

# EXPENDITURE GROWTH, FISCAL SUSTAINABILITY AND PRE-FUNDING STRATEGIES IN OECD COUNTRIES

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## 1. Introduction

OECD countries are ageing. This ageing is leading to demographic changes that are expected to significantly increase age-related expenditure over the next 50 years. Faced with this increase in expenditure, OECD governments have four options. First, they could modify policies to ensure that the increase in expenditure does not occur in the first place. Second, they could seek to increase growth to increase the capacity to fund the additional expenditure. Third, they could wait for the increase in expenditure and then increase taxes to ensure that debt levels do not become unsustainable. Finally, they could increase taxes or reduce expenditure in advance of the expected expenditure pressures to provide additional financial resources in the future. This last option, pre-funding, is the focus of this paper.

In discussing pre-funding, this paper seeks to address two questions. First, what is the current pre-funding practice in OECD countries? Second, why have some countries adopted pre-funding strategies while others have not? The paper also makes some observations on factors that a government should take into consideration when deciding whether to pre-fund.

At the outset we would like to stress that the focus of the paper on pre-funding is not meant to imply that pre-funding is necessarily the best option for individual countries. In other words we use the term “pre-funding” as a positive rather than normative description of a particular policy response.

The paper is organised as follows. Section 2 discusses the high level objectives of policy: well-being, equity and efficiency. Section 3 establishes a framework for defining and identifying pre-funding and discusses the related concept of fiscal sustainability. Section 4 identifies OECD countries that have adopted a pre-funding strategy. Section 5 then attempts to identify common characteristics of countries that pre-fund. Section 6 summarises and provides some tentative conclusions.

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## 2. Well-being, efficiency and equity – motivations for pre-funding

Each country has its own strategy for advancing the well-being of its people and there are many alternative analytic frameworks that have been adopted to map well-being.<sup>1</sup> This paper does not attempt to explore those different frameworks. In this paper we use a framework based on two broad criteria – efficiency and equity – which we believe are consistent with many of the different frameworks adopted by OECD countries.

### 2.1 Efficiency

In this paper we are interested in two issues related to aggregate fiscal policy: the path of taxes through time; and the path of debt through time. We are particularly concerned with these two paths given that, on current policy settings, most OECD countries expect to face significant expenditure pressures due to the ageing of the population. Changing taxes or changing debt levels are two possible responses to higher expected expenditure levels. Naturally, a third policy response is to modify policies so that additional aggregate expenditure does not arise. For the moment, to simplify the discussion, we focus on responses to an expected increase in expenditure some time in the future and ignore for the moment the possibility of changing expenditure or income levels.

#### 2.1.1 Tax smoothing

One possible response to an expected increase in future expenditure is to wait until the higher expenditure occurs and then increase taxes. Such a strategy would keep debt constant, but would require changes in taxes equivalent to the change in expenditure. An alternative approach would be to raise taxes now, reducing debt and allowing a lower increase in taxes in the future. Barro (1979) demonstrates that, for a particular set of assumptions, there are efficiency benefits associated with smoothing tax rates. Indeed, if efficiency were the only consideration the policy prescription is to attempt to maintain constant tax rates (or more precisely in the Barro model the tax-to-GDP ratio) through time. While the strong conclusion in favour of perfect tax smoothing requires quite restrictive assumptions, the conclusion that some tax smoothing is optimal is more robust (Buiters and Kletzler, 1992, p. 290). The intuition is straightforward: if the marginal excess burden of tax increases more than proportionally with tax rates, then efficiency costs are minimized by applying a constant tax rate to yield the required revenue.

This analysis assumes that the marginal cost of raising taxation is constant through time. If this is not the case, then the presumption is that more tax should be raised in the periods in which the marginal cost of raising taxation is lower.

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<sup>1</sup> For example, the Australian Treasury has developed a well-being framework for use in analysing policy (Australian Treasury, 2004).

The practical significance of tax smoothing is an empirical question. Cutler *et al.* (1990, pp. 50-53) estimate the benefits of tax smoothing for the United States over a 70 year time horizon from 1990 to 2060 in response to a demographic shock of increased spending of a little over 6 per cent of GNP. They conclude that the efficiency benefits that would arise from a perfect tax smoothing approach (in contrast to an approach of allowing taxes to move contemporaneously with changes in expenditure) would be quite small – around 0.017 per cent of GNP annually or around 1.1 per cent of 1990 GNP in present value terms.

Caution should be exercised in applying this result directly to other OECD countries. The critical assumption is the estimate of the marginal excess burden of taxation. Cutler *et al.* (1990) use an estimate of 30 cents in the dollar (based on Ballard, Shoven and Whalley, 1985) and a standard functional form whereby the marginal excess burden increases with the square of the tax rate. Naturally, the benefits of tax smoothing increase the greater the change in the marginal excess burden in response to a change in the tax rate. Accordingly, even assuming the same functional form, the higher the initial tax rate, then the greater the efficiency benefits associated with tax smoothing. This suggests that the benefits of tax smoothing will be correspondingly higher for most other OECD countries which have higher initial tax burdens than the United States.<sup>2</sup>

### 2.1.2 Debt levels and interest rates

The second efficiency consideration that arises with aggregate fiscal policy is the implication of government debt for interest rates. Theory suggests that higher government debt levels increase the level of interest rates.<sup>3</sup> Higher interest rates increase the costs associated with servicing the existing stock of debt and reduce investment, capital accumulation and growth.

Empirical estimates of the magnitude of these effects differ markedly. Engen and Hubbard (2004, p. 42) find in the United States context that an increase in federal debt equivalent to one per cent of GDP is expected to increase real long-term interest rates by around three basis points. However, they note that this conclusion is very sensitive to the particular empirical specification. Also in the US context, Laubach (2003) finds a statistically significant effect on interest rates of around 4 basis points for a one per cent increase in the debt-to-GDP ratio. Gale and Orszag (2003) undertake a US literature review that concludes that there is strong evidence that expected deficits increase interest rates.

Liebfriz, Roseveare and van den Noord (1994, p. 15) note that there is some evidence that budget deficits affect the spread between domestic and world interest

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<sup>2</sup> An important caveat is that this result assumes that there is a unique relationship between the tax rate and the marginal excess burden of taxation between countries. Clearly this is not the case given the disparate tax systems in OECD countries.

<sup>3</sup> In this respect we are focussing on the effect on long-run interest rates due to crowding out rather than the short run stimulus of aggregate demand (Engen and Hubbard, 2004, p. 4).

rates. Comley, Anthony and Ferguson (2002) find evidence of government debt increasing interest rates in Australia. However, while there is evidence that government deficits affect interest rates in some countries, there is little evidence that world real interest rates are affected by the stance of macroeconomic policy.

The relative importance of the interest rate channel will differ from country to country. In particular, fiscal policy may influence interest rates more in countries with high debt levels.

### 2.1.3 Other efficiency considerations

For completeness, we note that there are other channels through which fiscal policy affects efficiency. These include the individual allocative decisions, the impact of the overall size of government, and the impact of short-term fiscal policy on demand management and the implications for the average size and volatility of the output gap. Although all these questions are important, we do not attempt to deal with them in this paper.

## 2.2 Equity

In considering the longer term implications of fiscal policy, most OECD governments focus on the intergenerational equity implications of passing on future liabilities.<sup>4</sup> There are two traditions in discussing equity in the public finance literature: the benefit tradition and the ability to pay tradition. The benefit tradition focuses on the payment for services matching the benefit derived from the services. A tax system is said to be equitable "...if each taxpayer contributes in line with the benefits which he or she receives from public services" (Musgrave and Musgrave, 1989, p. 219). It is most commonly associated with payment for the provision of public goods (where the rationale for government provision is based on the particular production technology rather than equity goals *per se*) and is not solely a tax policy prescription, but one that considers jointly the tax and expenditure sides of the Budget.

