance by 2020) with health and social services reform*. Additional to the baseline, this scenario includes an improved fiscal path between 2023 and 2030 assuming a gradual realization of savings of 1.5 percent of GDP through the health and social services reform.

(2) *Moderated consolidation (2018 budget)*. The 2018 budget proposal's medium-term fiscal framework includes a more modest fiscal consolidation at a slower pace than that envisaged under the baseline. By the early 2020s, the overall fiscal deficit would be around 1 percent of GDP,¹⁸ or 0.5–0.75 percent of GDP higher than under the baseline.¹⁹

(2b) *Moderated consolidation (2018 budget) with health and social services reform*. This scenario combines scenario 2 with the health and social services reform savings over the longer term.

(3) *Abandoned consolidation*. This scenario assumes that the ongoing expenditure-based fiscal consolidation was abandoned. The overall fiscal deficit is assumed to stand at 1.75 percent of GDP throughout 2022, after which it changes only in line with age-related spending. This scenario also assumes that the health and social services reform would *not* be implemented.

Under all scenarios, IFNW exceeds static net worth as shown in [Figure 3](#). Therefore, Finland's future fiscal path is a source of strength and serves to offset its negative static net worth of –160 percent of GDP. In three of the five scenarios, IFNW is positive. It is highest under the most ambitious fiscal consolidation scenario, which is the baseline including the health and social services reform. Under the baseline without the health and social services reform, it remains still positive, but barely so. Under the more moderate medium-term consolidation, the health and social services reform is needed to achieve positive IFNW. A successful implementation of this reform would boost IFNW by some 65 percent of GDP. These figures highlight the favourable fiscal position of Finland during normal times and suggest a relatively large buffer if reform efforts are not abandoned. It remains to analyse whether these buffers would be sufficient to withstand another crisis similar to those experienced by Finland in the past.

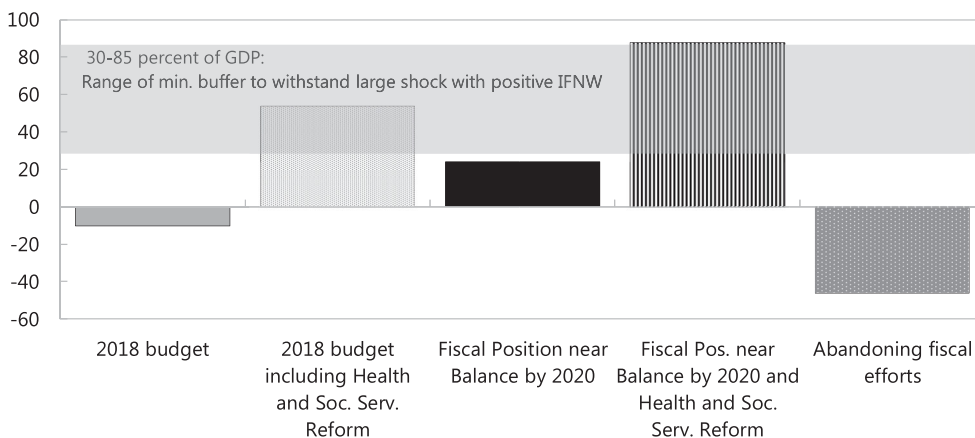


Figure 3. Intertemporal Financial Net Worth Under Various Scenarios (in percent of 2016 GDP). Source: IMF Staff estimates.

4. Stress-Testing the Balance Sheet

Stress tests can answer the question of how much a severe shock would decrease IFNW. They thereby provide an important yardstick for the required size of a fiscal buffer needed to withstand such a shock with positive IFNW. This section calibrates such a stress test for Finland and concludes that a buffer in the range of 30–85 percent of GDP would be needed.²⁰

For the stress scenario, we calibrate a severe shock by taking an average of the three most recent crises Finland experienced. These are the early 1990s Nordic Banking crisis, the Global Financial Crisis of 2008–2009 and the second dip of the ensuing double dip recession (in 2012–2014). Our severe shock therefore assumes that GDP would fall by 5.8 percent in 2018 and by 1 percent in 2019. Relative to the baseline, GDP would be 10 percent lower in 2019. The stress test also assumes that, in 2018, equity prices would fall by 40 percent and housing prices by 15 percent. On top of this macro-fiscal shock, we assume that three types of contingent liability realizations could occur. In order of increasing severity, they are: (i) some explicit contingent liabilities, such as government guarantees, could be called; (ii) in addition, limited recapitalization of banks may become necessary ('FSAP severe banking shock scenario');²¹ (iii) and an extreme scenario assumes that full recapitalization of the domestic banks OP and Municipality Finance would be needed.

