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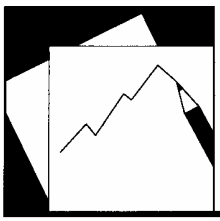

IMF Working Paper

An Approach to Long-Term Fiscal Policy Analysis

Steven Dunaway and Papa N'Diaye

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Asia and Pacific Department

An Approach to Long-Term Fiscal Policy Analysis

Prepared by Steven Dunaway and Papa N'Diaye[1]

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Abstract

This paper proposes an approach to setting fiscal policy that factors in the longer-term budgetary pressures that countries face owing, in particular, to population aging and rising health care costs. The approach attempts to overcome the difficulties in evaluating economic trade-offs and social welfare over extended periods. Long-term fiscal projections from the "Intergenerational Report" published as part of the Australian budget in May 2002 are used in a simple model of the Australian economy to illustrate some of the longer-term trade-offs that need to be considered in framing budgets over the medium term. These illustrative simulations, in particular, point out the importance of smoothing fiscal adjustment over time and, hence, the need for careful planning. Smoothing fiscal adjustment, however, raises a new set of questions regarding burden sharing across generations and what costs should be shared.

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Author's E-Mail Address: sdunaway@imf.org; pndiaye@imf.org

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Contents Page

I. Introduction

Most industrial countries face significant fiscal pressures over the longer term that are associated with population aging and rising health care costs. Although it is important to factor these long-term costs into medium-term fiscal policy decisions, it may be difficult to do so because of uncertainties about the magnitude of these costs and the timing of their impacts. At the same time, in setting a fiscal rule to accommodate these pressures, there are problems in evaluating economic trade-offs and social welfare over extended periods. To set such a rule effectively entails trying to determine an optimal level for the ratio of government debt to GDP and the appropriate time path for reaching this ratio, questions that have been particularly difficult to answer.

Attempts to capture the uncertainties associated with longer-term projections of fiscal costs have involved looking at the sensitivity of these projections to changes in key population and economic variables (such as fertility, mortality, migration, labor force participation, and productivity growth rates) and parameters affecting the cost of government programs (such as program participation rates and benefit payouts). A pragmatic approach to evaluating alternative debt-to-GDP ratios and time paths for achieving them has involved looking at simulations of models for a country's economy. By linking these two approaches, a framework for incorporating longer-term fiscal policy issues into medium-term fiscal policy formulation might be established. This combination could narrow the range of policy choices on which a medium-term strategy could be derived and periodically reviewed.

Long-term fiscal projections from the "Intergenerational Report" (IGR) published as part of the Australian budget in May 2002 are used in a simple model of the Australian economy to illustrate some of the trade-offs that need to be considered. These illustrative simulations, in particular, point out the importance of smoothing fiscal adjustment over time and, hence, the need for careful planning. The results presented here represent a very preliminary and partial application of a more comprehensive framework for incorporating longer-term fiscal policy issues into medium-term fiscal policy formulation. They point to many useful areas for further work. In particular, attempts to smooth fiscal adjustment over time raise a new set of questions regarding intergenerational burden sharing and what costs should be shared.

The remainder of the paper is organized as follows: Section II provides an overview of the difficulties in evaluating long-term fiscal pressures; Section III presents the sources of long-term fiscal pressures in Australia; and Section IV presents one approach for factoring those long-term fiscal pressures into Australia's medium-term fiscal policy framework.

II. Uncertainties in Estimating and Dealing with Long-Term Fiscal Pressures

Significant uncertainty surrounds projections of future fiscal costs. Because of delays in the implementation and impact of policy actions on macroeconomic variables and considerations of equity and efficiency, measures to counteract effects of population aging have to be taken today based upon projections of future paths of key variables such as:

fertility, mortality, migration, and labor force participation rates. They also entail important assumptions regarding key parameters affecting the cost of government programs.

