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# IMF Working Paper

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## Policy Challenges of Population Aging in Ireland

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## **IMF Working Paper**

European Department and Fiscal Affairs Department

### **Policy Challenges of Population Aging in Ireland**

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Authorized for distribution by James Morsink and Steve Symansky

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#### **Abstract**

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The projected rise in age-related government spending as a share of GDP in Ireland over the next forty years is among the highest in the euro area. In the absence of reforms, public debt will increase to unsustainable levels. This paper uses the IMF's Global Fiscal Model to compare the macroeconomic effects of different fiscal strategies to accommodate the rise in age-related spending. The simulations suggest that adopting a package of measures, including an increase in the retirement age, broadening the tax base, and raising indirect taxes, would be a more growth-friendly strategy than relying exclusively on raising the social security contribution rate.

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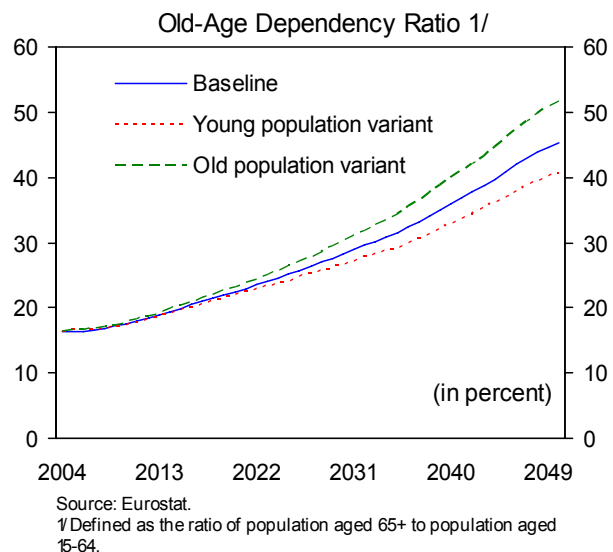
## I. INTRODUCTION

Ireland will experience rapid population aging in the coming decades. This demographic trend is expected to put significant pressure on public finances. The European Commission's Aging Working Group (AWG) projects that age-related spending would increase by 8 percentage points of GDP by 2050, with most of the increase accounted for by a rise in pension expenditure. In its 2006 report *Special Savings for Retirement*, the Pensions Board in Ireland proposed a substantial increase in the generosity of the pension system which, if endorsed by the government, would translate into an even steeper rise of age-related expenditure. At the same time, the expected decline of the population of working age in the long run could reduce the social security contributions base.

This chapter attempts to assess the fiscal and macroeconomic implications of the projected increase in age-related spending. To prevent a rapid build-up of debt, the rise in expenditure on pensions and health will need to be offset by a reduction of other public spending, substantial tax increases, and/or benefits reform. The IMF's Global Fiscal Model is applied to quantify and compare the effects of alternative fiscal adjustment strategies on employment and growth.

## II. DEMOGRAPHIC TRENDS AND FISCAL PRESSURES

The elderly dependency ratio in Ireland is expected to triple by 2050. Based on Eurostat's central projection, the elderly dependency ratio would increase from 16 percent in 2006 to 45 percent in 2050. The population of working age is projected to begin declining gradually by mid-2030, although total population growth will remain positive until 2050. Under two alternative set of assumptions ("young population" and "old population"), the dependency ratio would increase to 41 percent and 52 percent respectively.<sup>2</sup>