The fiscal balance deteriorates under the stress scenario, mainly driven by higher expenditures. Figure 4 summarizes how fiscal flows are affected under the stress scenario. While falling in absolute terms, general government revenues initially increase relative to GDP, because labour compensation drops less than GDP as firms retain some labour. Revenues will, however, revert back to the baseline as the economy recovers. Expenditures increase during the crisis on account of automatic stabilizers, such as higher expenditures on unemployment benefits. Expenditures also remain above the baseline in the long term, because (i) GDP in levels suffers a permanent loss as is typical as a result of crises (e.g. as human capital of the unemployed depreciates) and (ii) some expenditure growth is independent of GDP (e.g. health care expenditures, which are mainly driven by aging, remain the same in nominal terms). Therefore, absent additional post-crisis fiscal consolidation efforts, fiscal deficits would remain above the baseline.

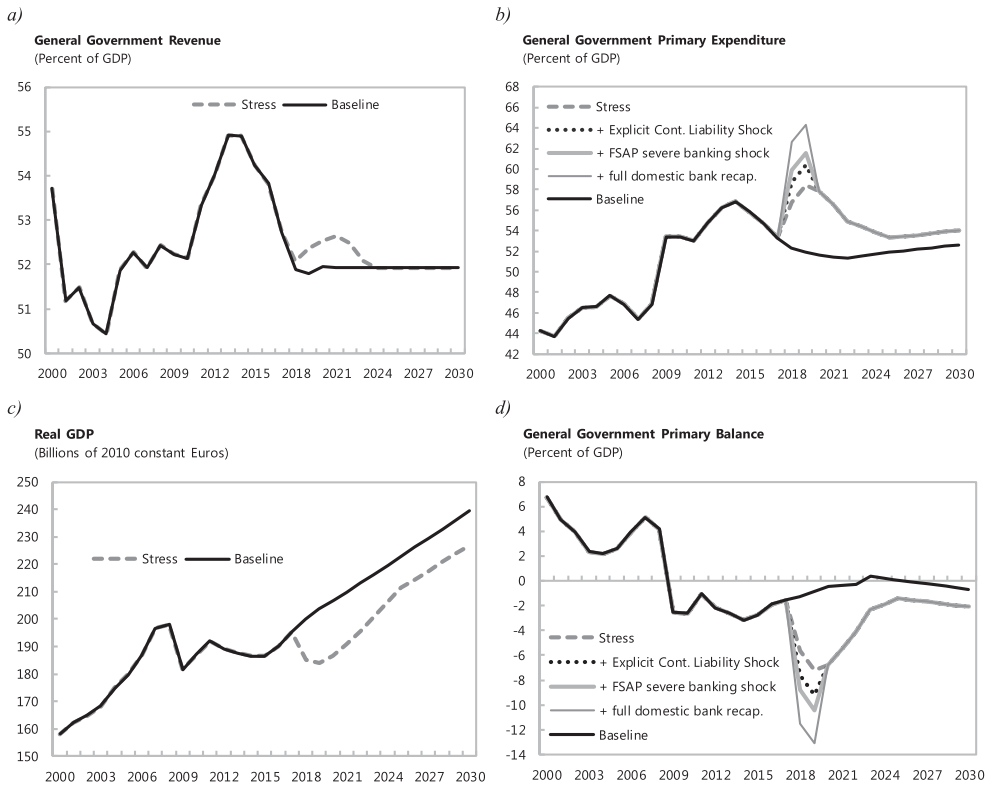


Figure 4. Fiscal Flows Under the Baseline and Stress Scenarios.