One comprehensive way to take account of this uncertainty for formulating policy decisions is through stochastic simulation. This approach involves assigning probabilities to a large sample of key input parameters/variables combination, solving for the variables of interest (outcomes) for each sample, and then evaluating how these variables (outcomes) change within that sample, and drawing conclusions about the probability distributions of the variables of interest (United States, Congressional Budget Office, 2001). Simply put, this approach helps to determine the relative weight that should be given to each outcome when making budgetary choices to deal with the longer-term effects of population aging. A similar study has been done by Creedy and Scobie (2002) for New Zealand using detailed demographic estimates covering fertility, migration, and mortality rates disaggregated by age and gender. They evaluate the impact of alternative hypothesis about health costs, incorporating distributional parameters for all of the major variables to build up probabilistic projections for social expenditure as a share of GDP. Their results show a great deal of uncertainty surrounding projections of future increases in expenditures.

Even if longer-term costs were known with greater certainty, there would still be a problem in deciding on a fiscal policy rule or policy actions and their timing to effectively deal with these prospective costs. In essence, this problem involves trying to determine an optimal level for the ratio of public debt to GDP and the appropriate time path for achieving that ratio. The economic literature does not provide much in the way of definitive answers to solving this problem. Specific conclusions about optimal public debt levels and time paths have to be derived from hard-to-quantify economic trade-offs (particularly, intergenerational transfers) and alternative criteria for evaluating social welfare. Consequently, results vary widely depending on the approach adopted and the parameters assumed in the models. A more pragmatic (and practical) approach is to use economic model simulations of alternative debt paths to assess potential trade-offs (Swagel, Gonzáles-Hermosillo, and Li, 1998). Robson and Scarth (1999) took this type of analysis a step further by factoring in the effects of uncertainties about future economic outcomes and the structure of the economy. In an analysis of fiscal policy rules for Canada, they simulate their economic model using a large set of random disturbances to mimic economic cycles and the effects of transitory shocks. They also simulate using alternative values for key parameters in the model to capture the potential effects of mismeasurement of the structure of the economy.

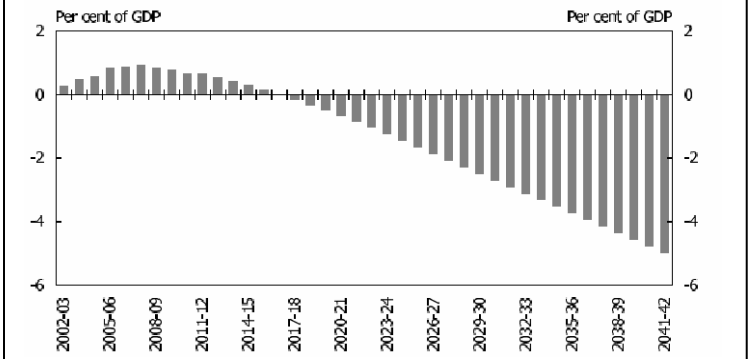
By linking the approaches to estimating costs reflecting uncertainties to the approaches used to evaluate trade-offs associated with alternative policy actions, a framework for incorporating longer-term fiscal policy issues into medium-term fiscal policy formulation might be established. Combining both sides could define a set of choices from which a medium-term policy strategy could be derived. This strategy would need to be re-evaluated at discrete intervals to reflect changes in the country's economic situation (which, for example, may be policy induced, such as measures to raise labor force participation rates or sustain productivity growth) and perhaps the increased certainty of some future costs as time passes. For instance, at five-year intervals the analyses of costs and policy trade-offs

could be repeated and the medium-term fiscal strategy adjusted to reflect new information and circumstances.

III. Sources of Long-Term Fiscal Pressures for Australia

Over the longer term, Australia could face renewed fiscal pressures due to rising health and aged care costs and the aging of the population. The Intergenerational Report estimated that, based on future demographic trends, declining labor force participation in older age brackets, and productivity growth at its historical average, a budget deficit would reemerge in the next decade, which could widen to about 5 percent of GDP by the end of a 40-year projection period (Figure 1). In the absence of adjustment, the ratio of net debt to GDP could reach 55 percent, an order of magnitude well above historical levels. Higher debt could raise real interest rates, lower investment, and ultimately have significant negative effects on output growth. This could add to the projected decline in output growth resulting from lower labor force participation in older age brackets.

