Budgetary Sustainability in the Presence of Macroeconomic and Financial Market Instability: An Application to the Case of Belgium

BAS VAN AARLE AND JOZEF KONINGS

This paper develops a stylized budgeting framework to analyze the effects of macroeconomic shocks and government bond market conditions on public finances. We focus on the impacts of primary fiscal balance shocks, growth, and interest rate shocks on budgetary sustainability. We consider the effects of financial sector bailouts, uncertainty about aging costs and instability viz. speculation in government bond markets. The framework is applied to the case of Belgium, where recently these issues have played an important role. A scenario analysis of budgetary adjustment under alternative hypotheses is carried out to analyze Belgian fiscal sustainability over the next 20 years.

INTRODUCTION

The collapse of Lehman Brothers in September 2008 and the global banking crisis and worldwide recession ("The Great Recession") that followed suit, triggered a massive response by policy makers. Central Banks provided liquidity in an attempt to cushion the global shock and to restore confidence; governments throughout the world implemented fiscal stimuli in a (more or less) coordinated fashion.[1] These large monetary and fiscal expansions automatically raise the question of how to design and implement viable "exit" strategies. Moreover, three years later, the

Bas van Aarle is an Professor, Faculty of Applied Economics, Hasselt University, Agoralaan C52, BE-3590 Hasselt, Belgium. He can be reached at *bas.vanaarle@uhasselt.be*.

Jozef Konings is an Professor, Faculty of Business & Economics and VIVES, KU Leuven, Naamsestraat 61, 3001 Leuven, Belgium. He can be reached at *joep.konings@econ.kuleuven.be*.

1. Consider, for example, the European recovery program and declarations at various G20 summits during 2010 and 2011.

financial crisis has turned into a (looming) sovereign debt crisis in several OECD countries.

This global financial crisis and recession shows the important effects of macroeconomic shocks in production, employment, interest rates and inflation on many budget items—both on the revenue and spending side—and the dynamics of the public debt stock. Financial market speculation about potential risks regarding sustainability of public finances—whether fully justified or not—can drive up financing costs of new debt and existing debt that is due to be refinanced. Macroeconomic and financial market instability has also led to budgetary instability. In other words, it is important for fiscal policymakers to gauge continuously the consequences of single or multiple macroeconomic shocks on the budget in the short run and longer-run.

In this paper, we construct a stylized budgeting framework that enables us to trace these macroeconomic impacts on sustainability of public finances in the context of global recession and financial market instability (viz. speculation in government bond markets). We focus on the effects of primary fiscal balance shocks and growth and interest rate shocks on budgetary sustainability. A crucial aspect of our approach is that we introduce a risk premium that depends on financing requirements and thereby on the level of debt and deficit, which implies that debt dynamics become nonlinear (i.e., quadratic) in the level of debt. Risk premia have indeed been a crucial factor in the recent budgetary instabilities in several European countries as financial markets have been questioning budgetary sustainability, thereby directly increasing the risk premium on government bonds and the budgetary costs of refinancing.

We also take into consideration that financial sector support and bailout packages create additional pressures on public finances, another important link between the financial crisis and public finances. Finally, budgetary costs of the aging population and financial sector support are explicitly taken into consideration as OECD countries will increasingly face the budgetary costs from the "baby-boomers" retirement wave. Integrating all these factors into one budgetary framework is useful for fiscal policymakers as it points at the importance of macroeconomic conditions and of credit markets for budgetary outcomes in the short run and particularly in the long run.

We apply this framework to an interesting example, the case of Belgium. Apart from prominent cases like Greece, Portugal, and Ireland, Belgium's public finance have also a few times drawn the interest of financial markets. In fact, the rating agencies Standard and Poor's, Fitch, and Moody's have repeatedly considered since 2008 a possible downgrading of Belgium and in 2011 rating agencies indeed downgraded the creditworthiness of Belgium. Speculation in global markets about the Belgian case is not only evidenced by the evaluations of the rating agencies but also by a small but persistent risk premium on Belgian bonds since 2009 relative to German bonds.[2]

2. See, for example, Arghyroua and Kontonikas (2011) on this speculation in bond markets. In 2010 and 2011 the Belgian spread (versus German bonds) has been increasing, although not in the same proportion as countries like Italy and Spain, which also have witnessed sharply increasing debt levels in the last few years. In 2012, the Belgian spread has decreased again significantly as most political uncertainty was removed.

While focusing on Belgium, the model and conclusions can be generalized to other EU and non-EU countries that are struggling with budgetary sustainability. It is interesting to note that Belgium's gross government debt level at the start of 2012, 98 percent of GDP, is comparable to countries such as the US (93 percent), the UK (89 percent), Portugal (94 percent), and Ireland (93 percent). In that sense, the results presented in our analysis could apply in a broad manner to these countries as well. For example, the current discussion in the US about the debt ceiling and the "fiscal cliff" would clearly be another interesting example of a country that is seeking strategies to secure fiscal sustainability in a context of growth and financial market instability.

The paper is organized as follows: Section 2 considers the retrospective time-series approach to evaluating government solvency and tests fiscal sustainability in Belgium during the period from 1980 to 2011. Section 3 constructs a stylized budget framework in order to assess budgetary sustainability in a forward-looking manner. Section 4 uses the budgeting framework to carry out a scenario analysis of budgetary adjustment in Belgium during the period from 2012 to 2030 under alternative hypotheses. The conclusions section summarizes the main results and policy implications.

BUDGETARY SUSTAINABILITY: A RETROSPECTIVE PERSPECTIVE

Fiscal sustainability, while very often discussed, is an imprecise concept. At the theoretical level, unsustainable public finance, viz. government insolvency, implies the violation of the inter-temporal budget constraint and the no-Ponzi game condition.[3] In evaluating fiscal sustainability it is important to clearly define time horizons and choose the right fiscal variables. Depending on the time horizon chosen, fiscal sustainability can be regarded as a short-term, medium-term, or long-term concept. Depending on, for example, whether government debt is defined as gross debt or net debt, including or excluding (implicit) social security liabilities (e.g., pensions), different conclusions may arise.

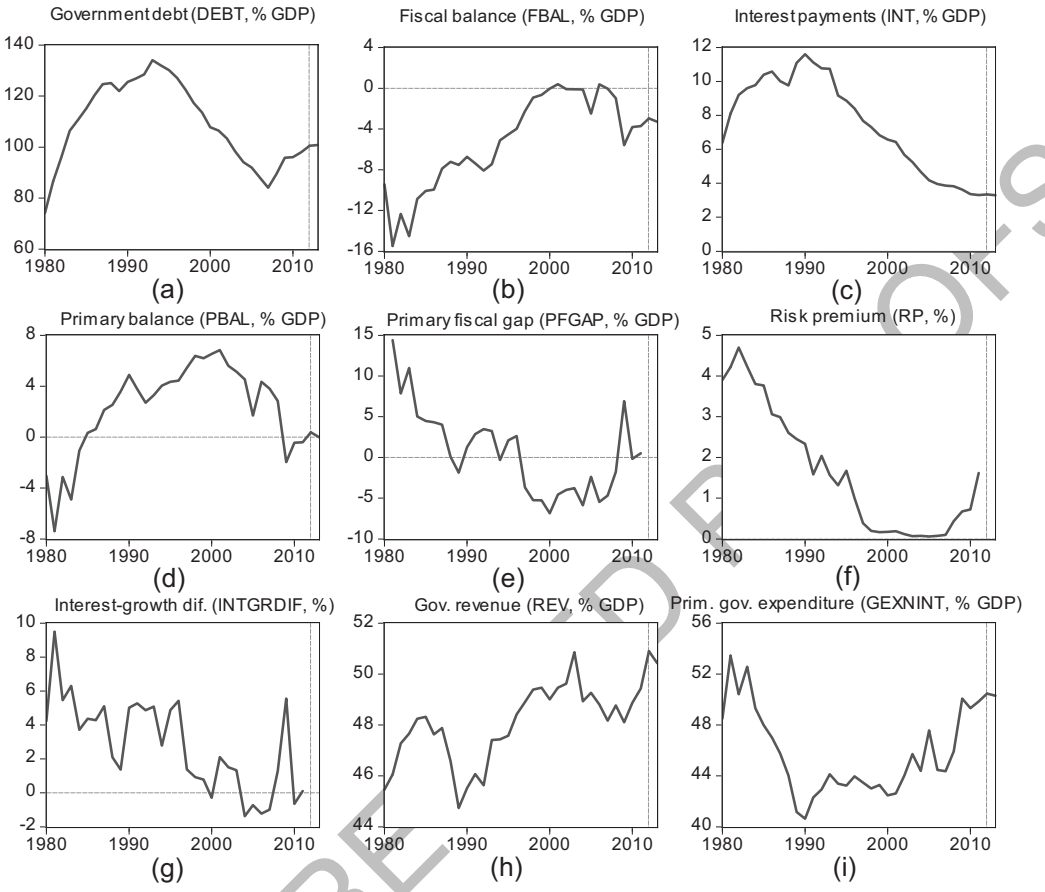
Following Bohn's seminal work (Bohn 1995, 1998), empirical studies on government solvency have focused on estimating stationarity of fiscal balances and on finding cointegration between debt and the primary fiscal balance. Other studies such as Afonso (2005) apply the test on cointegration between government revenues and government expenditures in order to examine the sustainability hypothesis. A general drawback of this literature is the lack of statistical power of conventional stationarity and cointegration tests in short time series.[4]

3. The no-Ponzi game condition (or transversality) condition requires that the long run debt level remains bounded so as to avoid explosive debt trajectories.