The decline in net worth is more sudden and pronounced than the debt dynamics. **Figure 5** summarizes how fiscal stock variables are affected in the stress scenario. The peak decline of net worth is reached in 2019 and amounts to 45 percent of GDP. In comparison, gross debt – often the focus of sustainability analyses – stands ‘only’ 20 percent above baseline in 2019. But it continues to rise through 2022, opening a 30 percent of GDP differential, as fiscal deficits remain elevated for some time after the shock.

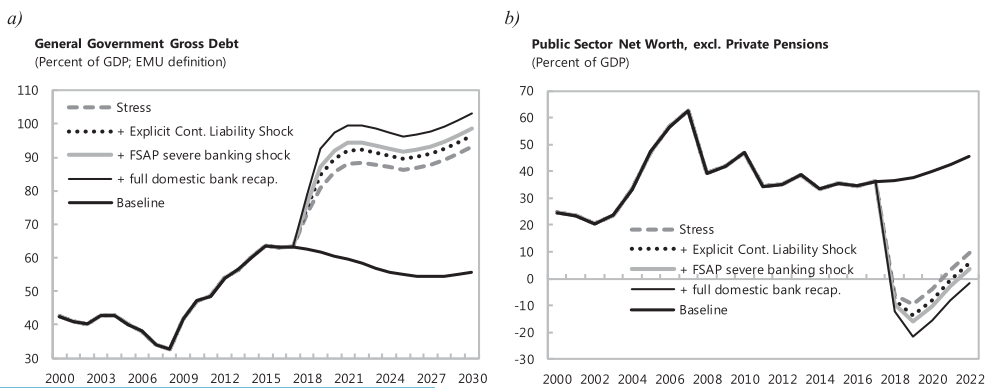


Figure 5. Fiscal Stocks Under the Baseline and Stress Scenarios

The difference is explained by net worth accounting for impacts of asset prices and through pension liabilities. Adverse asset price fluctuations decrease public sector net worth by 26 percent of GDP by 2019 and pension liabilities increase by a similar amount relative to GDP. These effects are usually ignored when assessing the fiscal position, as a balance sheet approach is required to capture them. This illustrates that government finances in Finland are hit hard in the short-run through the asset portfolio. In the medium- to long-run though, when debt dynamics take over, the recovery would be supported if asset values recover, as assumed here. However, even if asset prices recover quickly, it is important to note that large valuation losses might pose constraints on the fiscal position in the short-run.²² Existing pension liabilities increase relative to GDP due to the decrease in GDP. Finally, a realization of contingent liabilities could reduce public sector net worth further; our most adverse scenario would suggest by another 12 percent of GDP.

IFNW deteriorates more than static net worth under the stress scenario. In the stress scenario, 2019 IFNW is -80 percent of GDP relative to 27 percent of GDP under the baseline (see Figure 6). This 107 percent of GDP deterioration is considerably larger than the 45 percent of GDP decline in static net worth. This difference results from expenditures remaining higher than in the baseline ad infinitum (for reasons explained above). One option therefore to support IFNW would be to undertake post-crisis fiscal consolidation to offset this effect. Another option would be to realize savings already before a crisis to constitute a sufficiently high IFNW buffer to neutralize higher future fiscal deficits.

A buffer of around 85 percent of GDP would allow Finland to withstand a severe shock without the need for post-crisis fiscal adjustment. IFNW deteriorates by 107 percent at the peak but it would recover by about 25 percent of GDP until 2022 if the projected asset