Figure 1. Projection of Fiscal Gaps



Source: IGR, chart 4, page 7.

With an aging population and rising health and aged care costs, the IGR estimates that commonwealth spending could reach 27½ percent of GDP by 2041/42, compared with around 23 percent in 2001/02, with most of the increase expected to begin in the early 2020s. Some of the increase in spending would be due to increased pensions as the population ages. However, because government pensions provide only a supplemental safety net to retirement income from privately funded superannuation funds and voluntary savings, the resulting increase in pensions costs is envisaged to be moderate.[2]

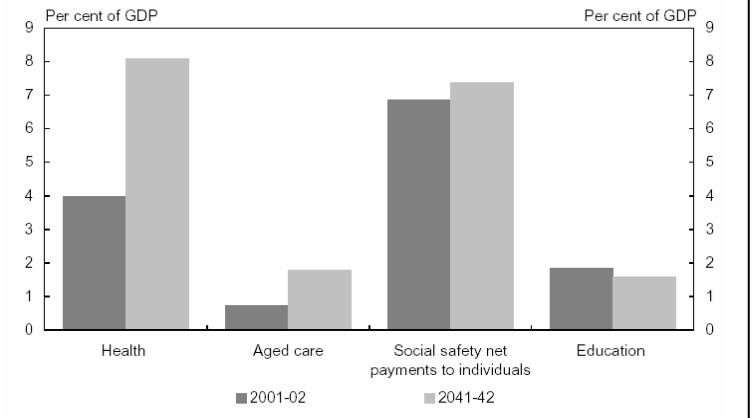
Health and aged care cost is the main driver of longer-term commonwealth spending. Over the last 30 years, commonwealth spending on health and aged care has increased markedly, reaching almost 5 percent of GDP in 2001/02 from around 2 percent in the early 1970s. The key cost driver has been the Pharmaceutical Benefit Scheme. Commonwealth spending on health and aged care is projected to almost double by 2041/42, reaching about 10 percent of GDP (Figure 2).

[2] For a detailed discussion, see Carey (1999).

Rising health care costs and population aging could lower growth in living standards and weaken budget balances. Various scenarios presented in the IGR show population aging would slow growth in real GDP per person to about 1½ percent per annum by the next decade, if recent trends in lower labor force participation in older age brackets continued and if productivity growth fell back to the average of the last 30 years (about 1¾ percent). Not only would the economy grow more slowly than currently, but also growing age-related public expenditures combined with revenues in line with the slower-growing GDP would increase fiscal pressures.

Substantial uncertainties surround the estimate of future fiscal costs in the IGR. For example, alternative scenarios in the IGR suggest that higher participation rates over the next 20 years, (towards the top of the Organization for Economic Cooperation and Development (OECD) member countries' current experience) could increase the level of GDP per capita by over 9 percent relative to the baseline scenario in the IGR by 2041/42. Reaching productivity growth of 2 percent per annum (halfway between the 30-year average of 1¾ percent and the 2¼ percent recorded over the past decade) could potentially provide a further 9 percent gain in the level of output. Under such scenarios, there would be no need for a fiscal adjustment to meet long-term fiscal costs beyond what is dictated by maintaining Australia's current fiscal policy framework of targeting budget balance over the cycle. These results illustrate the sensitivity of funding requirements to changes in underlying assumptions.

Figure 2. Projected Spending by Category



Source: IGR, Chart 19, page 33.

IV. An Illustrative Assessment of Long-Term Fiscal Policy Choices for Australia

Taking the cost estimates from the IGR as given, economic trade-offs from alternative fiscal adjustment paths can be examined using a simple model of the Australian economy based on the general specification in MULTIMOD, the IMF's multicountry macroeconomic model (key supply-side relationships for investment and output are explained in Box 1). In the model, higher longer-term government spending is associated with increases in future government liabilities in the absence of offsetting fiscal policy action, raising the level of debt. The increase in debt affects output mainly through its impact on the interest rate premium, defined as the difference between long-term interest rates on Australian government bonds and U.S. government bonds of comparable maturities. In addition, the premium is modeled as being influenced by the government debt-to-GDP ratio