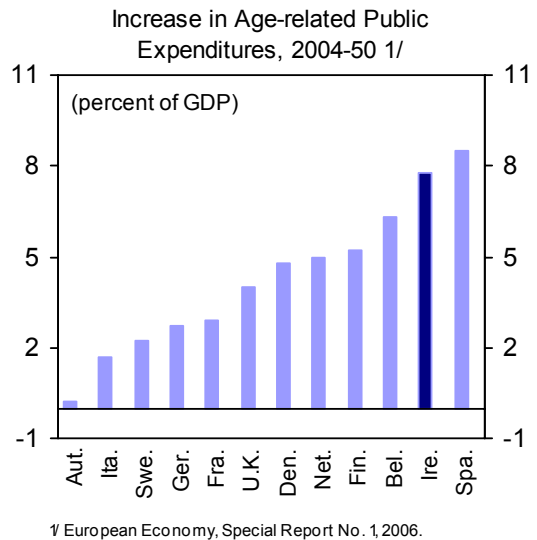


<sup>2</sup> The central projection assumes a mild decline in the birth rate from 1.98 to 1.8; an increase in average life expectancy by more than 6 years; and net migration inflows of 0.4 percent of the population annually in the medium term, declining to about ¼ percent of the population in the long term. The "younger population" projection assumes that the birth rate increases to 2, higher net migration flow, and lower increase in life expectancy than the central projection, while the "older population" version assumes that the birth rate declines to 1.6, lower migration, and higher life expectancy than in the central projection.

These demographic trends would lead to a substantial rise in age-related expenditure. In recent years Ireland's public pension system has become progressively more generous. The flat-rate pension value increased from

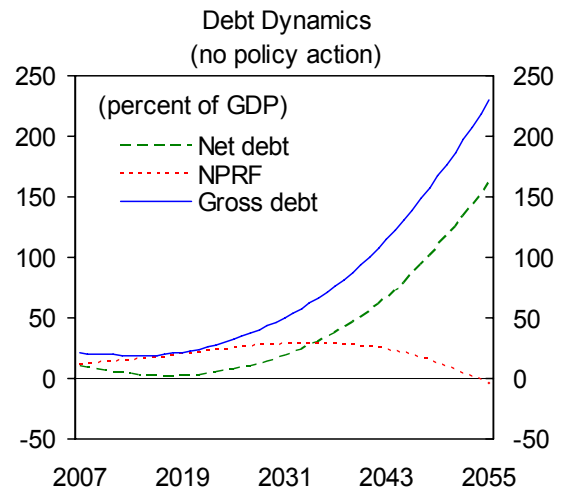
27 percent of gross average industrial earnings (GAIE) in 1997 to 34 percent of GAIE in 2007.<sup>3</sup> Assuming that the ratio of pension benefits to GAIE remains broadly at the 2007 level, the latest Stability Report projects that annual pension expenditure would increase by 6.5 percentage points of GDP between 2005 and 2050. Over the same period, health and long-term care expenditure is projected to increase by 2.6 percentage points of GDP. The rise in old-age spending is expected to be offset, in part, by a decline in education expenditure (of about 1 percent of GDP). These projections use the

same methodology and assumptions as the European Commission's Aging Working Group (EC Special Report No 1, 2006). Even though Ireland has a less generous pension system than many EU countries, it will experience the second largest increase in age-related spending (see chart) since a number of other countries have recently introduced reforms that would reduce the effective benefit levels and remove incentives for early retirement.



In the absence of fiscal adjustment, debt would grow to unsustainable levels. The chart on the right illustrates the debt dynamics, taking as given the central AWG projections for age-related expenditure and assuming that all other revenue and expenditure stay constant as a share of GDP. The calculation makes the following assumptions:

- The fiscal surplus gradually declines to zero by 2011 (since the stated medium-term goal is fiscal balance), the real interest rate is assumed to be 3 percent, and the real growth rate is the same as that assumed by the AWG (declining from about 5 percent in the near term to about 1½ percent in the long term).
- Based on announced government