4. Stationarity of a variable implies the existence of a well-defined mean around which a variable fluctuates. Cointegration implies the existence of long run trends/co-movements between variables. The empirical literature on fiscal sustainability uses the time-series properties in terms of (non)-stationarity and/or (non)-cointegration of fiscal variables to test for fiscal (un)sustainability. Budgetary sustainability or a bounded level of debt would require (at least) stationarity of the fiscal balance or relatedly, cointegration of government spending and revenues.

FIGURE 1

Fiscal and Macro-Economic Variables, Belgium, 1980–2013



Source: AMECO (Data for 2012-2013 concern projections).

In this section, we consider budgetary sustainability in the case of Belgium from a retrospective perspective. In order to understand current Belgian public finances and challenges, it is very useful to first scrutinize the main fiscal developments in the recent and more distinct past. Figure 1 summarizes the main budgetary and macroeconomic trends that are observed during the period from 1980 to 2011. All data are from the EU's AMECO database.

The general picture on sustainability of Belgian public finances is relatively mixed: a relatively high level of government debt (to GDP) (Panel [a]) is still present despite the substantial fiscal restructuring during the period 1990–2005. This fiscal consolidation—evident in an improving total fiscal balance (Panel [b]) and primary fiscal balance (Panel [d]) and a decreasing interest burden (Panel [c]), all as a percentage of GDP—followed after the fiscal derailment that took place during the 1980s. The improvement in fiscal sustainability is also nicely illustrated by the primary fiscal balance gap in Panel (e), which is our preferred fiscal

sustainability measure in this paper, and the decline in the risk premium (Panel [f]) of 10-year Belgian government bonds relative to German government bonds. In the course of the global financial crisis and the European debt crisis, fiscal balances in Belgium deteriorated again significantly. Another crucial driver of government debt sustainability is the difference between interest rates and economic growth rates. Panel (g) shows that also this variable was declining during the period 1990–2005, contributing positively to debt sustainability, while a negative shock occurs in 2009 with the advent of the global financial crisis. Panels (h) and (i) finally illustrate the evolution of government revenue and primary government spending as a percentage of GDP.

To obtain more statistical evidence, we applied the econometric tests of government solvency found in the literature and mentioned above to the Belgian case to obtain insight into fiscal sustainability during the period from 1980 to 2011. The results can be summarized as follows:[5]

(i) Government debt, total fiscal deficit, primary fiscal deficit, government spending, and government revenues are all nonstationary in the sample period from 1980 to 2011. The change in the primary fiscal balance is found to be stationary during this period, whereas the primary fiscal gap is on the borderline between stationarity and nonstationarity. The nonstationarity of government debt and especially the (primary) fiscal balance is an indication that intertemporal solvency was not fully ensured in Belgium during this period.[6]

(ii) If the expected real interest rate net of real growth is constant, intertemporal solvency holds if the stock of debt and the primary deficit are cointegrated, as shown by Trehan and Walsh (1991). To test for cointegration between debt and primary deficit in the case of Belgium, we applied both the Johansen (1991) procedure and the asymptotic[Q3] Engle and Granger (1987) single equation cointegration tests for equations with different deterministic components. The Johansen tests suggest that cointegration relations between the primary budget balance and the stock of debt are present. The Engle–Granger approach finds the errors of the estimated single-equations to be stationary in both cases, confirming the presence of co-integration. A strict interpretation of these tests, suggest therefore that solvency of public finance was ensured during the sample period.

(iii) The alternative approach taken by, for example, Afonso (2005) to test for a sustainable budget does not rely on the assumption of a constant net of real growth interest rate. It requires that revenues and expenditures move in parallel in the long run: only deviations of revenues from expenditures that are not mean-reverting violate restrictions on a sustainable budget balance. Consequently, if the budget process is balanced in the long run, we expect revenues and expenditures to be co-integrated. The cointegration tests in the case of Belgium are not fully consistent: the Johansen-test rejects the presence of cointegration between government

5. The complete statistical information on the unit root and cointegration tests in this section are found in the Appendix available from the authors by request. All data and the simulation tool of Section 3 are also available for the interested reader.

6. Hamilton and Flavin (1986) show that stationarity of the primary fiscal balance and gross government debt are sufficient conditions to ensure fiscal sustainability.

revenues and expenditures, but the Engle–Granger approach does not reject cointegration. The Engle–Granger cointegration test is implicitly based on a large sample assumption, so that one might attach a stronger weight to the Johanson's cointegration test that casts doubts on the cointegration between revenues and spending in the Belgian case.

Taken together, the unit-root tests and cointegration analysis provides mixed evidence on the solvency of Belgian public finances since 1980. The lack of consistency probably reflects the marked differences in the first-half of the sample when public finances were clearly on an unsustainable path and the second-half when fiscal consolidation reduced government debt and deficits significantly. Belgian public finances have essentially hovered around the boundaries of (in)stability during the last three decades, avoiding a fall into a debt trap but also with a less than comfortable margin. This makes it even more interesting to also assess the possible budgetary adjustment in the near and longer term.

FISCAL SUSTAINABILITY AND THE ROLE OF BUDGETARY AND MACROECONOMIC FACTORS: A STYLYZED FRAMEWORK

From the point of view of a policymaker or a financial analyst, the theoretical perspective of the no-Ponzi game condition or the retrospective perspective of empirical time-series research, is of limited use when evaluating sustainability of current public finances. Much more useful are tools that can answer questions, such as what is the likely impact of a low growth scenario on public finance sustainability in the near and medium term? Or, how will a fiscal consolidation effort translate into more fiscal sustainability in the longer term? How do financial market interventions impact on government debt dynamics? etc. This type of analysis is essentially forward-looking and in the form of evaluating alternative scenarios.

This section introduces a stylized budgeting framework that can be used to analyze macroeconomic impacts on public finances and assessing the risks to fiscal sustainability in a forward-looking manner (rather than the essentially backward looking-approach of the time-series analysis of the previous section). This budgeting framework, in the form of a small simulation model, can be summarized by the following equations:

Equation (1) determines the end of the current period debt-to-GDP ratio, d, as a result of the debt-to-GDP ratio at the end of the previous period, the GDP growth rate, y, fiscal balance-to-GDP ratio, b, and a stock-flow adjustment (as percentage of GDP), sfadj.[7] The subscript t refers to time. The fiscal balance (2) is the measure of government deficit and equals revenues as a percent of GDP, f, minus expenditures as a percent of GDP, g. Total expenditures as a percent of

7. The stock-flow adjustment (SFA) is the difference between the change in the stock of government debt and the flow of annual deficit/surplus. The net acquisition of financial assets is generally the main factor in the SFA. It reflects the acquisition less disposal of financial assets by the general government sector. Note that our model deals with the general government fiscal variables and is therefore not further worked out into federal, regional, local government and social security. Even if there is currently much debate about reforming the entire structure of government, our analysis ignores these complicated matters.

GDP, as modeled in (3), consist of primary expenditures (as percentage of GDP), g^p, interest expenditures (as percentage of GDP), *int*, and expenditures that are related to aging of the population (as percentage of GDP), *age*. Equation (4) defines the primary fiscal balance, b^p, by excluding the interest payments from the total fiscal balance. Primary fiscal balance refers to fiscal balance related to the provision of general government services. We assume that the primary spending to GDP, revenue to GDP and aging costs to GDP ratios are not affected by changes in the rate of GDP growth and in their turn do not affect growth.

Interest payments (5) are proxied by the interest rate at average maturity, i^{AM}, times the stock of debt outstanding at the start of the current period. The average maturity, *AM*, equals the average number of years to maturity of the outstanding stock of debt. The nominal interest rate in (6) is defined as the sum of the real interest rate,[8] r, (expected) inflation, π, and a risk premium, *rp*, evaluated at the average maturity, AM. We assume in (7) that this risk premium depends on the financing requirement (finreq), which is equal to the current deficit plus the current period stock-flow adjustment plus the level of debt at the end of the last period divided by the average maturity of this debt.[9] The nominal growth rate in GDP in (8) equals real growth rate in GDP plus the inflation rate.