and a variable that captures other factors that may affect the relative riskiness of Australian dollar-denominated assets. The relationship between the risk premium and the debt-to-GDP ratio is alternatively specified as a linear and a nonlinear relationship. Static simulations show the model properties under each type of relationship (Figure 3). With a linear relationship, a 10 percentage point increase in the debt-to-GDP ratio leads to a 10 basis point increase in the risk premium and lowers the level of output by about 0.4 percent. Under the assumption of a nonlinear relationship, an increase of a similar magnitude in the debt-to-GDP ratio raises the risk premium by about 21 basis points and lowers output by about 0.8 percent.

Dynamic simulations of the model were performed for four alternative scenarios (Figure 4).[3] The first scenario, the "baseline" scenario, uses IGR projections of future commonwealth spending that reflect changes in demographics and health and aged care costs and future revenues, which are assumed to remain a constant share of GDP, to derive the debt path. It is assumed that no actions are taken to offset the projected increase in spending relative to revenue (i.e., the budget is allowed to go into deficit). In this baseline scenario, the net debt-to-GDP ratio increases sharply over time, reaching 55 percent in 2042 from roughly zero in 2003. The bulk of the increase in debt occurs in the early 2020s, reflecting the expected steep rise in expenditures. The net debt-to-GDP ratio is assumed to remain constant at 55 percent beyond 2042.

The second scenario, the "balanced-budget" scenario, assumes that the government tries to maintain the debt-to-GDP ratio at zero by making the necessary fiscal adjustment (raising taxes and/or cutting expenditures) to counteract deviations of the projected increase in debt-to-GDP ratio from zero. In this scenario, the debt-to-GDP ratio reaches its target around 2008 and remains at that level thereafter, which requires fiscal policy adjustments. Such adjustments entail substantial economic costs. As Figure 4 illustrates, output is highly volatile.

[3] In these simulations, the linear specification of the risk premium is used. In addition to the risk-premium channel, output costs arise from the negative effects of the fiscal adjustments on aggregate demand. Individual consumers have model-consistent expectations about their future after-tax income streams but have also finite lives.

Box 1. Supply Side of Model: Key Equations

$$Y_t = \xi_t K_t^{\beta} L_t^{1-\beta} \quad (1)$$

$$K_t = I_t + (1-\delta)K_{t-1} \quad (2)$$

$$I_t = \left(\delta + g + \frac{q_t - 1}{\chi}\right)K_{t-1} \quad (3)$$

$$q_{t+1}K_t = q_t K_{t-1}\left[1 + r_t + \delta + rprem_t + (K_t / K_{t-1} - 1)\right] - \left[(1-\tau)\beta Y_t - \frac{\partial A_t}{\partial K_{t-1}} K_{t-1}\right] \quad (4)$$

$$A_t = \frac{\chi}{2}\left[\frac{I_t}{K_{t-1}} - (\delta + g)\right]^2 K_{t-1} \quad (5)$$