The ability to pay tradition focuses on the appropriate approach to finance a given amount of public services. The ability to pay tradition isolates the tax problem independently from the question of expenditure determination (Musgrave and Musgrave, 1989, p. 219). Subsidiary to the ability to pay tradition are the twin goals of horizontal and vertical equity. Horizontal equity requires that individuals with the same ability to pay, pay the same level of tax while vertical equity requires that

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<sup>4</sup> This implicitly assumes that changes in government fiscal policy can in fact transfer liabilities through time. However, if full Ricardian equivalence were to hold, then attempts by governments to pass liabilities through time would be thwarted by offsetting private sector saving behaviour. In practice we observe partial rather than full Ricardian equivalence. Accordingly, governments do have the capacity to transfer liabilities through time, but the magnitude of these transfers will be less than would be the case if there were no savings offsets.

those with a greater ability to pay, pay a higher level of tax (Musgrave and Musgrave, 1989, p. 223).

When dealing with *intra*-generational equity the dominant approach is the ability to pay approach. This partly recognises the difficulty of linking tax to expenditure and also the fact that the benefit tradition has difficulty handling redistributive taxes. Interestingly, this is not necessarily the case with intergenerational equity discussions. Indeed, the generational accounting literature sits more comfortably in the benefit principle tradition.

The choice of framework is not trivial. In particular, if we assume that there will be real per capita income growth over time, then each successive generation will be wealthier than its predecessor. If we adopt the ability to pay tradition this implies that the next generation should pay a greater amount of the burden. However, even this can provide little guidance as different assumptions imply different degrees of progress (Musgrave and Musgrave, 1989, p. 228-31).

This underlies the difficulties in answering the normative question of what is an appropriate fiscal policy, in particular since all fiscal strategies designed to deal with an expected future increase in expenditure have intergenerational equity implications.<sup>5</sup> Different traditions will suggest different answers to this question. The framework developed below is agnostic on this point, but does suggest how different pre-funding strategies may reflect different equity goals.

### 3. A framework for pre-funding

To establish a practical definition of pre-funding we consider some related concepts that deal with the government's balance sheet. We establish a practical definition of pre-funding that is consistent with broader theoretical concepts and can be ascertained from commonly available data sources.

#### 3.1 *The government budget constraint and sustainability*

A motivation for pre-funding is to ensure that current policies are sensible in light of longer-term constraints. That is, governments are concerned about their sustainability in the long term.

Policy is said to be sustainable if all obligations, current and future, can be met without changing current policy settings (Croce and Juan-Ramón, 2003).<sup>6</sup> These

<sup>5</sup> For example, if taxes are raised in line with expenditure and there are overlapping generations then those bearing the tax may be different from those that benefit from the expenditure. This may offend the benefit principle, but may not offend the ability to pay principle. Accordingly, judgments about the desirability of a particular policy cannot be divorced from the normative question of the preferred equity framework (and the balance of efficiency considerations).

<sup>6</sup> The theoretical literature distinguishes between two related concepts: solvency and sustainability. A government is said to be solvent if it can meet all of its current and future obligations, including by way of (*continues*)

obligations formally are part of the government's intertemporal budget constraint which can be expressed as:<sup>7</sup>

$$d_t = \sum_{n=1}^N \beta^{-n} ps_{t+n} + \beta^{-N} d_{t+N} \quad (1)$$

where  $d_t$  is the level of government debt as a ratio of GDP,  $ps_t$  is the primary surplus as a ratio of GDP at time  $t$ , and:

$$\beta_t = \frac{(1+r_t)}{(1+g_t)} \quad (2)$$

where  $r_t$  is the real interest rate and  $g_t$  is the real growth rate.

Equation (1) establishes the formal condition for sustainability. The fiscal position is sustainable if the present discounted value of future primary surpluses is equal to the outstanding stock of debt on the basis of current policies. In other words, sustainability requires that the present value of future primary surpluses are sufficient to pay off this debt.

### 3.2 The budget constraint and government net worth

The government budget constraint provides a useful theoretical perspective. However, it may not be possible to formally apply the constraint as a rule to inform policy for two reasons.

First, meeting the intertemporal budget constraint implies that the government extinguishes all liabilities by time  $N$ . However, a practical policy time-horizon is likely to be considerably shorter than  $N$  years.

Second, establishing whether the budget constraint is met in practice requires an estimation of future expenditure, taxation and interest rates that is difficult to do in practice.<sup>8</sup>

We believe that we need an alternative benchmark that focuses on a narrower set of revenues and expenditure (or in stock terms assets and liabilities) for practical purposes. However, we recognise that contemplating an alternative (and necessarily partial) benchmark risks being inconsistent with the broader conceptual base of the intertemporal budget constraint. While this is a constant risk, we believe that the benefits of operationalising the sustainability concept outweigh the costs and that

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changing its policies in the future. In contrast, policy is said to be sustainable if the government is solvent on the basis of current policies. Clearly sustainability is a stronger condition than solvency given the vast range of policy changes that a government can make over time. Given that solvency is a less relevant condition for OECD countries, we focus on sustainability.

<sup>7</sup> This is the constraint assuming  $\beta t$  is stable over time (*i.e.*  $\beta_t = \beta_{t+1}$ ) (see below for the definition of  $\beta t$ ).

<sup>8</sup> Establishing solvency entails the additional difficulty of either assuming the way in which policies will change, or making an equivalently difficult estimate of expected changes in policy.

these costs can be managed. The principal method for managing these risks is to focus on a narrow measure, while monitoring other factors that could alter the conclusion if the more comprehensive framework were applied.

### 3.3 *Weak sustainability – A stable net financial asset-to-GDP ratio*

In addressing sustainability a possible benchmark is one that ensures a stable net financial asset to GDP ratio over time. We believe that this is a reasonable starting point from both an efficiency and equity point of view.

From an efficiency point of view, a stable net financial asset position is likely to mean that government pressure on interest rates as a result of fiscal policy is stable. Similarly a stable net financial asset position is a minimum condition for avoiding intertemporal inefficiencies associated with changes in the marginal excess burden of taxation (see Section 2.1.1).

That said, in the presence of increasing expenditure pressures, more than a stable net financial asset ratio will be needed to avoid changes in the tax-to-GDP ratio. Ultimately, the optimal fiscal strategy from an efficiency perspective will depend on the profile of expenditure, the sensitivity of interest rates to debt levels and the efficiency benefits of tax smoothing. In general, we may expect that tax smoothing is a more significant issue for countries with high tax levels.

From an equity point of view a stable net financial asset position implies that this generation is handing on the same proportionate burden as it received. Given a neutral starting point this may underachieve on the benefit principle. However, it would appear broadly consistent with the ability to pay principle, assuming positive growth in GDP per capita.

Three issues need to be considered with respect to this approach to sustainability. First, by choosing net financial assets as a measure for assessing sustainability we are necessarily choosing a subset of the government balance sheet, running the risk that net financial assets could be stable, but policy is unsustainable due to the path of net worth. This is a legitimate concern. Our argument for choosing net financial assets is purely one of pragmatism as using net worth introduces a set of difficult valuation issues. To counter the risk, other expenditure drivers should be monitored. This is precisely the approach of exercises such as those documented in OECD (2001).