Finally, the primary fiscal gap as a percent of GDP is modeled in (9). A positive gap indicates that the current primary balance is not sufficient to stabilize debt at the current level so that debt will continue to grow. The primary fiscal gap indicator is a natural indicator of fiscal sustainability: a prolonged, positive and increasing primary fiscal gap implies that debt stabilization is increasingly difficult and fiscal sustainability is endangered. A negative primary fiscal gap on the other hand ensures fiscal sustainability.[10]

The risk-premium mechanism of (7) implies that the debt-dynamics become quadratic in the debt level as represented in (10), since (1)–(7) together imply:

$$d_t = \left(1 - y_t^r + r_t^r\right) d_{t-1} + \alpha\left(b_t + sf\,\mathrm{adj}_t + \frac{1}{\mathrm{AM}} d_{t-1}\right) d_{t-1} - f_t + g_t^p + \mathrm{age}_t \qquad (10)$$

Equation (10) explains how government debt dynamics are driven by economic growth, the interest rate, interest burden, and the primary fiscal balance. The interest rate (and interest burden), however includes a risk premium which in turn is driven by the financing requirement so that a nonlinearity results in the debt dynamics. This nonlinearity contrasts with the standard

8. The real interest rate, r, is exogenous and assumed to proxy a hypothetical risk-free interest rate/price of capital in a long-term equilibrium of capital markets.

9. In empirical studies on sovereign risk premia, government debt, and fiscal deficits, indeed are found to be crucial determinants. In addition other macroeconomic and institutional variables are often included, for example, output growth, inflation, the current account and political stability. The risk-premium-debt relation could be linked, for example, also to possible credit-rating downgrades by rating agencies when debt increases and doubts arise if long run fiscal sustainability is guaranteed. Whether or not this would be justified, such downgrades could in practice increase the risk-premium on debt and increase borrowing costs, basically along the lines of (7). See Bernoth et al. (2004) and Cruces and Trebesch (2011) on the empirical literature relating to the risk premium relation (7).

10. Note that the fiscal balance gap can be easily extended with additional fiscal sustainability gaps, calculated by replacing the current debt with a debt target, for example, a 60 percent debt-to-GDP ratio.

approach to analyzing government debt dynamics that ignores a link between risk premia and the debt level, that is, $\alpha = 0$. In the standard case the interest rate-growth differential is assumed to be constant and this assumption entirely determines the stability of debt dynamics.[11] If $\alpha > 0$, the interest rate growth differential is no longer constant due to a changing risk premium that depends on the debt level, where α measures the strength of the nonlinearity in the debt dynamics. A higher value α of makes the debt dynamics increasingly nonlinear and unstable.

Empirical studies on determinants of risk premia, as summarized in Baldacci and Kumar (2010), confirm that the government debt level is one of the crucial determinants of sovereign bond risk premia. The empirical estimates for α in their literature review are typically between 0.02 and 0.1. De Grauwe and Ji (2012), in an interesting analysis of the current European debt crisis, propose that financial markets initially underpriced risk in the euro area government bond markets. With the advent of the European Debt crisis, however, financial markets appear to have overreacted and overpriced these risks in the case of Portugal, Italy, Greece, Spain and Ireland, the PIGS countries. In their empirical estimations, the value increases from 0.01 in the precrisis period before 2008 to 0.10 after 2008.

A FORWARD-LOOKING APPROACH TO FISCAL SUSTAINABILITY

Fiscal sustainability can not only be defined in terms of observed behavior of fiscal deficits, debt, expenditures and revenues in the past, but also in terms of a forward-looking approach by considering alternative scenarios for the near future and longer term in terms of their implications for budgetary sustainability. We analyze a number of budgetary scenarios that could be relevant for understanding the sustainability of Belgian public finances.[12]

This section uses simulations with the fiscal framework introduced in the previous section, to assess the long run impact of changes in the macroeconomic environment, such as changes in growth rates, interest rates and the primary balance, on the possible evolution of public finances in the case of Belgium. The recent global economic and financial turmoil has also had substantial impacts on the Belgian economy and public finances. A significant number of challenges and vulnerabilities are present in the short run and longer run both on the growth front as well as on public finances themselves. For example, the budgetary costs from aging and from support interventions in the financial sector represent such challenges. Clearly, it is very difficult to assess how sustainable public finances are currently and what the most likely budgetary scenarios in the near term and longer term.

11. The debt-dynamics equation reduces to a standard linear difference equation in debt in case we assume that $\alpha = 0$ and that the real growth rate, the real interest rate, the inflation rate, the revenue to GDP ratio, the primary government spending to GDP and the aging-costs are exogenous. In that case, debt dynamics are stable (unstable) in case growth exceeds (is lower than) the interest rate.

12. Our analysis refers to the Belgian consolidated government and we refrain from a more detailed, decentralised analysis of the public finances of federal government and social security (s.c. Entity I) and regional and local governments (s.c. Entity II), notwithstanding the considerable number of important and interesting issues that can be raised in this respect.

We set out a baseline scenario for the period 2012–2030 (representing essentially a "status quo" situation) and analyze the consequences for budgetary sustainability when there are changes in crucial factors.[13] In the first case, we consider the effects of a small change in the interest rate since this variable is one of the crucial driving forces in the dynamics of the debt to GDP ratio and debt sustainability. A higher interest rate not only implies a higher interest burden from the outstanding debt, but we also consider the possibility that a higher debt stock induces an increasing risk premium on government debt, reinforcing therefore the instability from higher interest rates. In the second case, we analyze the effects of a change in the rate of economic growth, another crucial factor since it implies a larger income base to finance government spending, deficits and debt. In the third case, we consider the effects from a change in the primary fiscal balance that would bring the Belgian budgetary deficit by 2016 in line with the less than three percent total deficit requirement of the Maastricht Treaty. The fourth case combines the first three cases into "best" versus "worst" case scenarios. In the fifth and sixth cases, the budgetary consequences of aging and financial sector bailouts are assessed, respectively.

To simulate our simple model of the Belgian public finances for the period 2012–2030 and compare alternative scenarios (or "shocks") for a number of crucial variables, we need to choose a baseline scenario for the exogenous variables in the model that reflects essentially a "status quo" situation. While this baseline scenario should not be necessarily considered the most realistic scenario, we give it a number of features that could be a useful benchmark. We assume a real growth rate of 1.6 percent, an inflation rate of 2 percent and a real interest rate of 1.6 percent. These values are close to the historical averages during the 2000–2011 period (1.8 percent, 2.1 percent, and 2.0 percent, respectively). Primary government expenditures and government revenues are set at 49 percent and 50 percent of GDP (close to their 2009–2011 average values of 49.6 percent and 48.9 percent, respectively) which implies a (structural) primary balance of 1 percent, close to the official Belgian objective in its Stability Program 2011–2014.[14] Average maturity of government bonds, AM, is set equal to 6.5 years, its 2010 level. A simple regression of the Belgian long-term interest rate differential with respect to Germany on the financing requirement according to (7) in Table 1, suggests a value of 0.05 for α. Including the financing requirement with a lead instead of its current level to reflect the presence of forward-looking financial markets, also gives an estimate of 0.05 for

13. Public finances are continuously hit by economic, financial and budgetary shocks that change economic growth, real interest rates, and primary fiscal balances. To gain more insight, we calculated the estimated kernel distributions of shocks to economic growth, the real interest rate and the primary balance in the case of Belgium during the period 1980–2011. These shocks are obtained from estimating simple AR(1) processes in the rate of economic growth, the real interest rate and the primary balance. The estimated kernel density/probability distributions indicate that most of the time these shocks to growth, interest rates and primary balance are typically in the interval −1 to 1 percent on an annual base, but there is always a small probability that a larger shock hits the economy and therefore the budget.

14. In the period 2000–2007 Belgium managed to generate primary surpluses of the order of 1 percent and more, after 2007 the primary balance deteriorate to around −1 percent. Clearly, it is not certain that after the financial crisis and economic slowdown of 2008–2010 such a positive primary balance can be regained even if large priority is given to improve the primary balance.

TABLE 1
A Small Model of Aggregated Public Finances with Macroeconomic Factors and Government Bond Markets

$$d_t = (1 - y_t^n)d_{t-1} - b_t + sf\,\mathrm{adj}_t \quad (1)$$
$$b_t = f_t - g_t \quad (2)$$
$$g_t = g_t^p + int_t + \mathrm{age}_t \quad (3)$$
$$b_t^p = t_t - g_t^p - \mathrm{age}_t \quad (4)$$
$$int_t = i_t^{\mathrm{AM}} d_{t-1} \quad (5)$$
$$i_t^{\mathrm{AM}} = r_t + \pi_t + \mathrm{rp}_t^{\mathrm{AM}} \quad (6)$$
$$\mathrm{rp}_t^{\mathrm{AM}} = \alpha\,\mathrm{finreq}_t^{\mathrm{AM}} = \alpha\left(b_t + sf\,\mathrm{adj}_t + \tfrac{1}{\mathrm{AM}} d_{t-1}\right) \quad (7)$$
$$y_t^n = y_t^r + \pi_t \quad (8)$$
$$\mathrm{pfgap}_t = (i_t - y_t^n)d_{t-1} - b_t^p \quad (9)$$

α and would make the debt dynamics slightly more instable as the risk premium would react even with a lead to changes in fiscal variables.