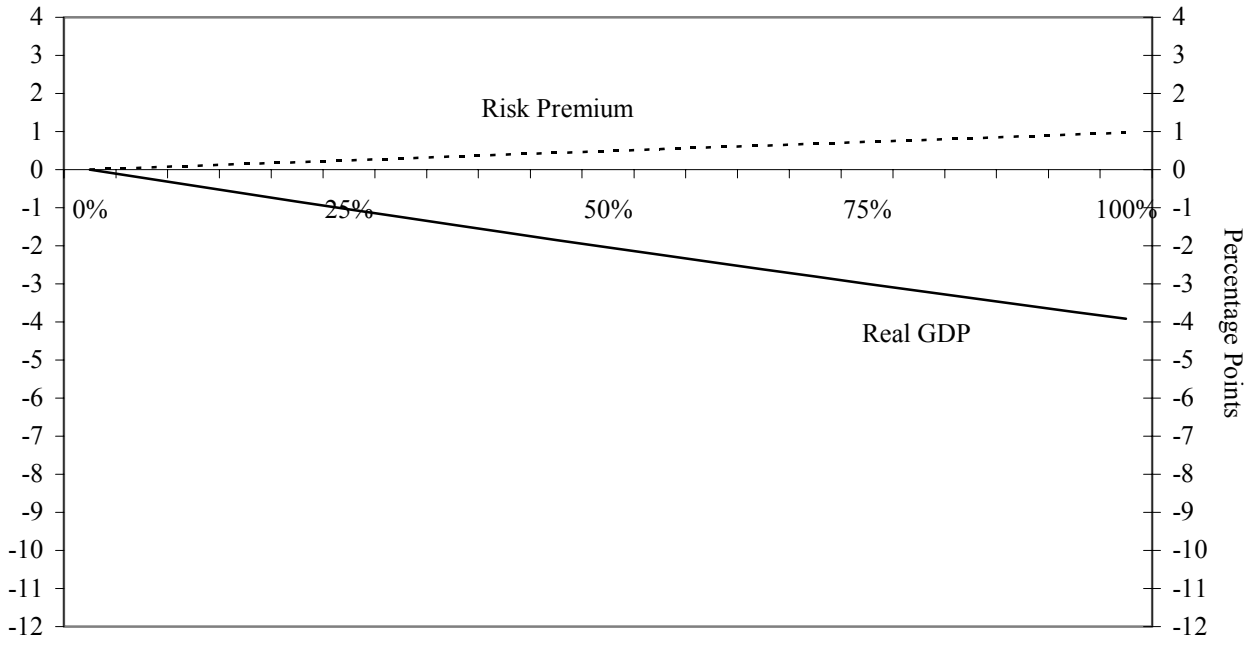
In equation (1), output is produced using a Cobb-Douglas production function with capital and labor as inputs. ξ, K, and L represent the level of total factor productivity, the stock of capital, and labor supply, respectively. β, the share of capital, is set to one-third. Labor supply is assumed to be exogenous and derived from the IGR projections of labor force and the unemployment rate.

In equations (2)-(5), the dynamics of the capital stock and investment are determined according to Tobin's Q theory, in which new investment is based on the relationship between the market value of capital and its replacement cost. In addition, it is assumed that there are costs to adjusting the capital stock.

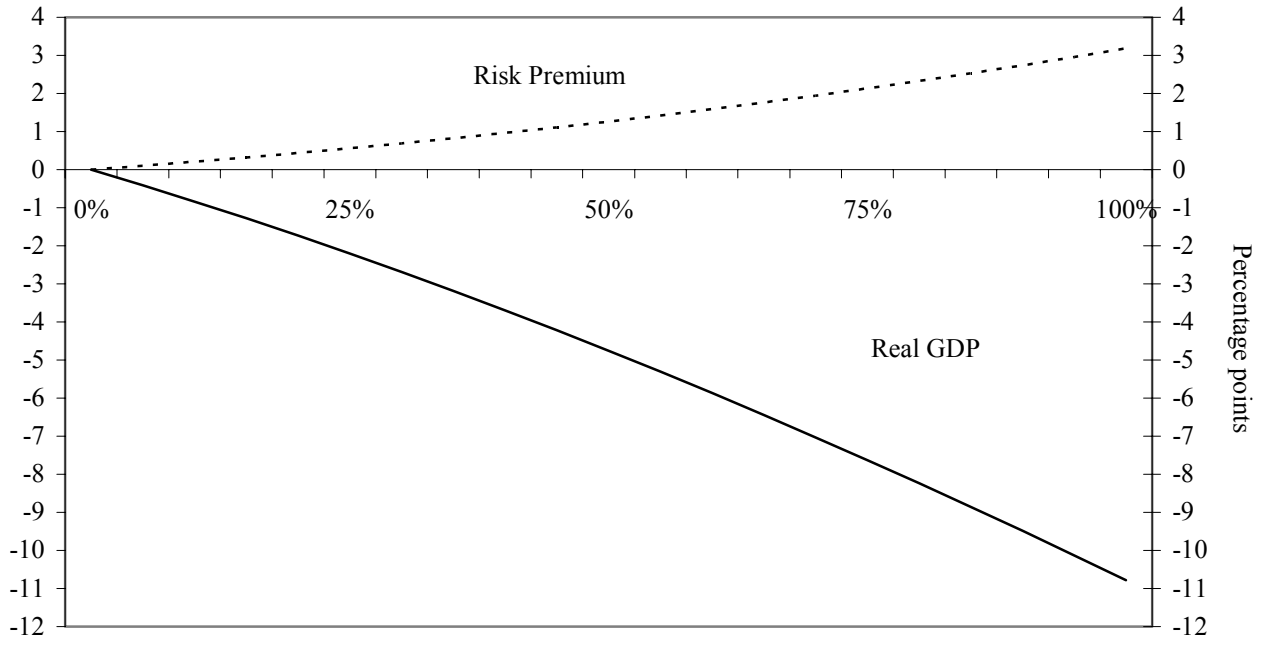
- Equation (2) defines the relationship between investment and the capital stock, where δ denotes the rate at which the stock of capital depreciates over time.
- Equation (3) sets investment as a function of Tobin's Q, and states that it is profitable to invest in new capital as long as q_t is greater than 1; g is the growth rate of output.
- Equation (4) states that the market value of the firm for each unit of capital today is determined by its expected value tomorrow, corrected for depreciation, and the difference between the expected discounted marginal profit and the marginal cost of adding new capacity. It indicates that the real value of today's capital stock is given by its discounted expected value tomorrow, augmented by the discounted after-tax income accruing to capital net of the real resources used to adjust the capital stock. The discount factor depends upon the real short-term interest rate, r_t, the rate of depreciation, the yield premium on capital, $rprem_t$, and the growth rate of the capital stock.
- Equation (5) defines the costs of adjusting the capital stock, which depends on the value of the parameter χ.