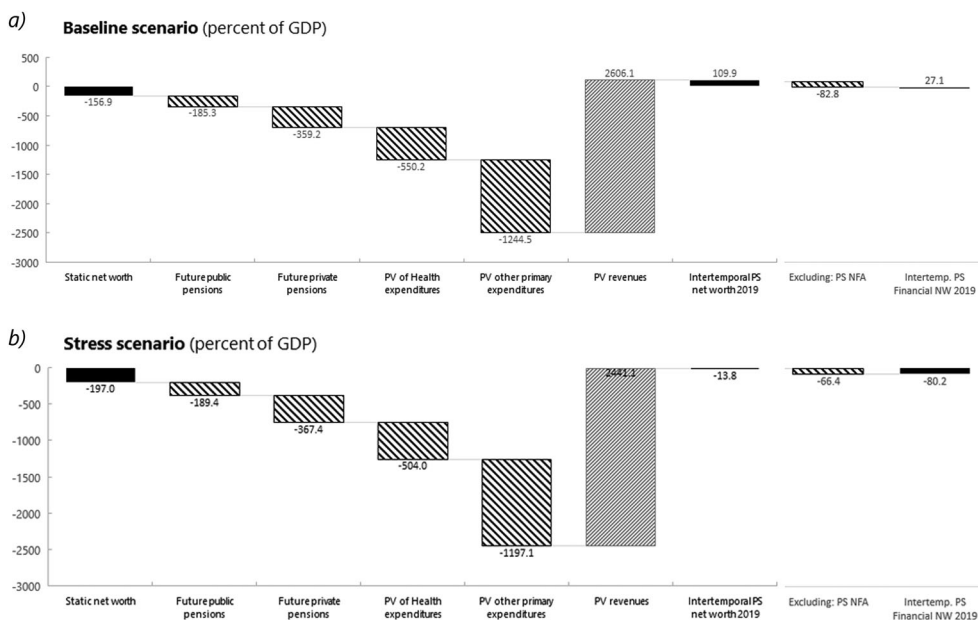


Figure 6. Intertemporal Public Sector Net Worth, 2019.

price recovery materializes in the aftermath of the crisis. Thus, a buffer of 85 percent of GDP would likely be sufficient to ensure a zero IFNW in the absence of post-crisis fiscal adjustments.

A buffer of approximately 30 percent of GDP would be sufficient to offset net worth deterioration of the crisis years, but this implies a need for post-crisis consolidation. Such consolidation would be needed to bring fiscal balances back in line with the baseline path after the crisis. We explore a variation of the stress scenario where fiscal consolidation is undertaken after the crisis to bring the fiscal balance back to its baseline path by 2027. We find that IFNW would decrease to around 0. This would be a drop of some 27 percent of GDP compared to the baseline. We therefore judge that a 30 percent of GDP buffer would suffice to withstand the most immediate impacts of a large adverse shock. However, sufficient fiscal effort will be required post crisis to again bring fiscal deficits back to the baseline (and cover the higher interest expenditures emanating from a larger debt stock).

The stress tests illustrate that health and social services reform is essential for Finland to build sufficient buffers to withstand a severe adverse shock with positive IFNW. Among the policy scenarios of Section 3, the only two scenarios that achieve an IFNW in the range of 30–85 percent of GDP are those including the health and social services reform (scenarios 1b and 2b). This underlines how crucial the reform is to fiscal sustainability.

5. Conclusion

The public sector balance sheet approach provides a more comprehensive tool than debt sustainability analyses. The static public sector balance sheet expands the analysis beyond debt by adding government assets, balance sheets of public corporations, and existing pension liabilities. Furthermore, the intertemporal balance sheet includes present values of all future fiscal balances, bringing together all stocks and flows in a single comprehensive framework. It provides the measure of intertemporal financial net worth (IFNW), which is equivalent to the public sector's intertemporal budget constraint. If IFNW drops considerably below zero, the risk of a loss of confidence could increase.

For Finland, the balance sheet approach provides new macroeconomic insights, given the country's substantial government assets and pension liabilities. We find that public corporations are profitable and that their balance sheets are strong. They therefore do not represent a large source of fiscal risks. Pension liabilities, on the other hand, are of paramount importance due to their size, continuing steady accumulation, and the aging profile of Finland's population. Large stocks of financial assets, accounted for mainly by social security funds, are subject to considerable valuation changes. Due to these valuation changes, in a crisis situation, net worth would fall by more than the increase in debt amplifying crisis impacts in the short-run.

For Finland, a positive intertemporal financial net worth in the range of 30–85 percent of GDP would be desirable. A buffer at the lower end of this range could absorb the immediate impact of a large shock, while maintaining positive intertemporal financial net worth. But it would require fiscal adjustments after the crisis to bring fiscal balances back onto the projected baseline. In contrast, a buffer of 85 percent of GDP would be sufficient to weather a large shock without a need for subsequent fiscal adjustment, while maintaining positive intertemporal financial net worth.