Simulating the model with these baseline assumptions result in the adjustment of public finances shown in Figure 2 by solid lines. The baseline scenario yields a profile with relatively little change in key measures of public finances during the 2012 to 2030 period: government debt decreases somewhat from its starting value of 98 percent of GDP to 95 percent by 2030 while the total deficit is practically constant and is marginally above the 3 percent deficit target of the Maastricht Treaty. A slightly negative primary fiscal balance gap indicates throughout the period public finances are sustainable, but in a very fragile manner. This baseline scenario implies sustainable public finances but the fiscal consolidation can be hardly considered ambitious and is not compatible with the European Stability and Growth criteria to reach a 60 percent debt ratio in the longer term. This baseline scenario is moreover vulnerable to a number of potential challenges as we will analyze in the following alternative scenarios.

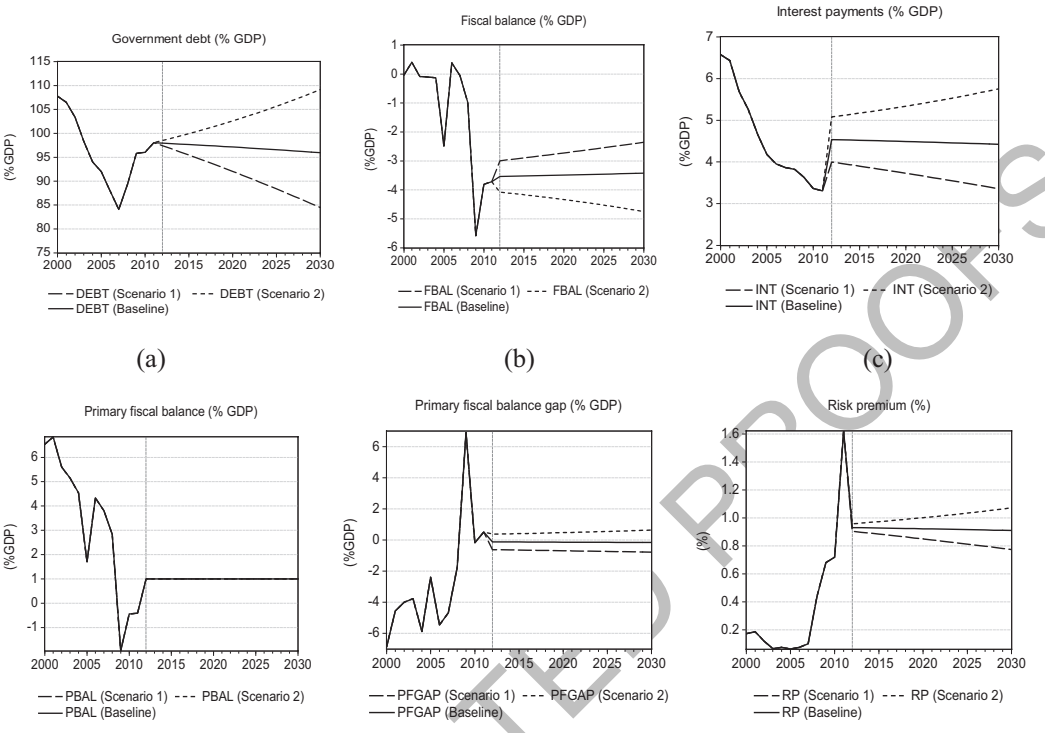
EFFECTS OF INTEREST RATE CHANGES

Interest rates are of crucial importance in the process of debt accumulation. With higher debt levels, public finances become more sensitive to interest rate changes due to their impact on interest burdens and thereby on the fiscal balance. In our simple simulation model there is also an additional nonlinear mechanism that enters into force: with increasing debt the risk premium starts to increase, adding an additional interest burden, thereby leading to additional debt accumulation, and so forth.

Scenario 1 (Scenario 2) analyzes the effects of a 0.5 percent decrease (increase) in the real interest rate to 1.1 percent (2.1 percent) instead of the 1.6 percent in the baseline case. The effects of such small interest rate changes are displayed in Figure 2 using dashed lines for Scenario 1 and dotted lines Scenario 2.[15] These alternative interest rate scenarios, illustrate the relatively high

15. In the Figures 2–8, the following abbreviations are used: DEBT, debt to GDP ratio; FBAL, fiscal balance to GDP ratio; PBAL, primary fiscal balance to GDP ratio; INT, interest payments to GDP ratio; PFGAP, primary fiscal balance gap to GDP ratio; RP, risk premium on government bonds.

FIGURE 2
Effects of Interest Rate Changes

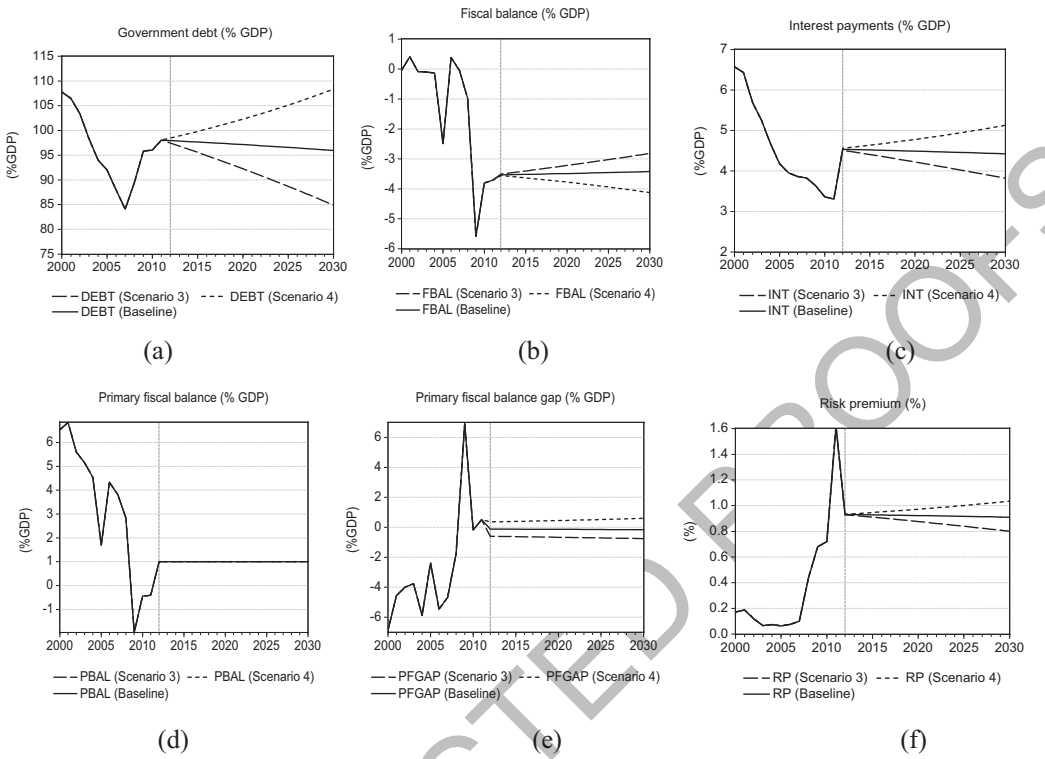


Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), 0.5% decrease in the interest rate of 0.5% (Scenario 1, dashed lines) vs. 0.5% increase in the interest rate (Scenario 2, dotted lines).

sensitivity of the Belgian budgetary variables to small changes in the interest rates due to the relatively high initial level of debt of close to 100 percent of GDP. Compared to the baseline, interest rate increases imply that fiscal sustainability deteriorates compared to the baseline, especially in the long run as debt (Panel [a]), fiscal balance (Panel [b]), interest payments (Panel [c]), and primary fiscal gap (Panel [e]) deteriorate. This effect is reinforced to a small extent also by the nonlinearity in the risk premium (Panel [f]). (Note how the simple nonlinearity in the risk-premium implies that positive and negative scenarios do not lead to fully opposite adjustment dynamics.)[16]

16. In case of non-linearities in a dynamic model, also initial conditions—here in particular the initial level of government debt—also matter for the model dynamics.

FIGURE 3
Effects of Changes in Economic Growth



Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), 0.5% increase in the real GDP growth rate of 0.5% (Scenario 3, dashed lines) vs. 0.5% decrease in the real GDP growth rate (Scenario 4, dotted lines).

EFFECTS OF GROWTH RATE CHANGES

Scenarios 3 and 4 consider an improvement or reduction in the GDP growth rate of 0.5 percent compared to the baseline. Such small but sustained changes in the GDP growth path have strong effects on public finances (Figure 3). In case of a positive growth shock, debt dynamics get on declining path (Panel [a]) and all fiscal variables improve (Panels [b], [c], and [e]). The positive fiscal dynamics of the 2000–2007 period are basically returning. In the medium and long run, fulfilling the fiscal convergence criteria of the Stability and Growth Pact is practically restored as Figure 3 shows. While the interest rate is a destabilizing factor in debt to GDP dynamics, economic growth is clearly a stabilizing factor. The effects of growth changes on debt dynamics are similar but opposite to interest rate changes (but not identical because of the slightly different risk premium dynamics).