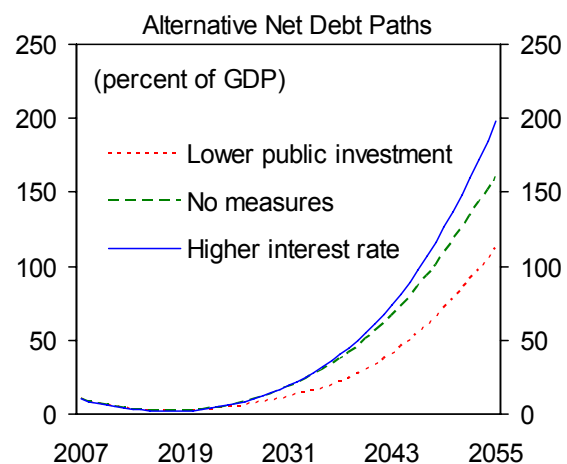
<sup>3</sup> Ireland's pension system is a flat-rate benefit system, with most people above 65 (or 66) eligible for either a contributory or a non-contributory pension benefit. There is no formal indexation system.

policy, the fiscal authorities are assumed to contribute 1 percent of GNP to the National Pensions Reserve Fund (NPRF) every year until 2055. The increase in the age-related spending is covered by debt issuance until 2025. After 2025, further rises in pension expenditure are financed by withdrawal from the NPRF, while the rise in other age-related expenditure is covered by debt issuance. Under such withdrawal assumptions, the NPRF would be exhausted shortly after 2050.

- Age-related expenditure as a ratio to GDP is assumed to stabilize after 2060 (with the increases in expenditure gradually declining to zero between 2050 and 2060). In the absence of reliable projections for the very long term, that will be the scenario used for the simulations in this paper.<sup>4</sup> In practice, it would be desirable to provide population projections and expenditure estimates of age-related spending over a horizon at least equal to the average life expectancy (similar to the practice of the US Social Security Board of Trustees).

There is substantial uncertainty around this “no policy action” scenario. On the upside, the assumption that all non-age-related expenditure would remain constant may be too pessimistic. Ireland is upgrading its infrastructure and currently maintains a relatively high level of public investment. It is reasonable to assume that eventually the investment rate will decline. The dotted line in the chart illustrates the level of net debt, assuming that public investment as a share of GDP gradually declines to the euro area average after 2020. On the downside, some of the assumptions

underlying the age-related expenditure projections may be too optimistic. For example, the AWG projections assume a substantial increase in labor participation and employment rates, which may be unrealistic. The health care projections assume that per capita costs would grow at the same rate as wages, while the experience of many countries suggests that health care costs tend to grow faster than wages. Finally, it may be unrealistic to assume that the real interest rate on debt would remain at 3 percent as debt grows (especially if the process of simultaneous aging in many advanced economies leads to a shortage of savings and a rise of the worldwide risk-free rate). The solid line shows the accumulation of debt assuming that the real interest rate gradually increases from 3 to 5 percent.



<sup>4</sup> Such scenario would be equivalent to the outcome of a policy of automatic indexation of the retirement age to increases in the old-age dependency ratio beyond 2060.

In practice, fiscal adjustment to address the rise in aging-related costs is likely to take place before debt rises to unsustainable levels. In the analysis that follows, the macroeconomic effects of two strategies are compared. In the first strategy, fiscal consolidation is achieved by a gradual reduction in public investment after 2020, combined with an increase in social security contributions. In the second strategy, consolidation is achieved by a combination of measures: a gradual reduction in public investment, an increase of the retirement age, income tax base broadening, and an increase of the VAT tax rate. Finally, the desirability of greater prefunding of pension liabilities is discussed.

### III. ANALYTICAL FRAMEWORK

A two-country version of a dynamic general equilibrium macro model, calibrated to the Irish economy, is used to assess the macroeconomic impact of fiscal policy. In the Global Fiscal Model (GFM), the effect of fiscal policy on real activity reflects responses from both aggregate demand and aggregate supply.<sup>5</sup> The model features the following departures from Ricardian equivalence:

- Consumers have finite horizons. As a result, even temporary changes in fiscal policy may affect consumption because any offsetting action required by the government's intertemporal budget constraint would be (in part) borne by future generations.
- A fraction of consumers are liquidity constrained. Liquidity-constrained consumers do not save and cannot borrow, and, therefore, any change in fiscal policy that affects their disposable income immediately changes their consumption as well.
- Taxes are distortionary, affecting labor supply and savings-investment patterns.