Second, the period over which we require stable net financial assets is important. The longer the time frame considered, then the stronger the criterion. For example, if we required the criterion to be met over a 40 year time horizon, then we must take account of spending pressures identified over that period. With a time frame of this length, the criterion becomes “weak” only if additional pressures arise

beyond the 40 year window. As the time period approaches infinity the criterion approaches full sustainability.<sup>9</sup>

Third, a stable net financial asset to GDP ratio may not be a desirable benchmark if the ratio is already too high. In terms of the framework presented here,  $\beta$  may be adversely affected by the high initial debt level or the higher debt-to-GDP ratio may not capture risks that fall outside the period being considered. Put another way, if fiscal policy has been poor in the past, then it may not be sufficient to “stand still” at a high level of debt.

### 3.4 Relationship of a stable net debt-to-GDP ratio and the primary balance

On the assumption that  $\beta$  does not change over time, then a stable debt-to-GDP ratio ( $d_t=d_{t+1}$ ) implies:

$$ps^* = \left[ \frac{(r-g)}{(1+g)} \right] d^* \quad (3)$$

where  $ps^*$  and  $d^*$  are the respective stable levels of the primary surplus and the level of debt.

Equation (3) shows clearly the required primary surplus (or deficit) that is associated with a stable debt-to-GDP ratio. Equation (3) illustrates the important point that for debt dynamics primary balances provide more useful information than general government financial balances.

A few special cases are of interest. Maintaining a zero net debt position requires a zero primary surplus and a zero general government balance. Similarly if the rate of interest is equal to the rate of growth of GDP, then a zero primary surplus is required to maintain a stable debt-to-GDP ratio.

Barro (1976) has argued that in a steady state the rate of interest must be greater than the rate of growth by a small margin. If the interest rate growth differential is small, then a stable net financial asset position requires a small primary surplus.

Table 1 provides information on the interest rate growth differential for the 30 OECD countries since 1991 (where data is available). The average differential was 0.3 per cent for short-term rates and 1.2 per cent for long-term rates. This average includes considerable individual country variation. Ireland benefited from a growth rate that exceeded short term interest rates by an average of 4.8 per cent and long-term rates by an average of 4.1 per cent. In contrast, Turkey on average had a growth rate 6.6 percentage points below its short term interest rate and 9.3 per cent below long-term rates (and faced a difficult economic adjustment process as a result).

<sup>9</sup> Indeed, over a 40 year period the criterion may not be that weak – arguably no OECD country currently meets the weak sustainability criterion over 40 years.



Table 1

**Differential between Interest Rates and Growth Rates**  
(average difference in percentage points)

	Short run	Long run
Australia	0.4	1.4
Austria	0.4	1.7
Belgium	0.5	1.8
Canada	-0.1	1.5
Czech Republic <sup>10</sup>	-1.2	N.A.
Denmark	0.8	1.9
Finland	1.0	2.6
France	1.3	2.3
Germany	1.2	2.3
Greece	0.0	-2.1
Hungary <sup>11</sup>	0.0	N.A.
Iceland	1.7	2.6
Ireland	-4.8	-4.1
Italy	1.4	2.5
Japan	0.3	1.7
Korea	-0.2	-0.4
Luxembourg	-3.0	-2.2
Mexico	0.6	0.6
Netherlands	-0.1	1.2
New Zealand	1.9	2.1
Norway	-0.7	0.0
Poland <sup>11</sup>	0.4	N.A.
Portugal	-0.1	0.1
Slovak Republic <sup>11</sup>	0.4	0.0
Spain	-0.7	0.3
Sweden	1.3	2.4
Switzerland	0.6	1.6
Turkey <sup>12</sup>	6.6	9.3
United Kingdom	0.9	1.2
United States	-1.0	0.6
<b>Average OECD</b>	<b>0.3</b>	<b>1.2</b>

Average interest rate/growth differential for 1991-2006 unless otherwise specified.

Source: OECD Economic Outlook 76 Database.

<sup>10</sup> 1994-2006.

<sup>11</sup> 1996-2004.

<sup>12</sup> 2000-2006.

Table 1 covers the recent past. Data availability makes it difficult to conduct a longer analysis for all countries. However, Figures 1a and 1b provide information for eight economies where continuous data is available from 1970. The recent period has been more stable than the Seventies and Eighties. It is beyond the scope of this paper to analyse this issue in detail. However, we believe a reasonable explanation is that the Seventies represented a period of negative differentials as a result of the unexpected inflation shock. In contrast inflationary expectations took some time to unwind through the Eighties and early Nineties. The more recent period may reflect a more “normal” configuration of rates following the absorption of these shocks.

If we were to put this into a European context, maintenance of a debt-to-GDP ratio at the Maastricht threshold of 60 per cent of GDP, with interest rates equal to growth rates and a growth rate of 2 per cent would mean that the primary deficit would have to be zero and the general government balance would have a deficit equal to 1.2 per cent of GDP to maintain a stable debt-to-GDP ratio.

### 3.5 *Defining pre-funding*

The above provides the necessary groundwork to define pre-funding. We link the definition of pre-funding to the benchmark provided by our weak sustainability criterion. We define pre-funding as raising more taxes than required to stabilize the net financial asset to GDP ratio.<sup>13</sup> We stress that this is a positive definition. That is, we intend pre-funding to describe a particular circumstance of policy stance without in any way implying that “pre-funding” is necessarily a desirable thing.

The intuitive appeal of the definition is that it captures the idea that the net financial asset position is a measure of the financial legacy that a government inherits at the start of each period. It also has the useful property that an improvement in the net financial asset position will, in the face of additional expenditure pressures, reduce the required level of future taxes necessary to stabilize the net debt position. Further, if the rate of interest is greater than the rate of growth, then an increase in taxes now will also reduce the required primary surplus to stabilize the net financial asset position.<sup>14</sup> This is the essence of pre-funding – raising taxes now to reduce pressure in the future.

A fundamental criticism of this approach is that it unduly privileges the starting net financial asset position. A country that has run very poor fiscal policy and has very high debt will be classified as pre-funding if it subsequently decides to reduce its debt. Some may argue that this debt reduction should be thought of as “post-funding” rather than pre-funding. We acknowledge that this is a possible approach to interpreting these facts. However, we believe that it is appropriate to

<sup>13</sup> This implies that debt reduction is equivalent to asset accumulation. See Appendix 2 for a more detailed discussion of debt reduction versus asset accumulation.

<sup>14</sup> Somewhat counter-intuitively, if  $r=g$ , then an increase in taxes which lowers the net debt level does not change the required level of taxation to stabilise the net debt ratio. The level of taxation required would still equal the level of taxation prior to the increase in order to preserve a primary surplus of zero.

describe it as “pre-funding” as it captures the actual decision faced by a government. The level of debt a government has at any point in time is a sunk cost. It cannot change that level, except by making forward looking decisions. Faced with higher expected expenditure the government can do one of four things: reduce the debt (pre-fund); alter the expenditure pressures; raise taxes in the future; or raise growth. “Pre-funding” is a description of one policy decision that a government can make. Again this illustrates the point that we do not wish “pre-funding” to be interpreted as necessarily a “good” thing.

Another potential criticism of this approach is that it is based on cash concepts. That is, we are focusing on the change in net debt that arises from the cash transactions in any period. In principle, we would wish to look at changes to the entire government balance sheet, encompassing changes to non-financial assets, the accrual of future expenditure liabilities and valuation of a government’s greatest “asset”, its ability to raise taxes. In practice, this raises the difficulty of measuring a range of assets and liabilities that are typically not included in government accounts (due to valuation difficulties).