Figure 3. Long-Term Cost of Debt

Linear Risk-Premium Function.



Nonlinear Risk-Premium Function.



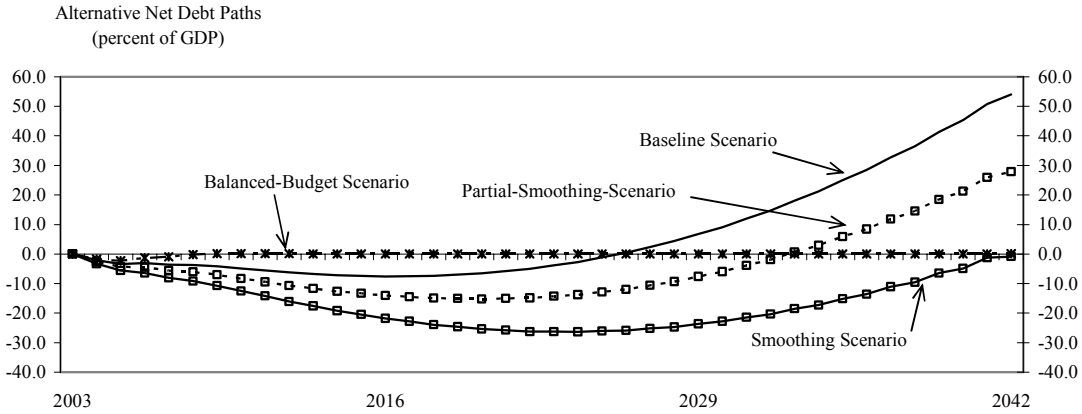
Source: IMF, MULTIMOD.