### IV. THE EFFECTS OF ALTERNATIVE ADJUSTMENT STRATEGIES

In the simulations, it is assumed that the government aims to maintain the gross debt-to-GDP ratio close to its current level. In the long term, this strategy is equivalent to maintaining a constant net debt-to-GDP ratio since, once the NPRF is exhausted, gross and net debt levels converge. Allowing debt to build up to a higher level before attempting to stabilize it is not inconsistent with sustainability, but the primary surplus (and the fiscal measures) necessary to support a higher debt level would be greater. In all scenarios, the maintained assumption is that the ratio of public investment to GDP will decline gradually to the euro area average after 2020 (a reduction of about 1½ percentage points of GDP).

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<sup>5</sup> See Botman and others (2006) for detailed description of the model, and Appendix I for the calibration for Ireland. Aggregate demand effects arise from the fact that consumers are impatient. Aggregate supply responses result from the distortionary effects of taxation.



In the first strategy (“the baseline”), the social security contribution rates are increased gradually to keep gross debt broadly constant.<sup>6</sup> Keeping gross debt constant would require a fiscal surplus of around  $\frac{1}{3}$  percent of GDP throughout the period. This can be achieved by raising the social security contribution rate by about 7 percentage points in the next 15 years. It can remain at that level until the NPRF runs out, since the rise in pension expenditure after 2025 is assumed to be financed from the NPRF (and the reduction in public investment after 2020 offsets the rise in health-related expenditure). After the NPRF is depleted, the social security rate needs to increase by about 20 points relative to its starting value (and even by more if age-related spending continues to rise after 2060).

The increase in social security contribution rates would have a negative effect on labor supply. Assuming labor elasticity to after-tax wages close to the middle of the range of existing estimates, labor supply would fall by  $3\frac{1}{2}$  percentage points due to the distortionary effects of labor taxes. In reality, labor supply could decline by more than that towards the end of the period, as the population of working age starts to shrink.<sup>7</sup> Despite the fall in labor supply, aggregate demand is likely to remain relatively high for most of the period. The reason is that after 2025, the increase in transfers to the population exceeds the increase in taxes as pension assets are distributed.

In the second strategy, fiscal sustainability is achieved through a combination of measures. Given the magnitude of the required increase of the social security contribution rate, it may not be feasible to rely only on this measure to achieve fiscal sustainability. In this alternative scenario, the combined effect of several measures is illustrated: a reduction in public investment of  $1\frac{1}{2}$  percentage points of GDP after 2020, an increase of the pension age by 2 years phased in gradually between 2033 and 2050 (it will affect those 40 years and younger in 2007), an income tax base broadening over the period 2021–24 (increasing revenues by about  $\frac{1}{4}$  percentage points of GDP), and a gradual increase in VAT to maintain gross debt broadly at its current level. In this scenario, the VAT rate would need to be raised by 4 percentage points by 2020, and by another 4 percentage points after the NPRF is exhausted.<sup>8</sup>