PRIMARY FISCAL BALANCE ADJUSTMENTS

Interest rates and growth rates are essentially outside the control of the fiscal authorities. Another crucial factor that determines the sustainability of public finances in the long run are adjustments in the primary fiscal balance which are more directly under control of fiscal authorities.[17]

Scenario 5 considers a temporary fiscal consolidation (expansion) effort ("spending cut") that reduces (increases) primary government spending during the 2012–2016 period by 1 percent of GDP.[18] During this period, therefore, a primary surplus of 2 percent is achieved (in the baseline the primary balance was set to 1 percent) and after 2016 the baseline situation is restored. The consequences of this consolidation effort can be found in Figure 4. In the alternative Scenario 6, a temporary budgetary deterioration of the same magnitude is considered. This would imply a temporary primary fiscal balance of 0 percent during the 2012–2016 period.

This fiscal consolidation package, is roughly similar to the official plan laid out in the Belgian Stability Program 2011–2014 (Belgian Stability Programme 2012).[19] The official Belgian Stability Program, which aims to reach budget balance by 2015, is based on more optimistic growth and real interest rate assumptions than our Scenario 5. Scenario 5 would result in a reduction in government debt (Panel [a]), total and primary deficit (Panels [b] and [d]), the risk premium (Panel [f]) and therefore the interest rate, and the total interest burden (Panel [c]). When the consolidation effort is discontinued after 2016, the basics of the adjustments in the baseline of course resurface. A significant level shift in debt and interest payments, risk premium and fiscal balance result from the temporary spending measures.

"BEST" AND "WORST" CASE SCENARIOS

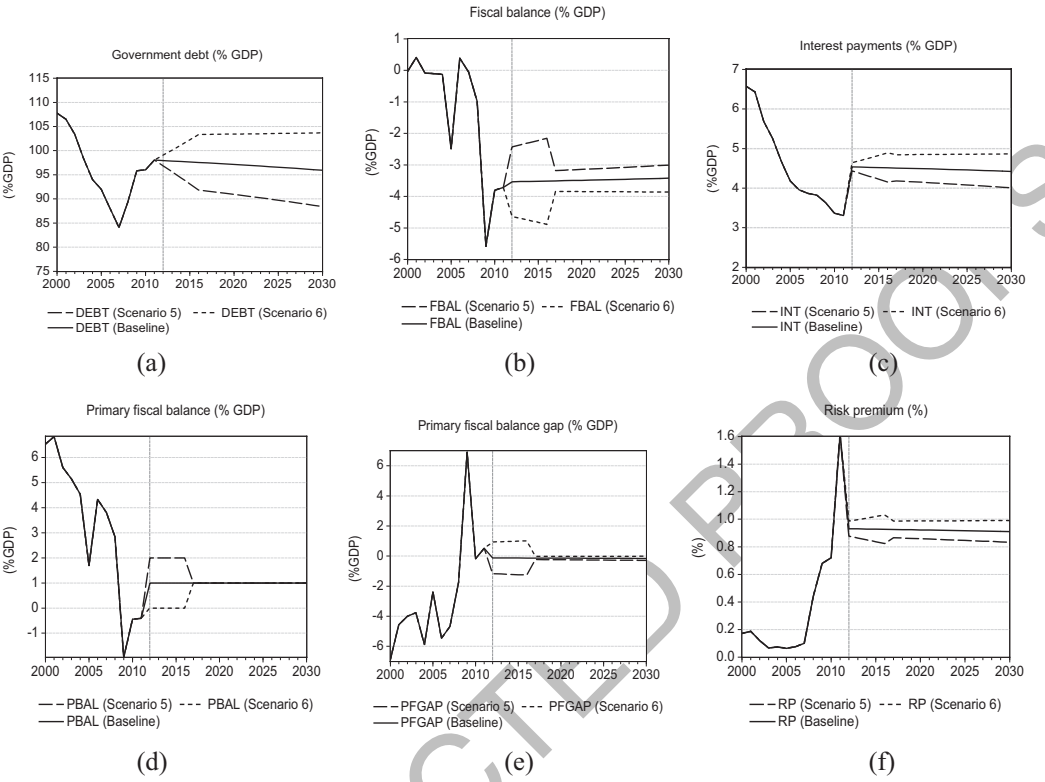
Potential risks and challenges also exist when several factors change at the same time. It is obviously very difficult to put any probability on such cases. If they all would change in a negative direction this might constitute a "worst case" scenario requiring adequate and swift adjustment to counteract the negative dynamics that occur in the absence of further action. In an opposite "best case" scenario, favorable dynamics of public finance result in the short term and especially in the long term, implying also more room to maneuver for policymakers. Figure 5

17. Clearly, consistent, sound and transparent fiscal institutions and fiscal rules (e.g., in the form of deficit, debt and/or expenditure rules or targets) could certainly be helpful in adjusting to primary fiscal balance shocks. See Marneffe et al. (2011) for an overview on fiscal rules and their effects in the euro area.

18. Alternatively, these scenario results from a reduction viz. increase in government revenues by 1 percent during the period 2012–2016. Given that in our simple framework spending or revenue changes do not affect (long run) economic growth (reflecting, e.g., a long run Ricardian equivalence setting) these spending and revenue measures are de facto equivalent in terms of their fiscal consequences.

19. Retrieved from the European Union's website http://ec.europa.eu/economy_finance/sgp/pdf/20_scps/2011/01_programme/be_2011-04-15_sp_nl.pdf

FIGURE 4
Effects of a Temporary Fiscal Adjustment

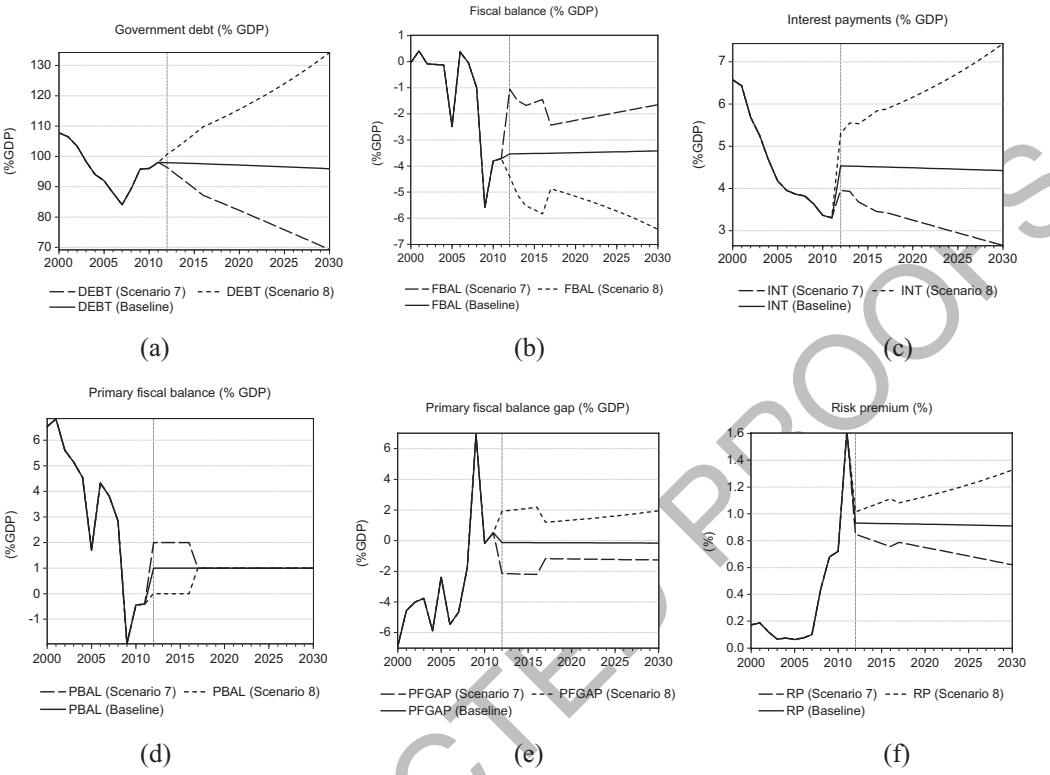


Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), a fiscal consolidation effort of 1% of GDP during 2012-2016, (Scenario 5, dashed lines) vs. a fiscal spending deterioration of 1% of GDP during 2012-2016 (Scenario 6, dotted lines).

analyzes such "worst case" versus "best case" scenarios. In the "worst case" scenario, (Scenario 7) the previous cases with interest rate increases (Scenario 2), decline in economic growth (Scenario 4) and a fiscal slippage in the short run (Scenario 6) are combined. In the "best case" scenario (scenario 8) the opposite Scenarios (1, 3, and 5) are combined.