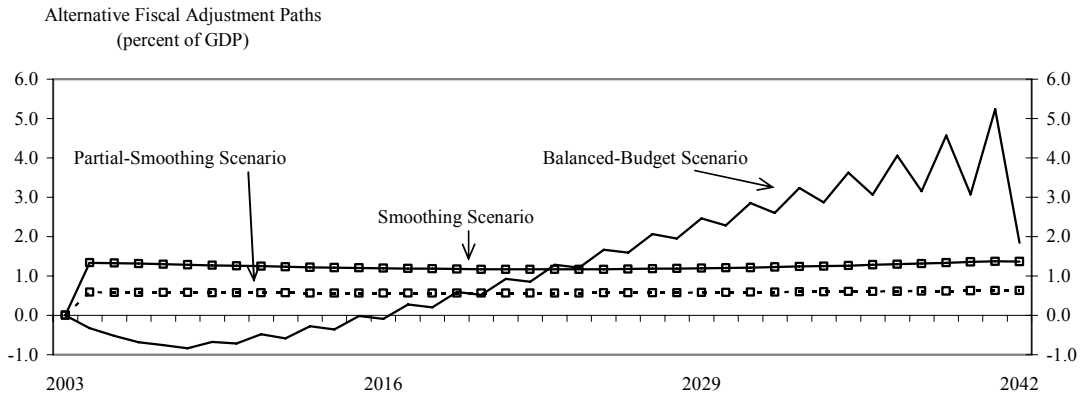
In the third scenario, the "adjustment-with-smoothing" scenario, the government deals with the problem of output volatility and achieves a zero-debt target over the long run by smoothing fiscal adjustment over the period to 2042. The smoothing is achieved by using the 39-year period 2004–42 to determine the required annual adjustment rate relative to baseline, amounting to about 1¼ percent of GDP. Although there are transitional output costs associated with this adjustment, they are shorter lived than in the "balanced-budget" scenario. This adjustment-with-smoothing scenario entails a substantial build up of government assets during the period, reaching a peak of around 26 percent of GDP in 2021, before going back to the zero-debt target in 2042.

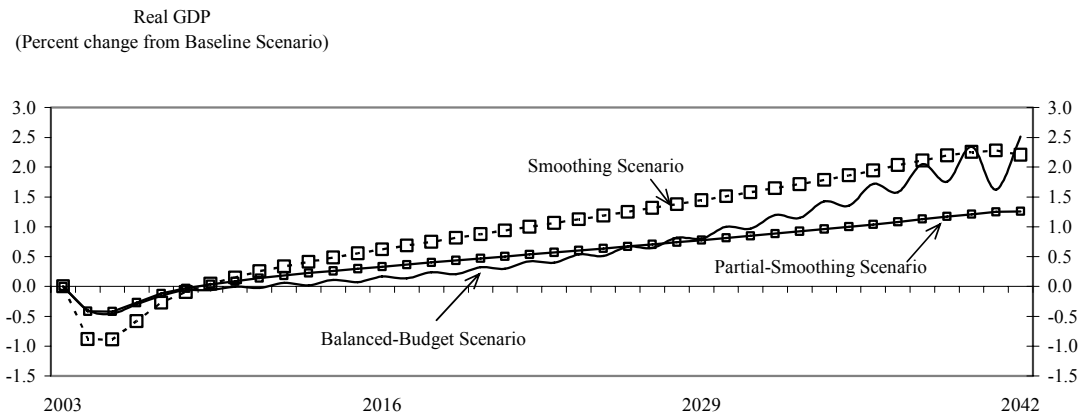
In the final scenario, "the partial–adjustment-with-smoothing" scenario, the government aims to smooth the fiscal adjustments. However, uncertainties regarding future costs and time preferences (reflecting burden sharing across generations and some time-discount factor, since the heaviest burden of population aging comes roughly 20 years in the future) lead the government to only partially adjust for the fiscal costs over the entire period to 2042. In this scenario, an average annual fiscal adjustment of one-half of 1 percent of GDP is assumed. Accordingly, the net debt-to-GDP ratio is at 27½ percent of GDP in 2042, compared with zero in the third scenario. This scenario engenders output marginally lower than in the adjustment–with-smoothing scenario but higher than in the balanced-budget scenario, suggesting potential trade-offs between the smoothing rule and the objective for the net debt-to-GDP ratio.

Smoothing fiscal pressures over time can also be viewed as a means of sharing the burden across generations. To do so, however, raises equity considerations, involving the question as to which expenditures should be spread across generations and which should be borne largely by individual generations. No attempt has been made to answer this question in the scenarios presented here.

Figure 4. Alternative Fiscal Adjustment Scenarios







Source: IMF, MULTIMOD.

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