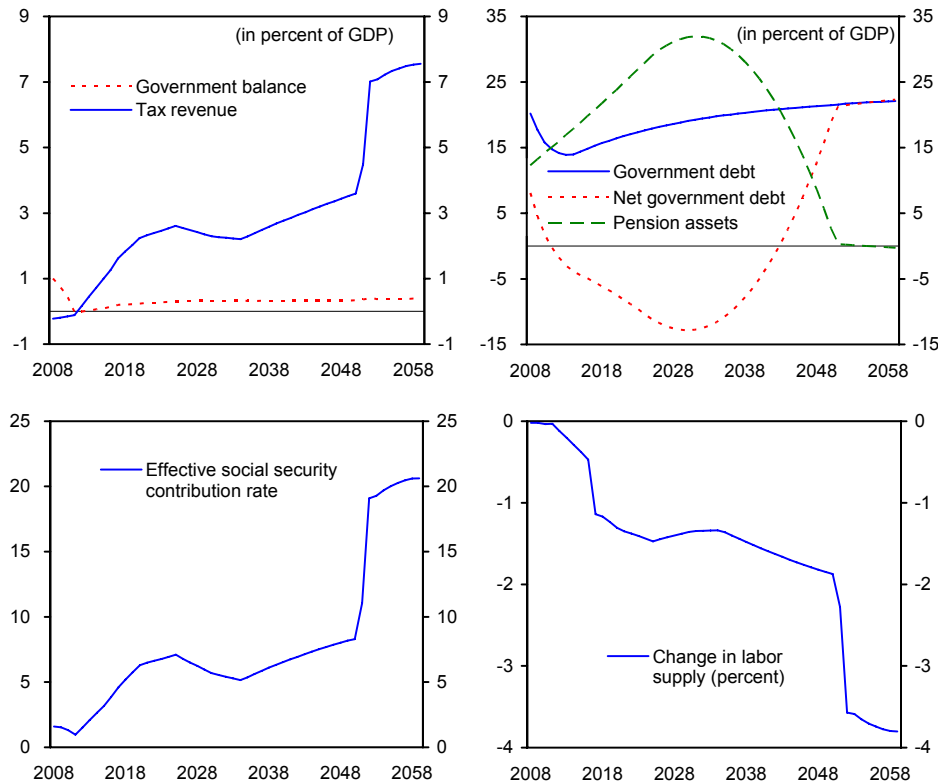
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<sup>6</sup> Even though in Ireland there is no requirement that the social security accounts should be balanced, raising the contribution rates to match, at least in part, the increase in outlays could be considered the default strategy.

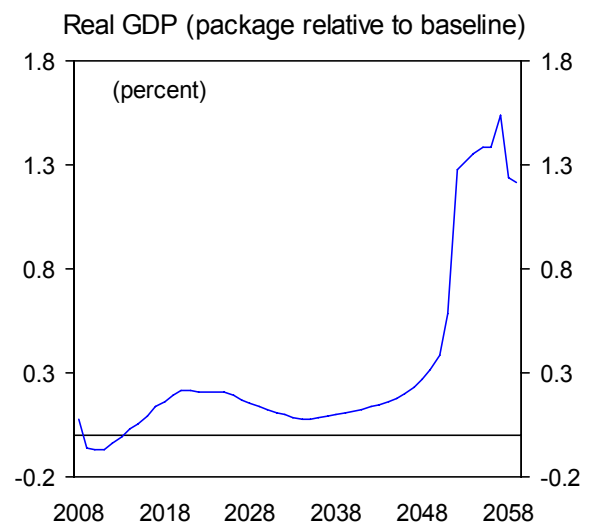
<sup>7</sup> In the simulation it was assumed that the social security contributions levied on workers are increased. However, the growth effects would be the similar if the payroll taxes on employers were increased instead.

<sup>8</sup> The model allows for other taxes as well, including a tax on profits, although it is not included in the suggested package of measures. Capital is more internationally mobile than labor, so raising taxes on returns to capital could not only lower investment, but also lead to an exit of capital. The suggested package of measures is illustrative, and other options could be considered in practice, such as a higher increase of the retirement age and/or changes in other indirect taxes (property taxes for example).