Using a partial cash concept has the advantage of putting the analysis within a practical setting. We believe this is reasonable, as long as it is considered a *starting* point, not an end point. This starting point is then augmented by information about key long-term liabilities and other influences on the broader balance sheet.

### 3.6 *Identifying pre-funding – practical issues*

It is necessary to map the above definition of pre-funding to the concepts applied in national accounting and budget data. To do this we consider two alternative approaches to analysing pre-funding: the direct approach and the indirect approach.

#### 3.6.1 *Direct approach to identifying pre-funding*

The direct approach seeks to observe the stable debt-to-GDP ratio directly, and looks directly at net financial liabilities. Two main issues arise when looking at net financial liabilities. First, the classes of assets included in the definition (e.g. bonds, shares, property). Second, the set of institutional arrangements that are to be included. The treatment of funded or partially funded pension funds is the most important issue in this respect.

In considering these two issues we should keep in mind the original purpose for looking at this variable. We are interested in the net financial legacy that a government inherits in each period. Accordingly, the measure would ideally include all financial liabilities that have concrete payment obligations and assets that will deliver clear returns.

In the first instance we consider the variable “net financial liabilities” (OECD, 2004j). The definition of the variable is reasonably broad:

*“... debt and other liabilities (short- and long-term) of all the institutions in the general government sector, defined by ESA95/SNA93, subject to data availability...Such assets may be cash, bank deposits, loans to the private sector, participations in private sector companies, holdings in public corporations or foreign exchange reserves, depending on the institutional structure of the country considered and data availability.”*

With respect to the key issue of government pension schemes:

*“The status and treatment of government liabilities in respect of their employee pension plans in the national accounts have been diverse across countries, making international comparability of government debts difficult. The current interpretation of the 1993 SNA is that: i) “autonomous” funded pension plans should be classified outside the general government sector, which entails that their assets and liabilities are not reflected in the general government debt data; ii) non-autonomous pension plans should be classified inside the general government sector and only the funded component should be reflected in the general government liabilities. Furthermore, the 1993 SNA recommends that the liability inherent in unfunded schemes be recorded as a memorandum item for the government sector. However,... few follow the 1993 SNA recommendation.”*

Accordingly, the variable “net financial liabilities” is a useful starting point for assessing whether pre-funding is occurring. That said, this variable may need to be modified given the particular definition of this variable for individual countries.

### 3.6.2 Indirect approach to identifying pre-funding

The indirect approach of defining pre-funding does not start with net financial liabilities. Instead we look at the state of the primary balance, which, in conjunction with an assumed relationship between the rate of interest and the rate of growth, provides insight into the trajectory of net financial liabilities (as per equation (3)).

The general government primary balance is equal to the general government financial balance minus net debt interest payments. Net debt interest payments according to SNA93 include interest on deposits, securities other than shares, loans and other accounts receivable (SNA93, paragraph 7.93).

The main reason for using an indirect approach rather than a direct approach is that data may be more readily available on flows rather than stocks. As can be seen from above the way in which assets and liabilities are reported is not consistent across all OECD countries. This complicates establishing the extent of pre-funding on the basis of the reported data.

The key issue in this area is to ensure that the stocks and flows are treated consistently. Accordingly, any returns on pension assets should be included in the

primary balance if and only if the assets of the pension funds are *not* included in the measure of net financial assets.

Alternatively, if the net interest of the pension assets are excluded from the measure of the primary surplus, then this is appropriate if and only if the assets and liabilities of the fund are fully measured in the current period measure of net financial assets. Given the fact that few funds are valued in this way, it is probably better to include the net interest payments of pension schemes in the measure of the primary surplus, but at the same time carefully monitor the evolution of the primary surplus over time. This implies that net financial asset measures should exclude net pension assets.

The OECD also publishes structural primary balance measures. However, the OECD's concept of structural balance is not directly related to the path of debt dynamics as the OECD measure gives an indication of the expected balance were the economy operating at potential. Unless the economy operates on average at potential, then maintaining a structural balance is not an indication of pre-funding (even if the rate of interest were equal to the rate of growth).

### *3.6.3 Identifying pre-funding – other objectives*

A government may have intended to reduce the net debt-to-GDP ratio for reasons other than pre-funding. Reducing debt has a range of “no regrets” benefits including reducing vulnerability to shocks and reducing interest rate risk premia. Particularly at high levels of debt, debt reduction may be a desirable policy independent of any motivation to fund future liabilities. Put another way there may be efficiency benefits associated with reducing risk premia that are in addition to any efficiency benefits associated with tax smoothing or intergenerational equity benefits associated with shifting the tax burden through time. In this context, discussions of pre-funding need to be mindful of the fiscal history within a country, which may not have been optimal.

For either case we still define an improvement in the net debt position as pre-funding. Government's may not have intended to improve their net asset position with a view to covering future expenditure pressures, but their action has nevertheless improved the starting point for dealing with these pressures. That said, intentional pre-funding may be more sustainable than unintended pre-funding. Furthermore, debt reduction that is motivated by reducing risk premia is unlikely to continue beyond the point at which risk premia have been reduced to acceptable levels.

In the analysis that follows, quantitative observations are supplemented by analysis of the stated policy objectives of the government in question to ensure that the classification of pre-funders reflects more than simply a statistical correlation.

#### 4. Countries with pre-funding strategies

This section considers the country experience with pre-funding. Our methodology involves a two stage process. First, we filter the countries on the basis of the process outlined in Section 3.6. That is we look for direct evidence of improved financial asset positions and also compare countries' primary surpluses with the calculated primary surplus required to stabilize net financial liabilities. Second, we then look in some detail at the set of countries to ensure that there are not other factors that have been obscured by the data. We also take account of forward looking intentions as embodied in announced policy.

This two stage process recognises that not all the data is constructed on a consistent basis and that there is an element of judgment in classifying individual countries.

##### 4.1 *Financial liabilities*

We first look at the change in general government gross financial liabilities (Table 2). Table 2 includes projections up to 2006 in addition to historical data. We have chosen to use these projections to provide further information on the intentions (albeit over a short period) of OECD countries.

The theory outlined in 3.6.1 indicates that net financial liabilities are a better measure. However, data on gross financial liabilities is available for a larger number of countries. Accordingly, this data should be thought of as indicative only.

As is clear from Table 2, the time period that is being considered heavily influences the countries that may be identified as having undertaken pre-funding. On the basis of the last five years (defined as 2001 to 2006, which includes some projections) 13 countries may have undertaken some degree of pre-funding. These countries are Australia, Belgium, Canada, Denmark, Greece, Iceland, Ireland, Italy, Luxembourg, New Zealand, Norway, the Slovak Republic, Spain, and Sweden.

If the period being considered were instead the last 10 years, then Finland, the Netherlands, the United Kingdom and the United States would be added to the list and the Slovak Republic would be excluded from the list.

Less data is available for the last 15 years, but for those where data are available, the numbers indicate that the list should include the first list without Greece, Italy, and Luxembourg, but adding the Netherlands and the United States.