The results for the "best-case" scenario show quite clearly how the effects accumulate to result in a very substantial fiscal alleviation in the short run and particularly longer term. The 60 percent debt criterion of the Maastricht Treaty is even met eventually. By contrast, the "worst-case" scenario implies an unsustainable fiscal adjustment path in the long run and the need to undertake corrective action to avoid such a scenario from unfolding itself. Note again that due to the nonlinearity resulting from the risk-premium mechanism, that both scenarios are not perfectly symmetric relative to the baseline: in the "worst" case scenario the risk premium mechanism adds additional instability.

FIGURE 5
"Best" versus "Worst" Case Scenario



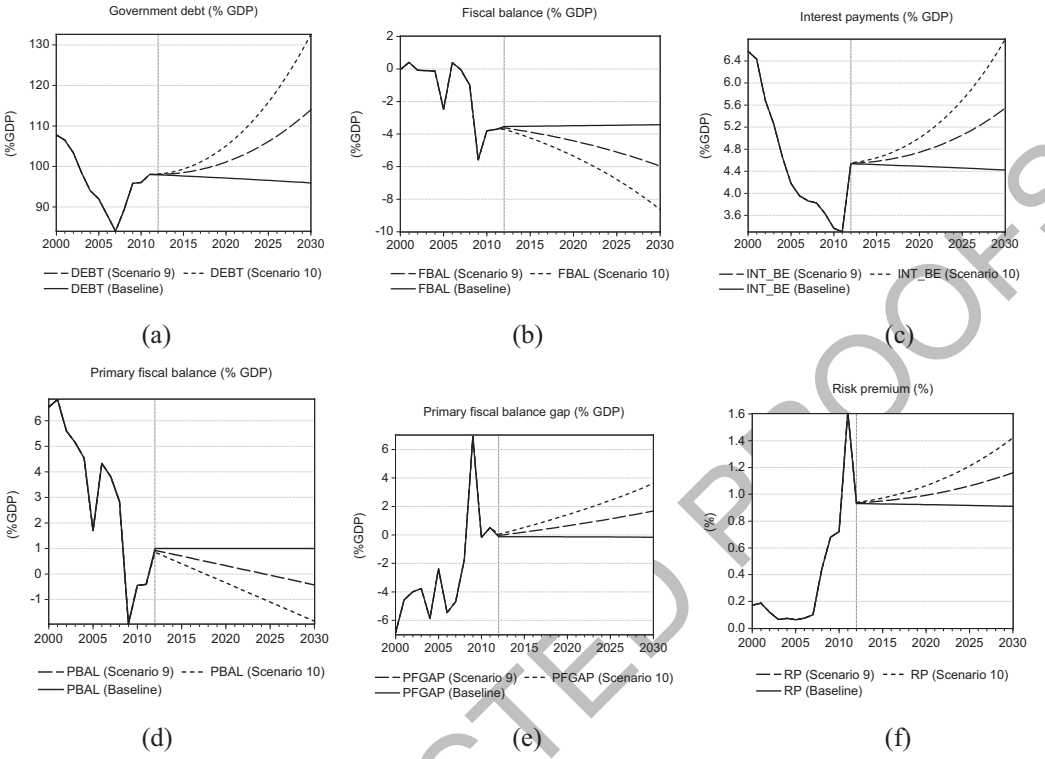
Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), "best case" scenario –high growth, low interest rate, fiscal consolidation 2012-2016- (Scenario 7, dashed lines) vs. "worst case" scenario –low growth, high interest rate, fiscal slippage 2012-2016- (Scenario 8, dotted lines).

BUDGETARY COSTS OF AGING

Estimates from, for example, the OECD suggest that a country like Belgium may face aging costs in the order of 0.1 percent each year cumulatively during the period 2011–2030 and even beyond.[20] Taken together the aging of population leads to significant cumulative, budgetary costs in the order of 2.5–3 percent of GDP by 2030. In the baseline and other scenarios examined so far we ignored these additional budgetary costs, or maybe better stated, we assumed implicitly that these costs were matched by equivalent reductions in other nonaging related budgetary expenditures. Scenarios 9 and 10 introduce extra government spending relating to aging.

20. This scenario is also considered by the High Council of Finance (2009). Standard and Poor's (2010) use a value of 0.3 percent for the annual aging costs. This assumption leads to a rather dramatic deterioration of Belgian fiscal variables and seems a bit unrealistic.

FIGURE 6
Effects of Aging Costs



Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), 0.075% annual increase in ageing costs (Scenario 9, dashed lines) vs. 0.15% annual increase in ageing costs (Scenario 10, dotted lines).

Scenario 9 considers relatively contained budgetary costs from aging, 0.075 percent cumulative each year during the period 2012–2030; Scenario 10 assumes substantial budgetary costs, 0.15 percent cumulative each year during the same period. Figure 6 displays the effects of these aging cost scenarios.

Over time the costs associated with aging are clearly significantly affecting public finances through increasing government spending, deficits, and debt particularly towards the second-half of the period. Clearly, an increasing interest burden and risk premium also contribute to the fiscal deterioration. Without being accompanied by fiscal consolidation, aging, in other words can markedly deteriorate the fiscal situation.

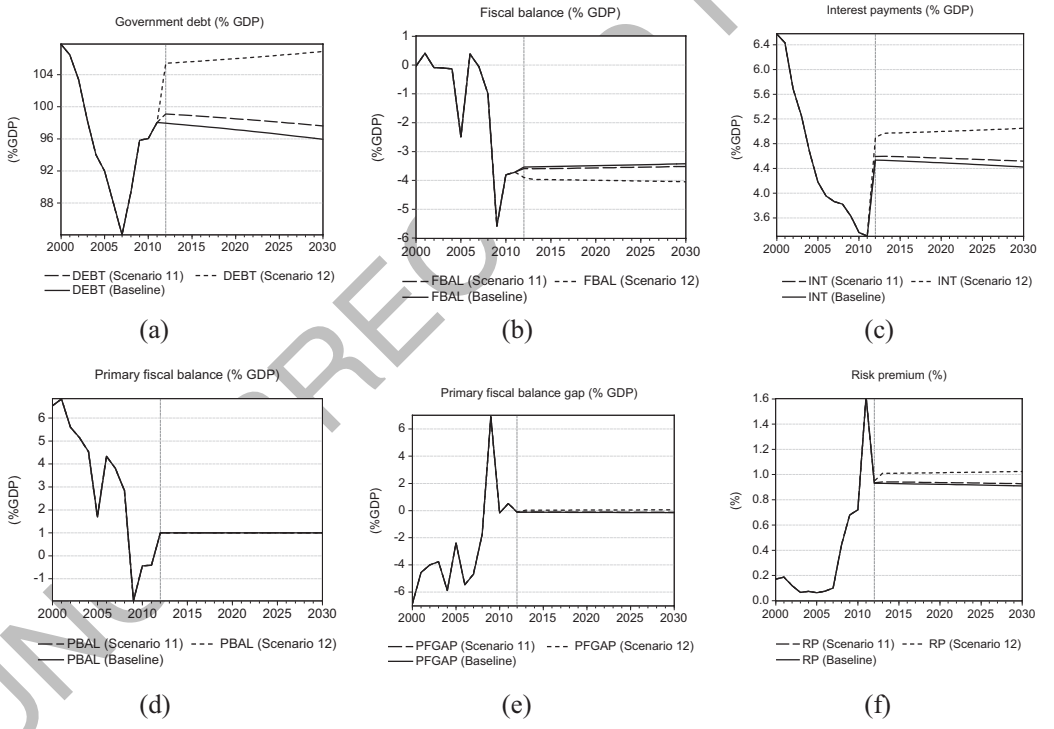
BUDGETARY COSTS OF FINANCIAL SECTOR SUPPORT

Directly in the aftermath of the Lehmann collapse and the resulting global financial turmoil, the Belgian government was forced in September 2008 to carry out substantial support interventions

to the Belgian system banks (Fortis, DEXIA Bank, ING, and KBC) to replenish their capital. More recently in October 2011, renewed support was required to avoid a collapse of DEXIA Bank. Part of the bank was acquired by the state for an amount of four billion euro. In addition, a state guarantee of up to 54 billion euro on bad loans was provided, which is clearly a much larger potential risk in the long run. To finance this intervention, additional borrowing by the government was needed. While gross government debt increases by the full amount of this operation, due to what is technically a stock-flow adjustment (see also Footnote 7), net debt of course would only increase to the extent that the participation would turn out to be result in loss-making, or in the worst case worthless when DEXIA Bank would still go bankrupt. In a very positive scenario, the bank would recover quickly and the state would as a sole proprietor now, benefit from considerable profits and valuation gains.