## Strategy 1: Raising the Social Security Tax Rates



Implementing this package of measures is more growth-friendly than raising the social security contributions. The increase of the retirement age is equivalent to a reduction in (the lump sum) social security transfers. As a result of budgetary savings from this measure, a smaller increase in distortionary taxes would be required. In addition, reducing income tax exemptions (tax base broadening) is less distortionary than raising the marginal tax rates. Similarly, the VAT is less distortionary than payroll taxes (social security contributions could be considered equivalent to a payroll tax) since it has a broader tax base—accumulated savings are also taxed—therefore the rates would not need to be increased as much. Shifting revenue from direct to indirect taxation is beneficial for employment and growth. Raising the VAT is especially appealing in an aging society where, while the direct tax base contracts, the indirect tax base is likely to be more stable. The chart on the right compares the growth



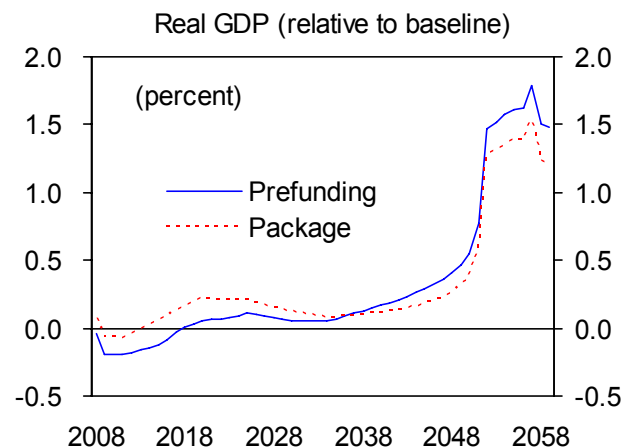
effects of the package relative to the baseline. The results are relatively robust to variations in the model assumptions (Appendix II).

In general, policies that help raise productivity and labor participation would help ameliorate the growth effects of fiscal adjustment. Such policies include increasing the flexibility of labor markets, ensuring greater competition in product markets, and encouraging investment in education and research (in addition to changes in the structure of taxation and raising the retirement age). Higher net migration flows (especially if the immigrants are relatively young) would increase GDP growth and could improve the fiscal position in the short run, but the effects would be temporary since the immigrants would also age.<sup>9</sup>

Greater prefunding of age-related liabilities could also be considered. It can be implemented either by adding more than 1 percent of GNP to the NPRF or by a reduction of gross debt. These two options are equivalent if the interest rate on debt is the same as the rate of earnings on the pension assets, although accumulating assets may be preferable to gross debt reduction from a political economy perspective. Higher prefunding may be desirable for a number of reasons. First, intergenerational equity could improve. A pay-as-you-go system results in a falling ratio of benefits to contributions as the elderly dependency ratio starts to rise. Second, aging will occur simultaneously in many

countries, which may result in an increase of the world interest rate.<sup>10</sup> If that happens, having a lower public debt (or higher net assets) would be even more beneficial. Lower debt would also lead to a smaller crowding out effect. Finally, greater prefunding serves as insurance in case the actual increase in age-related spending is higher than projected. Prefunding would result in some output loss in the short run (since taxes would be initially higher than in

the absence of prefunding), but in the long run output would be higher than otherwise. For example, if the fiscal surplus is maintained at its current level (about 1 percent of GDP) until 2050, net debt would be close to zero at that horizon and fiscal balance can be maintained thereafter. See the chart for the growth effects of that strategy relative to the package of measures discussed earlier (resulting in a surplus of  $\frac{1}{3}$  percent of GDP).



<sup>9</sup> See Fehr and others (2004) and Iakova (2007).

<sup>10</sup> Ford and Laxton (1999) find that 12.5 percent increase in debt in the OECD raises the real interest rate by 100 basis points. Botman and Kumar (2007) illustrate the effect of global aging pressures on an individual country's debt dynamics.

## V. PENSION BOARD PROPOSALS

The Pensions Board recently has proposed expanding the generosity of the pension system. The Pensions Board (which consists of representatives of all social partners) has identified as an issue the fact that a substantial fraction of the Irish population does not have private retirement savings and therefore relies entirely on the public pension system, which may not provide sufficient means for retirement. In a 2006 report, the Pensions Board has proposed to address this issue either by (i) increasing the generosity of the public pension system,<sup>11</sup> (ii) creating a compulsory private pension system with some government involvement or, (iii) a combination of the two.