However, making early headway in building buffers would be prudent. This would be in line with a long-standing practice that has served Finland well in the past. It would also help provide insurance against risks; five such risks are worth highlighting. First, as a small open economy, economic growth in Finland is relatively volatile.²³ Second, it is uncertain how much savings the health and social services reform will ultimately yield. Economic literature suggests that demands for and relative prices of social and health services could well increase more than envisaged (Andersen et al., 2007).²⁴ Third, the size of Finland's balance sheet is quite large, with sizable pension assets counterbalancing liabilities. While this can, in certain situations, attenuate fluctuations in net worth, it does imply vulnerability to asynchronous valuation changes. Governments are well advised to abstain from immediate policy reactions in response to valuation changes, but they would need to act if they leave net worth persistently depressed. Fourth, relatively large contingent liabilities represent a risk. Fifth, the analysis presented here is inevitably subject to considerable uncertainty inherent in macroeconomic and demographic projections and relating to future interest rates.²⁵

As public sector balance sheet analysis can provide early warning signals of fiscal imbalances, it would be desirable to apply it to an ever wider set of countries. Our Finnish example shows that – if envisaged reforms are carried out as planned – the country's fiscal position is robust despite strong aging pressures. But this may not be the case for many other countries facing such pressures, in Europe and elsewhere. We find that public corporations are not a source of severe balance sheet risks in Finland, but incorporating them into the analysis in other countries, especially those with weaker institutional frameworks, may have strong sustainability implications. Given that challenges in data compilation can be insurmountable for individual researchers, it is our hope that governments find such analysis sufficiently useful to put in place reporting systems enabling the compilation of such balance sheets.

Notes

1. Net worth measures from public balance sheets have been shown to outperform debt measures in predicting long-term sovereign spreads both in advanced and emerging economies as shown in Gruber & Kamin (2012) and Hadzi-Vaskov & Ricci (2016). In addition, countries with stronger public sector balance sheets have been found to experience shallower and shorter recessions (IMF, 2018).
2. Easterly (1999) calls fiscal adjustment an illusion when the budget deficit or public debt is reduced but net worth stays virtually the same and provides various interesting anecdotes of creative accounting or 'financial engineering' from the second half of the last century.
3. Milesi-Ferretti and Moriyama (2006) find that debt reductions after the 1998–2002 period, in contrast, were accompanied by commensurate improvements in net worth in most EU countries. Several more studies provide empirical evidence for creative accounting in the EU and elsewhere. A non-exhaustive list of papers includes Milesi-Ferretti (2004), Koen and Van den Noord (2005), Von Hagen and Wolff (2006), Buti, Martins, and Turrini (2007), Bernoth and Wolff (2008), and Beetsma, Giuliadori, and Wierds (2009). Also, early empirical evidence by Easterly (1999) suggests that in various developing countries with IMF or World Bank programs government liabilities were reduced by selling government assets, leaving net worth in those countries largely unchanged.
4. It is well recognized that valuation of assets can be difficult, particularly for those assets without market prices. These are then often valued at historical costs or replacement costs