Table 3 presents data on net financial liabilities. On the basis of net financial liabilities, the countries that may have undertaken some pre-funding in the past 5 years are the same as those identified by the gross liabilities measure for the same period, with the addition of Korea, and the exclusion of the Slovak Republic and Sweden. Sweden is included on the 10 year measure, as would be the Netherlands. No data is available for Greece, Ireland and the Slovak Republic. Longer term

**Table 2**

**Change in General Government Gross Financial Liabilities (Data to 2006)**  
(percent of GDP)

Country	5-year change	10-year change	15-year change	Peak-2006
Australia	-4.1	-23.4	-5.9	-26.6
Austria	0.0	0.4	12.6	-1.7
Belgium	-16.8	-39.5	-34.8	-47.7
Canada	-16.1	-35.4	-17.3	-35.9
Czech Republic	17.1	N.A.	N.A.	0
Denmark	-8.5	-29.4	-25.6	-43.7
Finland	1.7	-13.6	27.9	-13.6
France	12.5	9.9	37.1	0
Germany	8.6	8.8	30.2	0
Greece	-7.6	-4.2	25.0	-7.6
Hungary	0.2	N.A.	N.A.	-7.1
Iceland	-15.5	-25.7	-7.2	-28.4
Ireland	-10.7	-48.1	-70.2	-70.2
Italy	-2.7	-16.4	2.9	-16.4
Japan	33.0	81.5	110.6	0
Korea	3.9	15.4	14.6	0
Luxembourg	-0.1	-1.8	0.7	-1.8
Netherlands	6.6	-21.1	-20.2	-29.0
New Zealand	-9.9	-18.5	N.A.	-38.5
Norway	-2.4	-3.8	-0.7	-13.7
Poland	17.6	N.A.	N.A.	0
Portugal	8.9	2.1	N.A.	0
Slovak Republic	-11.0	7.2	N.A.	-12.2
Spain	-9.2	-22.9	3.6	-22.9
Sweden	-4.2	-25.8	3.4	-25.8
United Kingdom	5.3	-6.1	12.9	-7.3
United States	8.8	-6.7	-4.5	-8.6

Source: OECD Economic Outlook Database and authors' calculation.

Table 3

**Change in General Government Net Financial Liabilities (to 2006)**  
(percent of GDP)

Country	5-year change	10-year change	15-year change	Peak-2006
Australia	-4.9	-21.4	-10.7	-27.3
Austria	0.3	-3.3	8.7	-4.1
Belgium	-13.0	-36.3	-31.1	-40.9
Canada	-14.9	-41.8	-24.3	-43.7
Denmark	-6.0	-24.1	-20.6	-25.5
Finland	-3.6	-29.6	-2.0	-32.3
France	12.0	6.1	29.9	0
Germany	13.9	15.5	37.8	0
Hungary	11.4	N.A.	N.A.	0
Iceland	-8.3	-21.7	-1.6	-21.8
Italy	-1.4	-15.4	6.6	-15.7
Japan	29.5	65.0	82.1	0
Korea	-4.2	-15.2	-19.1	-19.7
Netherlands	8.4	-11.3	7.0	-12.4
New Zealand	-15.1	-25.5	NA	-42.7
Norway	-19.2	-54.6	-53.1	-60.1
Portugal	9.5	10.3	N.A.	0
Spain	-9.0	-20.3	0.1	-20.2
Sweden	4.5	-24.1	6.6	-24.1
United Kingdom	5.9	-1.1	23.9	-4.3
United States	9.6	-8.7	-4.9	-10.8

Source: OECD Economic Outlook 76 Database and authors' calculations.



measures suggest the US is a pre-funder, in contrast to the shorter term measure, reflecting the more recent reversal of earlier fiscal consolidation.

#### 4.2 *Primary balances*

Equation (3) sets out the relationship between the required primary surplus to maintain a stable debt-to-GDP ratio on the assumption of a stable  $\beta$ . This is equivalent to defining the stability condition assuming a constant relationship between the interest rate and the growth rate. We recognise that this is a simplifying assumption, as the relationship between interest rates and growth rates is not stable over time. Seeking to deduce the implied path of net financial liabilities over time requires quite detailed information about the nature of the debt and asset portfolios of each individual country, and goes beyond the scope of this exercise, which simply aims to create a filter to identify countries that should be examined in more detail. As a result, we have calculated measures based on equation (3) recognizing that they will imperfectly describe the implied underlying debt dynamics. A more detailed analysis encompassing more realistic assumptions about debt dynamics could be further pursued by the countries themselves.

As a first approximation we look at three periods. These periods are 2002-06, 1997-2006, and 1992-2006. For these periods we calculate the average primary surplus for each country with the calculated required primary surplus. For calculating the required primary surplus we use the average gross financial asset position in the mid year of the period. For the interest rate we make the further simplifying assumption that the whole portfolio is financed using long-term debt. The results are summarised in Table 4.

This approach suggests a similar list of pre-funders as the analysis of changes to debt-to-GDP ratios, with the addition of two further countries – Luxembourg and Greece. However, despite the strong primary surplus position of Greece, it is not classified as a pre-funder on the basis of the information on gross financial liabilities and more detailed examination of Greek fiscal policy. The primary balance measure would also tend to exclude the US as a pre-funder.

#### 4.3 *Individual countries*

The following sections provide a brief discussion of each of the individual countries classified as pre-funders in the previous analysis. The discussion is not comprehensive, but instead attempts to set out the approach taken to pre-funding and some relevant background information.

One complication in identifying countries that are pre-funding is to clearly distinguish between countries that have undertaken pre-funding in the past and those that intend to undertake pre-funding in the future. Furthermore, there are some countries that formally have a framework that implies pre-funding (for example

Table 4

**Difference between Actual Primary Surplus  
and Calculated Required Primary Surplus (to 2006)**  
*(percent of GDP)*

Country	5-year average	10-year average	15-year average
Australia	2.2	2.4	1.0
Austria	0.3	0.2	-0.7
Belgium	4.3	4.9	3.1
Canada	2.8	4.0	1.3
Denmark	2.0	3.0	1.6
Finland	2.2	3.7	-0.2
France	-1.5	-0.6	-2.0
Germany	-2.2	-1.1	-1.2
Greece	4.5	5.0	N.A.
Iceland	-0.1	1.2	-0.9
Ireland	-0.7	0.9	-0.8
Italy	0.3	1.3	0.9
Japan	-5.1	-5.1	-3.9
Korea	3.0	3.0	N.A.
Luxembourg	-0.8	1.4	1.0
Netherlands	-1.3	1.7	0.9
New Zealand	1.9	1.3	1.5
Norway	5.4	6.5	3.8
Portugal	-0.6	0.4	N.A.
Slovak Republic	-1.1	-3.8	N.A.
Spain	3.2	3.1	0.8
Sweden	0.1	1.5	-2.7
Switzerland	0.2	0.4	-0.1
United Kingdom	-1.4	0.9	-1.0
United States	-1.9	0.5	-0.1

Source: OECD Economic Outlook 76 Database and authors' calculations.

balance over the cycle with an initial debt position), but have not actually undertaken pre-funding as they have not met their own targets and it is unclear whether they will achieve their fiscal targets in the future.<sup>15</sup>

With respects to these issues, we have attempted to come to an on balance decision as to the pre-funding intention and practice of a country giving particular weight to the forward looking intentions of countries (given the focus is preparation for future demographic pressures). In this respect we separate two groups of countries. The first we identify as “strong pre-funders”. The second, we identify as “mild pre-funders”. The “strong pre-funders” are identified by clear evidence of past pre-funding and a forward looking commitment to further pre-funding. The second group are characterised by less pre-funding in the past, or a forward looking pre-funding policy that implies less pre-funding, or weaker compliance with their own policy.