The generosity of the public pension system is a matter of social preference, however, the fiscal and growth implications of changes to the system need to be considered carefully. The average replacement rates in Ireland are higher than those in the United Kingdom, but lower than in some continental European countries. The thinking behind the current system in Ireland is that the key role of the public pension system is poverty prevention, while the responsibility to ensure a desirable (higher) level of income after retirement is borne by the individual. Some of the Pension Board proposals, if implemented, would change the nature of the public pension system to one that attempts to ensure a desirable level of income. Depending on the degree of public funding, the expansion of the pension system could have negative effects on the fiscal position and growth greater than the effects discussed in the above analysis.<sup>12</sup> Many continental European countries, which aimed to provide a desirable level of income, have recently implemented politically difficult reforms to curtail the generosity of their pension systems.

## VI. CONCLUSIONS

Looking forward, a key policy challenge will be to balance social priorities with the need to maintain a competitive and vibrant economy. The main findings of this analysis are the following:

- Substantial fiscal measures will be required to prevent a build-up of debt as age-related spending rises. If the increase in expenditure is matched mainly by a rise in social security contributions, a very large increase of the contribution rate would be necessary. A rise in the tax burden of that magnitude would have a negative impact on labor supply. The model simulations suggest that using a package of measures, including an increase of the retirement age, could be a more growth-friendly strategy.
- Ireland has the advantage of starting from a healthy fiscal position. Careful planning could help ameliorate the long-term fiscal pressures. For example, targeting a small

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<sup>11</sup> The proposed goal is to increase the flat rate pension from 34 percent of GAIE to 50 percent of GAIE.

<sup>12</sup> See the analysis of ESRI and Fitzpatrick Associates in Appendices A and B of Pensions Board (2006).

fiscal surplus (as opposed to balance) in the medium term would reduce the magnitude of the required adjustment in the long term. To safeguard fiscal saving, an increase in the annual contribution to the NPRF could be considered.

- The regular publication of a sustainability report, detailing the long-term fiscal projections, the risks around them, and possible measures to address the fiscal effects of aging, could be beneficial.<sup>13</sup> It could inform public opinion, provide a vehicle for early discussion of the costs and benefits of various fiscal measures and reform options, and help overcome any bias towards short-term planning.

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<sup>13</sup> While Ireland's annual Stability Program already includes long-term projections, a more detailed report could discuss the risks around the projections, possible policy measures to address long-term fiscal pressures, and the appropriate medium-term fiscal target.

## Appendix I.

### Parameterization of the Global Fiscal Model

The model is parameterized to reflect key macroeconomic features of Ireland. In particular, the ratios of consumption, investment, government spending, wage income, and income from capital relative to GDP are set to their values in 2006. Similarly, key fiscal variables—revenue-to-GDP ratios from taxation of corporate, labor, and personal income and from consumption tax, as well as government debt and current government spending—have been calibrated to Ireland’s fiscal structure. The size of the Irish economy relative to the world economy is such that Irish policies would have only a minimal impact on the global rate of interest.

Key behavioral parameters are based on microeconomic evidence.<sup>14</sup> These include parameters characterizing real rigidities in investment, markups for firms and workers, the elasticity of labor supply to after-tax wages, the elasticity of substitution between labor and capital, the elasticity of intertemporal substitution, and the rate of time preference.