- but approaches across countries vary. For Finland, it provides comfort that data on financial and non-financial assets could be taken from Eurostat with valuation following Eurostat's well-accepted ESA2010 guidelines (Eurostat, 2013).
5. Weimar Germany published a central government balance sheet (Finanzministerium, 1933) and the League of Nations in 1938 released a questionnaire on government balance sheets (League of Nations, 1938).
 6. In comparison to existing work, for instance in IMF (2006a, 2006b, 2008, 2009), and to countries that already produce such balance sheets routinely (e.g., Australia, New Zealand), Finland's net worth appears quite satisfactory.
 7. Public corporations are those over which the state exerts direct control, either through a majority equity stake or other means. Note that public sector equity holdings in companies in which the state does not exert control do not comprise public corporations. These equity holdings are instead recorded as financial assets of the general government.
 8. The difference arises due to two reasons. First, Maastricht debt excludes accounts payable and financial derivatives (6.4 percent of GDP at end 2016). Second, debt under the Maastricht definition is evaluated at nominal value instead of market value.
 9. See Brede and Henn (2018) for more detail and figures.
 10. A real discount rate is applied to compute this present value from the series of future projected pension payment streams. This real discount rate has been revised down gradually from 4 percent in 2007 by the ETK Finnish Centre for Pensions on whose figures we rely. This explains some of the increase in the present value of pension liabilities since then. For the 2016 estimates, a real interest rate of 3 percent is employed up to 2026 and 3.5 percent from 2027 forward, based on calculations by the ETK Finnish Centre for Pensions.
 11. The Finnish government receives pension contributions also from private sector employees, administers the corresponding pension funds, and is responsible for payouts.
 12. To be exact, pension claims accumulated by public sector employees before 1993 represent *contractual* obligations for the government.
 13. Appendix Table A1 provides numeric details for Finland's public sector balance sheets for all years of our analysis. For a more detailed breakdown of the changes in public sector net worth see Brede & Henn (2018).
 14. The revision in pension liability estimates in this period also includes a change in the discount factor from 4 percent to 3.5 percent between 2009 and 2010, a revision between 2014 and 2015 due to inclusion of the effects of the 2017 pension reform, and at the same time a further reduction of the discount factor to 3 percent for the 2017–2026 period.
 15. See Brede and Henn (2018) for further details on Finnish government guarantees.
 16. For further information, see the Finnish State Treasury's website: http://www.treasuryfinland.fi/en-US/Funding_and_cash_management.
 17. See Brede and Henn (2018) for further details on the construction of the projected series.
 18. Finland's interest expenditure was 1.1 percent of GDP in 2016 and is projected to decrease to 0.8–0.9 percent by the early 2020s.
 19. Note that Finland has considerably outperformed its fiscal projections in the recent past and, with economic growth continuing to be strong, it is relatively likely that the baseline may be achieved despite the less ambitious targets set forth in the 2018 budget.
 20. For a detailed description of the construction of the stress scenario please refer to Brede and Henn (2018).
 21. Taken from the IMF, 2016 Financial System Stability Assessment for Finland.
 22. For instance, in order to avoid liquidation of assets at low prices, the central government may want to assume a larger share of pension payouts, relative to those paid from the pension funds.
 23. Since 2000, real GDP volatility in Finland exceeded this of the other similar-sized Nordic economies largely due to idiosyncratic one-off factors, including the restructurings of Nokia and the paper pulp industry, as well as the recession in and sanctions against neighboring Russia. Therefore, real private consumption volatility is possibly a better measure at the moment; Finland's consumption volatility has been in line with Nordics but considerably higher than that of larger euro area economies (Brede & Henn, 2018, p. 22).

24. Wagner's law suggests that demand for some welfare services tends to increase faster than income and Baumol's law suggests that productivity in production of welfare services tends to increase at a lower rate than in production of goods and other services. While demographic projections attempt to account for these effects, they may prove stronger.
25. The balance sheet analysis implicitly assumes that yields on assets and liabilities would move in line with each other in the future. But if interest rates on liabilities rose faster than on assets, the fiscal position would be negatively affected.