In the analysis displayed in Figure 7, we assess the budgetary impact of such an operation to safeguard the financial system. In Scenario 11, a one-time positive stock-flow of the size of

FIGURE 7
Effects of Financial Sector Bail-Outs



Note: Baseline scenario Belgian public finances 2012-2030 (solid lines), 1.1% of GDP budgetary costs of financial sector/DEXIA Bank bail-out (Scenario 11, dashed lines) vs. 7.1% budgetary costs of financial sector/DEXIA Bank bail-out (Scenario 12, dotted lines).

1.1 percent of GDP in 2012 is carried out that measures the budgetary impact of the support operation and acquiring of a part of DEXIA Bank. In Scenario 12, a much larger one-time positive stock-flow adjustment of 7.1 percent of GDP is carried out, reflecting a very negative scenario where not only the budgetary costs of acquiring DEXIA Bank are counted (1.1 percent of GDP as in Scenario 11) but also a cost of 6 percent of GDP that would be incurred if 40 percent of the loan guarantees provided by the Belgian State on bad loans (as part of the DEXIA Bank deal) would indeed be invoked.[21]

The budgetary effects of this intervention are not negligible, especially in the extended DEXIA Bank bail-out variant (Scenario 11). In addition to the initial stock-flow adjustment that puts public debt on a higher level, the financial market interventions affects public finances through their effects on interest payments, including an effect on the risk premium, and thereby deteriorating fiscal balance and debt. This case makes it clear that even a one-time fiscal intervention, in the form here of a one-time injection in the form of financial sector support, may have longer-term fiscal consequences, through debt accumulation and interest costs (including risk-premium effects). The effects increase when the "recovery rate" of these support interventions declines.[22]

BUDGETARY COSTS OF BOND MARKET INSTABILITY

One important mechanism in the budget framework underlying the simulations are the borrowing costs. These borrowing costs were influenced by the risk premia charged in government bond markets on the financing requirements. Profligate governments may see their borrowing costs rise from increasing risk premia. This in turn would increase further deficits and debt accumulation. So far we kept this mechanism constant with a relatively low value of α (0.05), implying only a modest nonlinearity in the debt-dynamics. It is interesting to compare the baseline scenario ($\alpha = 0.05$) with a scenario without this risk premium mechanism (Scenario 13, $\alpha = 0$) and a scenario where this mechanism is considerably stronger ($\alpha = 0.1$).[23]

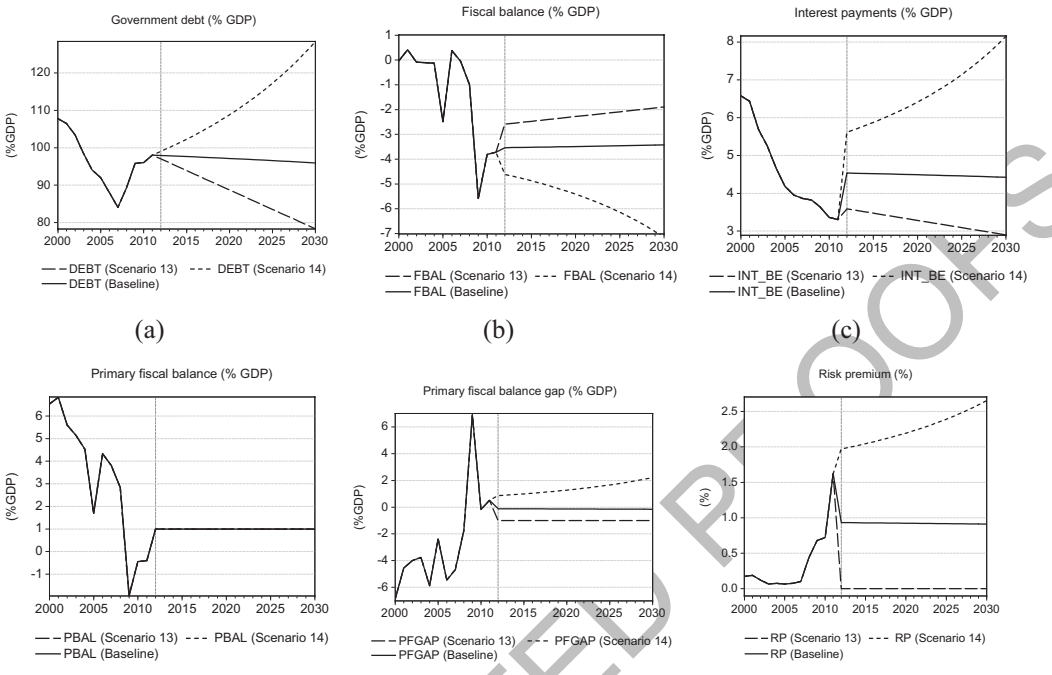
The scenario without risk-premium held essentially in the prefinancial crisis period. It could also be similar to the introduction of euro-bonds. In that case, bond issuances by euro area countries, including Belgium, would be subject to common guarantees implying that they are essentially equivalent to each other and risk premia vis-à-vis would no longer exist by

21. Here assumed to be invoked immediately in 2012, in practice this could also be (much) later, for the sake of the analysis this assumption is not too crucial.

22. To be fair, one also needs to acknowledge the (potentially large) benefits to the Belgian economy and society from safeguarding the financial sector from a financial sector meltdown in September 2008. Arguably, the Belgian financial sector was not that far from a collapse when authorities stepped in practically overnight.

23. Alpha (α) would typically differ between countries and over time. Many factors could in fact be behind the value of α that would pertain to a certain country at some point in time, think, for example, of the characteristics of the government stock such as average maturity, fraction of domestic to foreign owned government debt, currency composition of debt, the amount of net versus gross debt, etc. Also macroeconomic factors such as current account balance, growth, and inflation could matter in the risk premium formation mechanism implicit in the value of α.

FIGURE 8
Effects of Speculation in Financial Markets



Note: Baseline scenario Belgian public finances 2012-2030 (solid lines) with $\alpha = 0.05$, no risk premium mechanism $\alpha = 0$.(scenario 13, dashed lines) vs. stronger non-linearity in risk premium mechanism $\alpha = 0.1$ (Scenario 12, dotted lines).

definition. This option has been repeatedly proposed and been considered by the European Commission.[24]

This example also shows the importance of the risk-premium mechanism and the role of the nonlinearity. Increasing the nonlinearity of risk premia in bond markets contributes to considerably greater instability in the debt and deficit dynamics. Compared to the baseline scenario, fiscal sustainability is rapidly lost in this scenario. On the other hand, in the absence of the risk-premium, borrowing costs are considerably smaller than in the baseline scenario and remain essentially on their prefinancial crisis track. Fiscal sustainability is improved as debt and deficits are on a declining path and the primary fiscal balance gap is negative[Q7] (Figure 8).

Taken together, our analysis suggests that Belgium is finding itself at a crossroad currently: it faces the difficult choice of whether to embark upon a path of fiscal consolidation with substantial political costs or continuation of the status quo or fiscal slippage that would turn out to

24. See its recent Greenpaper on euro-bonds (European Commission (2011).

be harmful in the longer term. Political indecisiveness is a major risk if no clear vision and strategy emerges on budgetary adjustment in the near term and longer term. Macroeconomic vulnerabilities concerning growth and interest rates also loom and could threaten fiscal sustainability. Budgetary costs of aging, financial sector bailouts, and positioning of bond market participants (giving rise to an endogenous, instable risk premium mechanism) are additional potential sources of budgetary instability. Taken together with a high initial debt level, these constitute significant risks to budgetary sustainability in the longer run.

CONCLUSIONS

We constructed a simple budget framework to analyze the adjustment of fiscal variables in the context of the global financial crisis and economic slowdown of 2009–2011. Simulations with this simple framework in case of Belgium, provided a number of useful insights and policy implications that generalize quite directly to countries with similar difficulties in maintaining budgetary sustainability in the aftermath of the global financial crisis. Firstly, we showed the importance of interest rates and GDP growth rates for the dynamics of the fiscal variables in the longer run. Even a small reduction in interest rate or a small improvement of growth delivers important longer term gains in limiting/preventing the "debt snowball." Given that interest rates and economic growth are only indirectly under control of policymakers, fiscal prudence suggests that governments need to be very cautious regarding projections on interest rates and growth. One of the contributions of this paper is the inclusion of an endogenous risk premium to the interest rate-growth differential. The nonlinearity in the risk-premium and debt relationship leads to additional instability that could result in a "debt snowball."

Secondly, small changes in spending and revenues drive dynamics of fiscal balance and debt. We illustrated this with the effects of a temporary primary balance adjustment. Front-loaded budgetary efforts that seek to address fiscal sustainability in the near future, such as the significant Belgian fiscal consolidation program planned for the period 2012–2016, can contribute to regaining fiscal sustainability. Thirdly, potential risks and challenges exist in situations where several factors change at the same time. If they change in a negative direction creating a type of "worst case" scenario, adequate and swift adjustment will be needed to counteract the negative dynamics that will occur when the combined adversities reinforce the negative tendencies. Fourthly, aging costs constitute another clear risk to the medium and long run sustainability of public finance. Finally, one-time financial sector support measures that were carried out to support the Belgian financial sector, are not likely to be budgetary neutral and may generate longer term budgetary effects through their effects on interest burden and risk premia.