At this stage it is important to stress that we do not intend to imply that the “mild pre-funders” are necessarily pursuing poorer policies than the “strong pre-funders”. The appropriate policy for each country depends on their specific circumstances. Even putting aside the general issue of whether pre-funding is the right policy response, there may be other issues such as the extent of future pressures and the state of the balance sheet at any point in time.

For example, we characterise Australia as a “mild pre-funder” notwithstanding the substantial pre-funding that has occurred in the last decade (general government net financial liabilities have fallen by over 25 percentage points of GDP from 1995 to 2004 (OECD Economic Outlook 76 Database)) and the fact that Australia has demonstrated strong compliance with its own medium term fiscal framework. The reason that we do not define Australia as a “strong pre-funder” is that the balance over the cycle objective implies little pre-funding once net financial liabilities are low. Similarly we define Ireland as a “mild pre-funder” notwithstanding the dramatic reduction in gross financial liabilities (over 70 per cent of GDP over the last 15 years) as a result of the implied forward looking strategy.

In contrast, we characterize Belgium as a “strong pre-funder”. Belgium has reduced its net financial liability position by a little more than Australia over the last decade (around 35 percentage points of GDP from 1995 to 2004 (OECD Economic Outlook 76 Database)) and also has a balance over the cycle objective. However, given that Belgium had general government net financial liabilities of over 90 per cent of GDP in 2004, the balance over the cycle objective implies much higher primary surpluses and further reductions in debt.

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<sup>15</sup> Many countries in the European Union are notable in this respect. The Stability and Growth Pact commits member countries to comply with the medium-term budgetary objective of positions of close to balance or in surplus (European Commission, 2005). If this were adhered to, then all EU member countries with a net debt position would be pre-funders. We have not characterised them this way.

#### 4.4 *Strong pre-funding countries*

##### 4.4.1 *Belgium*

The Belgian Government has a pre-funding strategy which involves reducing debt in order to provide scope for increase age-related spending. The current Government target is to reduce gross debt to 30 per cent of GDP by 2030 from 100.7 per cent of GDP in 2004 (OECD Economic Outlook 76 Database).

To achieve this reduction in debt the Belgium High Finance Commission estimates that the structural budget balance must be increased to a surplus of 0.3 per cent of GDP in 2007 and then rise to 1½ per cent of GDP over 2011-18 before slowly falling back to zero by 2030 as the budget costs of ageing rise (OECD, 2005).

While the Belgian Government intends to follow the adjustment path outlined above, the OECD's assessment is that this will require further policy adjustments, including with respect to health policy (OECD, 2005).

##### 4.4.2 *Canada*

The Canadian Government has adopted a strategy of reducing debt and has a fiscal strategy of achieving a balanced budget or better (OECD, 2004g, p. 27). This implies a declining debt-to-GDP ratio. This strategy has been partly motivated by concerns about future expenditure pressures. The Canadian Minister for Finance explicitly made this link (Goodale, 2004) when releasing the 2004 Economic and Fiscal Update – “By continuing to reduce the debt burden, we will build our flexibility to meet emerging demographic pressures – paying down debt today means more money for social programs tomorrow.”

To date, Canada's debt reduction strategy has reduced general government net interest payments from a peak of 5.7 per cent of GDP to 1.3 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). General government net financial liabilities were 31.1 per cent of GDP in 2004 (OECD Economic Outlook 76 Database).

The Canadian Government has an objective of reducing the federal debt-to-GDP ratio to 25 per cent within 10 years (OECD, 2004g, pp. 27-29).

##### 4.4.3 *Denmark*

Denmark has a clear pre-funding strategy with primary surpluses being run to reduce debt (general government gross financial liabilities were 48.4 per cent of GDP in 2004 (OECD Economic Outlook 76 Database)) and provide scope to continue expenditure programs without the need to excessively raise taxation.

The Danish Government has a medium term fiscal strategy which is to ensure that public finances are sustainable in the long-term. This has translated into a target

of maintaining a structural general government surplus of around 2 per cent of GDP (OECD, 2003c, p. 107).

#### *4.4.4 Finland*

The Finnish Government's fiscal objectives, set out in June 2003, are to reduce the central government debt-to-GDP ratio; aim to achieve balanced central government finances under normal conditions of growth; and limit growth in real spending by central government to EUR 1.12 billion over the four year electoral period (OECD, 2004h, p. 44).

The Finnish Government has undertaken some pre-funding to date. This is evidenced by the positive net lending (currently around 3 per cent of GDP per year) of the pensions and social security funds.

Finland's general government financial balance has been in surplus since 1998 and has been around 2 per cent of GDP over the last four years after peaking at 7.1 per cent of GDP in 2000 (OECD Economic Outlook Database 76). This strong fiscal position is partly due to a positive contribution from the pensions and social security contributions. In 2005 the general government surplus is estimated to be 2.1 per cent of GDP which comprised a surplus of 3.0 per cent of GDP in the pension and social security funds, a central government deficit of 0.7 per cent of GDP, and a municipal government deficit of 0.2 per cent of GDP (OECD, 2004h, p. 57).

Finland's general government sector had net assets of 34.8 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). The net asset position reflects large asset holdings with the public pension scheme offsetting general government gross financial liabilities of 51.8 per cent of GDP in 2004 (OECD Economic Outlook 76 Database).

#### *4.4.5 Luxembourg*

Luxembourg has a pre-funding strategy of maintaining balance in the central government accounts and accumulating assets in the social security funds. On current assumptions this is equivalent to maintaining a general government surplus of around 2 per cent of GDP.

The Government is committed to maintaining general government budget surpluses (with the central government in balance) in the medium term. This will result in the further accumulation of net financial assets, which stand at around 50 per cent of GDP (OECD, 2003h, p. 41). The central government balance excludes social security surpluses. This surplus was projected by the government to be 2.2 per cent of GDP in 2003 (OECD, 2003h, p. 46). Accordingly, if the Government

were to meet its target, then central government balance would imply an annual general government surplus of around 2 per cent of GDP.<sup>16</sup>

#### 4.4.6 New Zealand

The New Zealand Government has a comprehensive pre-funding strategy. This strategy includes (Cullen, 2004, p. 23):

- The establishment of the New Zealand Super Fund (NZS Fund). The NZS fund is designed to partially fund future government superannuation benefits.
- Maintaining operating surpluses during the contribution phase of the NZS Fund. Contributions will be made to the NZS Fund during this period.
- The Government is contributing around 1.4 per cent of GDP in 2004, with contributions estimated to decline to zero in 2026. (New Zealand Super Fund, 2005).
- On current projections the fund is estimated to peak (as a proportion of GDP) at just under 40 per cent of GDP in 2036 (New Zealand Treasury, 2004).
- Reducing sovereign issued gross debt-to-GDP ratio to below 20 per cent.
- Increase net worth consistently with the operating surplus objective.

One interesting aspect of the New Zealand approach is the assumed rate of return on the asset portfolio. NZS Fund have used an assumed rate of return of 10.2 per cent per year.<sup>17</sup> Therefore, a significant contribution to the pre-funding strategy is the excess return above the rate of growth of GDP.

#### 4.4.7 Norway

Norway presents a special case. The raw data suggests that Norway is a very strong pre-funder. However, this is motivated more by revenue smoothing than provisioning for increased expenditure.

Analysis of pre-funding in Norway is complicated by the existence of oil revenues that are expected to fall over the next 50 years. The oil strategy – placing assets in a fund and allowing an annual drawdown equal to the estimated real rate of return – is based on the belief that all generations should benefit from the natural resource endowment. The strategy is not motivated by changing demographic or spending pressures.