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Appendix

Table A1. Finland's Historic Public Sector Balance Sheets 2000–16 (Percent of GDP).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A (=B+D-F) Static Public Sector Net Worth	-114.6	-117.7	-125.6	-126.4	-116.5	-103.4	-94.5	-82.3	-114.3	-138.7	-133.2	-146.4	-151.6	-152.1	-166.1	-163.6	-163.1
B General Government	96.4	95.6	95.1	100.7	109.3	122.2	133.7	136.7	118.9	133.8	134.8	121.3	124.2	129.0	130.6	129.9	128.4
Assets	147.3	143.9	143.1	150.2	158.9	168.7	177.6	176.7	157.7	183.3	190.8	178.4	188.0	193.5	202.0	204.0	203.4
Nonfinancial	66.3	65.2	64.9	63.9	64.6	66.2	67.2	66.9	68.9	74.1	73.1	72.5	74.8	75.9	76.7	76.0	74.9
Financial	81.0	78.7	78.3	86.3	94.3	102.5	110.5	109.8	88.8	109.2	117.7	105.9	113.3	117.5	125.3	128.0	128.5
Liabilities	50.9	48.2	48.0	49.5	49.6	46.4	43.9	40.1	38.8	49.5	55.9	57.1	63.8	64.5	71.4	74.1	75.0
D Public Corporations and Central Bank	5.1	5.8	5.9	5.9	6.6	8.4	6.3	6.1	5.3	6.5	6.9	7.1	7.3	7.4	7.9	9.7	9.6
Assets	30.1	29.4	34.2	32.7	32.7	32.6	32.9	34.8	38.9	44.9	56.6	83.2	81.3	61.6	56.3	74.0	75.1
Nonfinancial	12.5	12.1	13.5	12.4	12.1	10.9	11.0	10.3	10.9	12.6	13.5	13.3	13.7	12.7	10.5	9.0	9.7
Financial	17.6	17.3	20.7	20.2	20.6	21.7	21.9	24.5	28.0	32.3	43.2	69.9	67.6	48.9	45.8	65.1	65.3
Liabilities	25.0	23.6	28.3	26.8	26.1	24.1	26.6	28.7	33.6	38.4	49.8	76.1	74.0	54.2	48.4	64.4	65.4
F Existing Pension Liabilities	216.1	219.1	226.6	233.0	232.4	234.0	234.4	225.0	238.5	279.0	274.9	274.8	283.1	288.5	304.6	303.2	301.1
Existing Public Pension Liabilities	76.8	77.9	80.6	82.9	82.6	83.2	83.4	80.0	84.8	98.3	94.7	93.9	96.4	97.7	105.1	104.1	103.3
Existing Private Pension Liabilities	139.2	141.2	146.0	150.1	149.7	150.8	151.1	145.0	153.7	180.7	180.2	180.9	186.7	190.8	199.5	199.1	197.8
G (=H-I-J-K) Intertemporal Component (under Baseline assumptions)	229.9	225.3	226.9	229.2	224.7	222.0	217.0	201.6	209.2	247.2	244.0	243.6	251.5	257.3	274.1	273.3	271.5
H PV of Revenues	2662.6	2586.3	2593.6	2613.6	2574.3	2553.9	2501.5	2378.0	2352.6	2591.1	2580.2	2521.4	2554.7	2580.8	2626.8	2649.8	2650.7
I Future Pension Liabilities	591.6	569.4	567.8	570.7	562.4	558.1	545.4	520.7	503.8	541.0	543.7	527.9	532.6	537.5	537.5	547.4	550.9
Future Public Pension Liabilities	205.5	197.5	196.6	197.3	194.2	192.3	187.6	178.9	172.6	185.7	188.4	183.4	185.0	186.8	184.5	188.0	188.8
Future Private Pension Liabilities	386.1	371.9	371.2	373.4	368.3	365.8	357.8	341.9	331.2	355.3	355.3	344.6	347.7	350.7	353.0	359.4	362.1
J PV of Health Expenditure	498.6	488.1	493.0	500.0	495.5	494.8	488.0	467.4	465.8	515.4	515.8	506.9	516.2	524.3	536.5	545.1	549.1
K PV of Non-Pension, Non-Health Primary Expenditure	1342.5	1303.5	1305.9	1313.7	1291.6	1278.9	1251.1	1188.3	1173.9	1287.5	1276.7	1243.1	1254.4	1261.8	1278.7	1284.0	1279.1
L (=A+G-C-E) Intertemporal Financial Net Worth, IFNW (under Baseline)	36.5	30.4	22.9	26.4	31.6	41.6	44.4	42.1	15.0	21.8	24.2	11.3	11.5	16.5	20.7	24.8	23.9
<i>Memorandum items:</i>																	
PV of Primary balance	10.9	3.4	-2.6	-6.8	-10.7	-15.0	-20.5	-26.4	-32.3	-35.1	-34.4	-34.7	-35.1	-34.9	-34.2	-33.7	-33.6
PV of Primary Expenditure	2633.1	2564.5	2577.3	2601.1	2565.5	2549.3	2502.3	2385.4	2365.6	2604.5	2592.6	2534.1	2567.1	2592.2	2636.6	2658.4	2658.5
Nominal GDP (Euro billions)	136.3	144.4	148.3	151.6	158.5	164.4	172.6	186.6	193.7	181.0	187.1	196.9	199.8	203.3	205.5	209.6	215.6

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