NOTE

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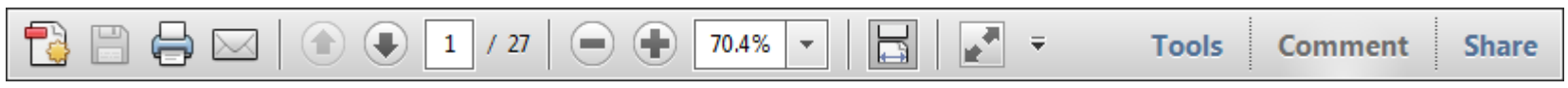

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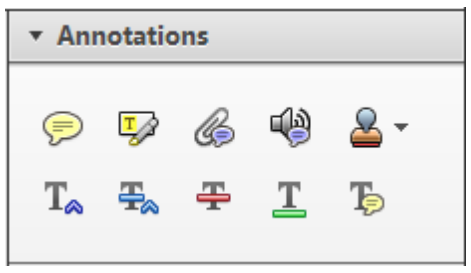

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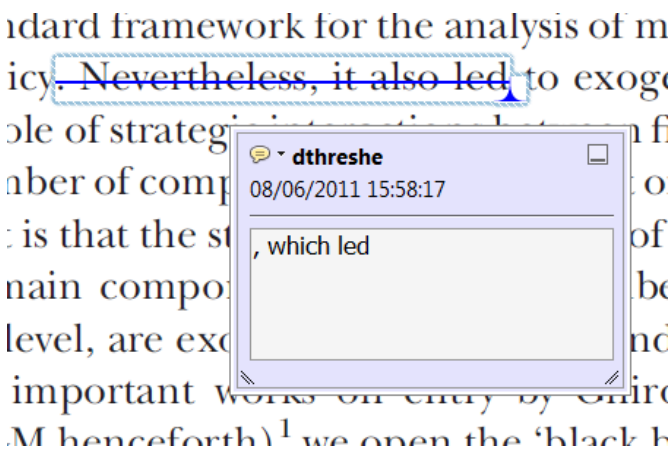

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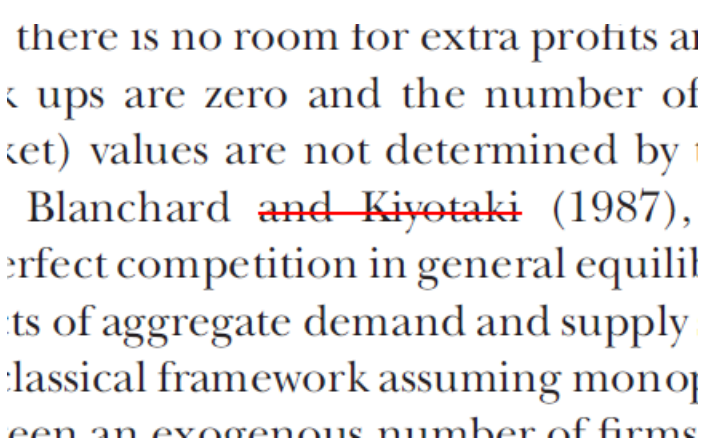

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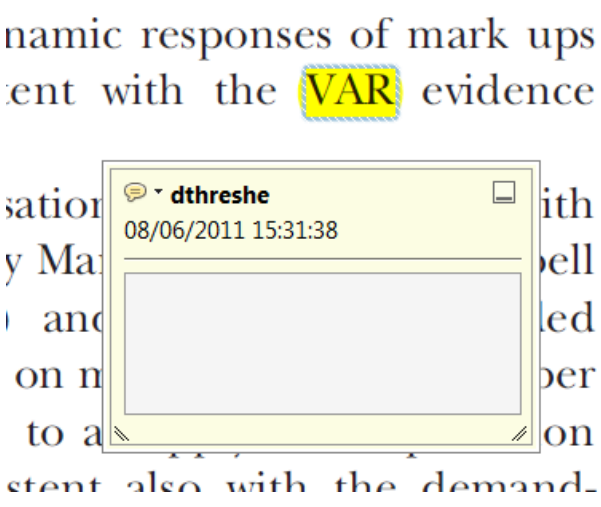

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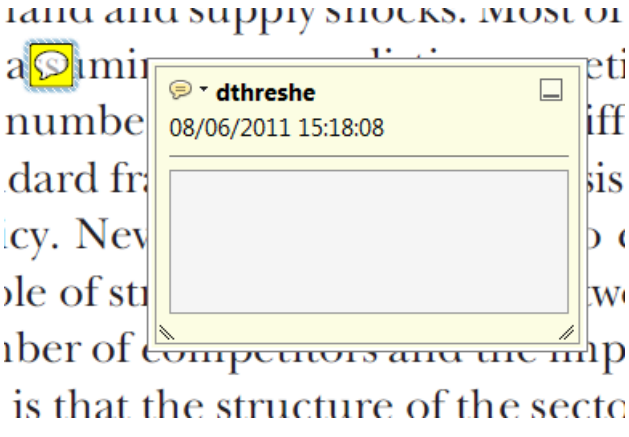

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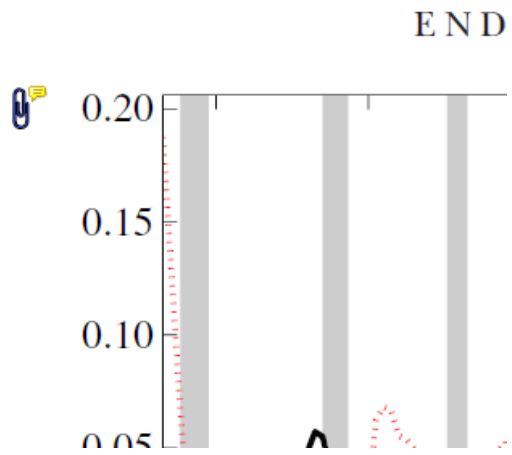

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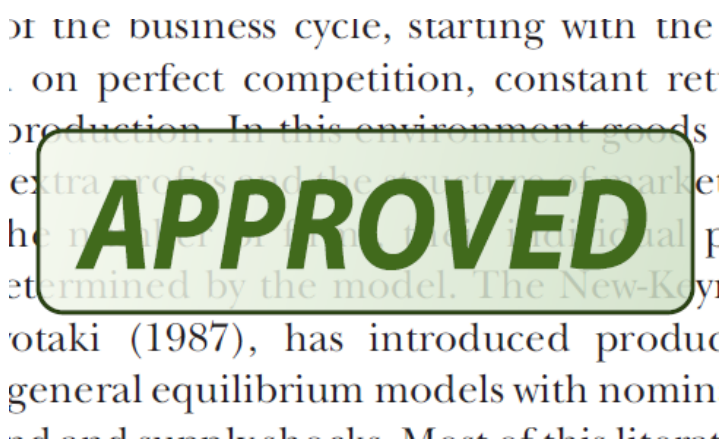

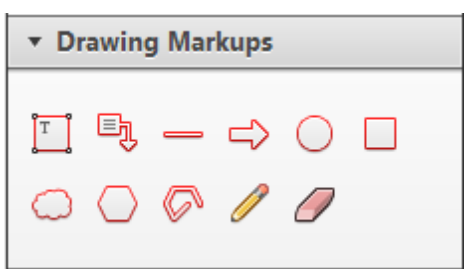

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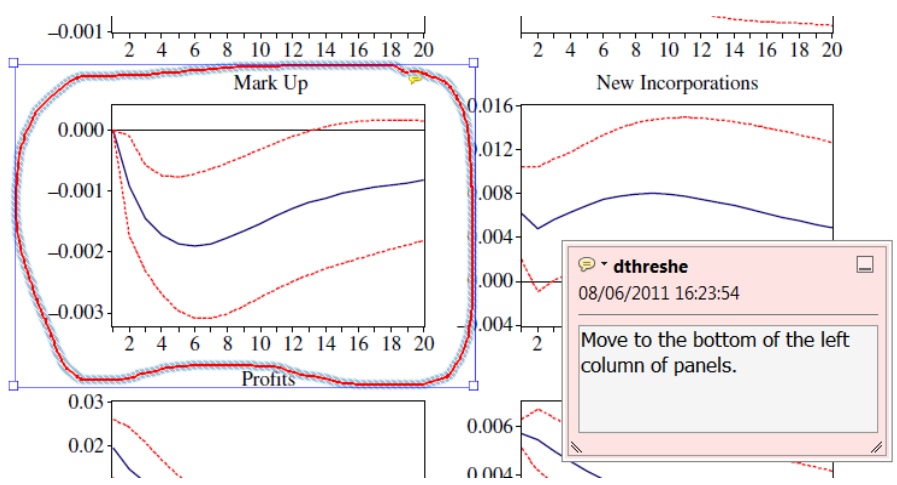

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