There have been some proposals to hypothecate the Petroleum Fund to pension liabilities (OECD, 2004d, p. 13). However, the current proposal does not

<sup>16</sup> Luxembourg has an extremely generous public pension system. The replacement rates guaranteed by the general public pension scheme are exceptionally high at 98 per cent of average income for a worker on average earnings with 40 years contributions (IGSS, 2002, quoted in OECD, 2003h, p. 47).

<sup>17</sup> This is an arithmetic mean – see McCulloch (2003) for an excellent discussion of arithmetic versus geometric means.

seek to change the rule that assets can only be withdrawn in line with an estimated real rate of return. As a result, the proposal may have potential governance benefits (by increasing the effective political ring-fencing of the assets), but it would not materially change the extent of pre-funding.

#### *4.4.8 Sweden*

The Swedish Government has a fiscal strategy, introduced in 1997, of maintaining a general government surplus of 2 per cent of GDP over the cycle. The fiscal strategy also includes nominal expenditure ceilings and from 2000 balanced budget requirements for local government (OECD, 2004k, p. 163).

Sweden has significantly consolidated its financial position over the last decade. With the exception of a small deficit in 2002, Sweden has maintained a general government financial surplus since 1998. This contrasts with a general government financial deficit of 11.4 per cent of GDP in 1993 and 9.3 per cent of GDP in 1994. General government net financial liabilities have declined from a peak of 25.7 per cent of GDP in 1996 to 3.8 per cent of GDP in 2004 (OECD Economic Outlook 76 Database).

### *4.5 Mild pre-funding countries*

#### *4.5.1 Australia*

Australia has been undertaking significant pre-funding over the last decade. Indeed, on the basis of past performance Australia would be characterised as a strong pre-funder.

The Government's fiscal strategy, introduced in 1996, is to maintain budget balance, on average, over the economic cycle (Australian Government, 2004, p. 1-5). To date this has involved an element of pre-funding as budget balance has implied primary surpluses. The average primary surplus between 1996 and 2004 has been 2.4 per cent of GDP (OECD Economic Outlook 76 Database).

However, as net debt approaches zero, maintaining budget balance on average over the cycle will imply declining levels of pre-funding as the primary balance approaches zero.

Looking forward the Australian Government has a pre-funding strategy, targeted at pre-funding public sector employee superannuation liabilities. To this end the Australian Government has announced the establishment of a Future Fund. The Government has announced that Fund earnings will be reinvested and excluded from the calculation of the underlying cash balance (Australian Government, 2005, p. 1-6). Accordingly Fund earnings will contribute to improving net worth.

The Australian Government (2004, p. 1-7) has set out a multi-pronged strategy for addressing demographic challenges involving elements of pre-funding,

lowering expenditure and growing the economy faster to maintain a stable fiscal position into the future.

#### 4.5.2 Iceland

The Iceland government has a policy of maintaining budget surpluses over the business cycle and of reducing debt. This represents pre-funding. This is partly motivated by a desire to reduce vulnerability to external shocks. They also have undertaken specific measures to pre-fund public sector employee pension entitlements (OECD, 2003e, p. 50).

Iceland has gone through a period of fiscal consolidation with general government surpluses since 1998. General government net financial liabilities have also fallen in recent times from a peak of 40.4 per cent of GDP in 1995 to 22.7 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). To put this in context, this reduction represents an unwind of a fast accumulation of financial liabilities in the early Nineties. General government net financial liabilities were 9.9 per cent of GDP in 1989 and around the current level at 20.1 per cent of GDP in 1991 (OECD Economic Outlook 76 Database).

#### 4.5.3 Ireland

The extent of forward looking pre-funding is unclear given the lack of an articulated medium term fiscal strategy. The Irish Budget appears to be running a *de facto* target of around balance over the cycle. This represents pre-funding while net financial liabilities remain positive.

The Irish Government established the National Pension Reserve Fund (NPRF) in 1999 to help meet the future costs of social welfare and public service pensions. The Irish Government is required by law to contribute 1 per cent of GNP to the fund each year until 2025. The Fund's assets can only be drawn from 2025 onwards, to help smooth the burden arising from additional pension commitments. The assets of the NPRF are projected to be 21.3 per cent of GDP in 2020 and 64.1 per cent of GDP in 2050 (Irish Government, 2004, pp. E.24-25).

It is important to note that the one per cent commitment, in itself, does not increase the savings rate of the Irish Government. As they note (Irish Government, 2004, p. E.13) "...this pre-funding does not affect the General Government Balance, but does add to the General Government Debt". This is because the transfer of funds to the NPRF is not expenditure for the purposes of calculating the general government balance. Accordingly, the only additional pre-funding that results from the existence of the fund is the extent to which the rate of return on the assets exceeds the cost of government debt.<sup>18</sup>

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<sup>18</sup> See Appendix 2 for a discussion of debt reduction versus asset accumulation.



The Irish Government's balance sheet has improved substantially over the last two decades with general government gross financial liabilities having fallen from over 100 per cent of GDP in the late Eighties to 29.3 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). The debt-to-GDP ratio net of the National Pension Reserve Fund (NPRF) is projected to be around 23 per cent of GDP at end 2004 (Irish Government, 2004, p. E.15).

#### *4.5.4 Italy*

The Italian government does not appear to have a clear pre-funding strategy. Although the Italian government intends to improve the primary balance by around ½ per cent per year each year until 2008 they have not provided precise indications of how this will be achieved. Italy's general government balance in 2004 is estimated to be a deficit of 2.9 per cent of GDP. The structural balance is estimated to be a deficit of 2.7 per cent of GDP and the general government primary balance is estimated to be 1.8 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). Accordingly, if this improvement were to occur then there would be a modest degree of pre-funding.<sup>19</sup>

Further, this strategy is primarily targeted at reducing debt to lessen interest payments and provide room for pro-growth expenditures and tax cuts rather than to pre-fund expected demographic pressures.

The major fiscal pressure in Italy arises from the poor balance sheet position. Public gross debt in Italy was 106 per cent of GDP in 2004 with public debt interest payments equal to 5.3 per cent of GDP (OECD 2003a, p. 49). Although this is high, it does represent a reduction from a peak of 124.3 per cent of GDP in 1994 (OECD 2003a, p. 59).

#### *4.5.5 Korea*

The Korean Government does effectively have a pre-funding strategy.

The major long-term driver of additional expenditure is the National Pension Scheme. The Government is required to review the sustainability of the NPS every five years. In 2003 the government proposed reducing the generosity of the scheme and increasing the contribution rate. These proposals have not yet been approved by the National Assembly (OECD, 2004c, p. 66).

To the extent that the Government chooses to increase the contribution rate this is pre-funding. In contrast, revising the benefit formulae is an example of renegotiating the social contract. The recent proposal by the Government is a mixture of benefit reduction and pre-funding.

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<sup>19</sup> The interest rate growth differential has fallen substantially in Italy. The differential between long term interest rates and growth was only 0.1 per cent in GDP. This compares with an average of 2.5 per cent between 1991-2001, which included a high of 8.2 per cent in 1992.

To date the Korean Government has been pre-funding. The general government has continuously run surpluses which have resulted in a net financial asset position of 30.7 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). Korea's gross public debt is also relatively low at around 35 per cent of GDP (OECD, 2004c, p. 37).

#### 4.5.6 Netherlands

The Netherlands' Government has a pre-funding strategy which aims at maintaining government finances on a sustainable path defined as a path that maintains constant tax rates (OECD, 2004l, p. 15). A sustainable path requires a government surplus of around 1 per cent of GDP on an ongoing basis (OECD, 2004l, p. 78).