Simulations examine the impact of changing the values of the following key parameters:

- The wedge between the rate of time preference and the yield on government bonds. This parameter, which determines consumers’ degree of impatience, has not been subject to extensive microeconomic analysis. The baseline value of the wedge is set to 10 percent (corresponding to a planning horizon of 10 years), with an alternative simulation using 1 percent, corresponding to a planning horizon of 100 years.
- The fraction of liquidity-constrained consumers. The baseline assumes that 40 percent of consumers experience liquidity constraints. These consumers have no wealth and consume one-fourth of aggregate consumption. An alternative simulation assumes that 10 percent of individuals are liquidity constrained.
- The sensitivity of labor supply to the real after-tax wage (Frisch elasticity). The baseline value (-0.1) suggests relatively elastic labor supply. An alternative simulation assumes almost completely inelastic labor supply (-0.01).
- The elasticity of intertemporal substitution. The baseline value for this parameter, which describes the sensitivity of consumption to changes in the real interest rate, is -0.33. The parameter value in the alternative simulation (-0.25) is consistent with the lower end of microeconomic estimates. Other main aspects of the model are as follows:

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<sup>14</sup> The structural parameters have been calibrated using evidence from Laxton and Pesenti (2003) and Batini, N’Diaye, and Rebucci (2005).

- Consumption and production are characterized by constant elasticity of substitution functions. Firms and workers have some market power, so that prices and wages are above their perfectly competitive levels.
- The presence of traded and nontraded goods allows for a bias toward domestic goods in private or government consumption.
- There are two factors of production—capital and labor—that are used to produce traded and nontraded goods. Capital and labor can move freely between sectors but are not mobile internationally.
- Investment is driven by Tobin's  $Q$  with adjustment costs. Firms respond sluggishly to differences between the discounted value of future profits and the market value of the capital stock.
- Wages and prices are fully flexible. As a result, monetary policy is ineffective.

There are two kinds of financial assets, government debt (traded internationally) and equity (held domestically). In the standard version of the GFM, international trade in government debt implies the equalization of nominal interest rates across countries as capital markets are fully integrated. Alternatively, however, the model can be specified such that it contains a risk premium that depends on the level of public debt.

## Appendix II.

### Sensitivity Analysis

The results for the growth effects of the package of measures versus the baseline are relatively robust to variation in the model assumptions (Table A1). Only if labor supply is inelastic, there will be little difference between the two strategies, since raising social security contributions will not cause significant changes in labor supply. Consumption smoothing is more important with a lower intertemporal elasticity of substitution, therefore payroll taxes distort the labor-leisure choice by less in this case, reducing the beneficial effects of the adjustment package modestly. A longer planning horizon and/or fewer rule-of-thumb consumers, in principle, make the model more Ricardian and reduce the crowding-out effects associated with higher debt. However, since net debt changes broadly by the same amount in the two strategies, changing the horizon does not affect the significantly the relative benefits.<sup>15</sup>

Table A1. Sensitivity Analysis  
(Deviation of real GDP from baseline in NPV terms) 1/

	Package
Baseline parameter values 2/	9.3
Longer planning horizon 3/	10.4
Fewer rule-of-thumb consumers 4/	9.2
Less elastic labor supply 5/	2.1
Lower intertemporal elasticity of substitution 6/	5.3

Source: GFM simulations.

1/ Baseline increases social security contributions on workers and employers; sum of discounted deviations of real GDP from adjusting through a package or prefunding relative to the baseline; discount rate equal to market interest rate as determined in the model simulations.

2/ Planning horizon: 10 years; fraction of rule-of-thumb consumers equal to 40 percent; moderately elastic labor supply ( $\eta = 0.90$ ); and intertemporal elasticity of substitution equal to  $1/3$ .

3/ Planning horizon equal to 100 years.

4/ Rule-of-thumb consumers equal to 10 percent.

5/ Inelastic labor supply ( $\eta = 0.99$ ).

6/ Intertemporal elasticity of substitution equal to 0.25.

<sup>15</sup> In fact, the small improvement of the performance of the package with a longer planning horizon comes from the accumulation of assets in the economy (as the marginal propensity to consume of optimizing consumers declines), which makes the VAT less distortionary as a larger share of the tax falls on wealth.



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