The estimation of a sustainable path is clearly very sensitive to assumptions. A key assumption in the Dutch projections is the assumed rate of return of pension assets. The CPB sustainability projections assume a real rate of return of 4 per cent on bonds and 8½ per cent on equities. The required structural surplus increases by 0.9 per cent of GDP for every 1 per cent decrease in the assumed rate of return of pension fund assets (van Ewijk *et al.*, 2000, p. 67).

#### 4.5.7 Spain

The government aims for a balanced budget or a small surplus (OECD, 2003g, p. 51). This has the effect of pre-funding while net financial liabilities are positive.

In recent years the general government balance has been in broad balance. This has contributed to a significant reduction in net financial liabilities. General government net financial liabilities have fallen from 53.1 per cent of GDP in 1996 to 37.0 per cent of GDP in 2004 (OECD Economic Outlook 76 Database). Gross financial liabilities have also declined from 77.1 per cent of GDP in 1996 to 58.4 per cent of GDP in 2004 (OECD Economic Outlook 76 Database).

## 5. Reasons for pre-funding

The following table provides some key statistics related to the subset of countries that have adopted pre-funding strategies. The first group of countries represent the strong pre-funding countries. The second group represent the mild pre-funding countries. The rest of this section considers the characteristics of these countries compared with the other OECD countries that do not have a pre-funding strategy.

Table 5

**Fiscal Positions of Pre-funding Countries**  
(percent of GDP)

Country	Gross Financial Liabilities 2000	Gross Financial Liabilities 1995	Net Financial Liabilities 2000	Net Financial Liabilities 1995	Tax and Non-Tax Receipts-to-GDP Ratio
Belgium	115.0	138.8	102.5	125.6	49.5
Canada	81.8	100.8	44.8	69.3	44.1
Denmark	54.4	78.4	8.7	25.9	57.4
Finland	53.2	65.7	-31.5	-3.8	56.1
Luxembourg	5.5	6.7	N.A.	N.A.	44.7
New Zealand	44.7	56.9	20.7	34.7	41.3
Norway	30.0	34.4	-60.6	-32.6	58.2
Sweden	64.2	82.2	1.4	25.3	62.4
Average of strong pre-funders	56.2	70.5	12.3	34.9	51.7
Australia	25.2	44.6	9.9	28.2	36.5
Iceland	41.9	60.3	24.0	40.4	45.6
Ireland	38.3	81.9	N.A.	N.A.	36.4
Italy	124.5	133.5	98.9	109.2	46.2
Korea	16.3	5.5	-27.0	-17.4	29.3
Netherlands	66.7	90.8	35.1	54.1	47.5
Spain	67.3	70.3	43.3	48.9	39.1
Average of mild pre-funders	54.3	69.6	30.7	43.9	40.1
Average of non pre-funders	64.9	73.2	39.2	39.0	42.7
OECD average (unweighted)	59.5	71.2	27.8	41.3	44.8

Source: General government gross financial liabilities, general government net financial liabilities and total tax and non-tax receipts are from Economic Outlook 76 Database. Change in old age pension spending and health spending are from OECD (2001), except for the following: Pension figure for Luxembourg IGGs(2002); pension and health expenditure for Iceland is from the EU EPC quoted in OECD (2003f); health expenditure for Italy is from EU EPC quoted in OECD (2004d). For pensions and health the OECD average is the average of the 21 countries covered in OECD (2001).

### 5.1 *Initial debt position*

Table 5 presents information on the gross and net financial asset position of the pre-funding countries at year 2000. This indicates that in 2000 the average gross general government financial liabilities of the strong pre-funding countries are around 9 per cent of GDP lower than the average of the non pre-funding countries. The difference between the strong pre-funders and the non pre-funders on the basis of net assets is even more marked, with the strong pre-funding countries having a net financial asset position almost 30 per cent of GDP lower than the latter.

However, to some extent, this is not surprising given that these countries have been chosen on the basis that they have implemented a pre-funding strategy. In 1995, there was little difference between the strong pre-funding countries and the non pre-funding countries in the gross or net financial asset positions.

Accordingly, as a group, we conclude that the initial asset position does not appear to provide a strong explanation for the decision to pre-fund. That said, high initial debt positions were probably influential in some individual countries. For example, the initial debt position of Belgium, Canada and Italy does appear to have been a significant factor in their decisions to pre-fund. In the case of Belgium and Italy broader European considerations (in particular adoption of the Euro) also played a significant part.

### 5.2 *Magnitude and type of spending pressure*

The average estimated increase in old age pension spending for the strong pre-funding countries is 4.5 per cent of GDP (Table 6) and the average of the mild pre-funding countries is 4.2 per cent of GDP. This compares with an OECD average of 3.8 per cent of GDP. Given the differences in methodologies for calculating these figures and the inherent uncertainty associated with long-term projections of this kind, we would not want to over-interpret this information. That said, the data are consistent with the proposition that the magnitude of expected increases in pension expenditure is related to pre-funding.

It is clear, however, that there are many countries with strong pension funding pressures that are choosing not to pre-fund. Germany, for example, expects to see old age pension spending increase by 5 per cent of GDP but as yet has not adopted a pre-funding strategy. Instead, it is seeking to reconsider some of its expenditure programs.

These differences between countries may be better explained by the qualitative issue of differences in funding commitments. These commitments may be considered as forming a spectrum, ranging from the strongest, being contracts at law, to less well-defined social contracts to provide public services into the future. Many public sector employee pension schemes are contractual in nature, and the government has little choice but to fund them. Broader commitments to support a level of retirement incomes for the community at large may fall more within the

Table 6

**Spending Pressures**  
(percent of GDP)

Country	Change in Old-Age Pension Spending, 2000-2050	Change in Health Spending, 2000-2050
Belgium	3.7	3.0
Canada	5.8	4.2
Denmark	3.6	2.7
Finland	4.8	3.8
Luxembourg	2.0	N.A.
New Zealand	5.7	4.0
Norway	8.2	3.5
Sweden	2.2	3.2
Average of strong pre-funders	4.5	3.5
Australia	1.6	6.2
Iceland	0.5	3.5
Ireland	4.4	3.5
Italy	1.7	2.1
Korea	8.0	0.8
Netherlands	5.3	4.8
Spain	8.0	N.A.
Average of mild pre-funders	4.2	3.5
Average of non-pre-funders		
OECD	3.8	3.3

terms of a social contract which is subject to renegotiation, with the strength of that social contract varying between countries.

Many of the countries in the strong pre-funding category could be said to have strong social contracts which bind their governments to provide a certain standard of income support into the future – a feature in particular of the Nordic countries. Other countries where the social contract may be less strong are either mild pre-funders, or are more inclined to pursue strategies to renegotiate the social contract.

In contrast to the information on expected changes in pension expenditure, there appears little evidence that expected changes in health expenditure explain differences in the tendency to pre-fund. The average estimated increase in health expenditure is 3.5 per cent of GDP for both the strong and mild pre-funding countries compared with the OECD average. Furthermore, the health estimates should be treated with an even greater degree of caution than the pension estimates as the methodologies differ more and there are more countries where there is no data. That said, there is no reason to believe that the countries we describe as pre-funders would systematically have estimated health costs that are higher than the OECD average. For example, Australia, Canada and the Netherlands do allow for enrichment in their estimates, while many non-pre-funding countries do not.

Moreover, consideration of the nature of the social contract in respect of health care may suggest a different policy response than applies to pensions. In many countries, expected increases in health expenditures are as much a function of improvements in technology as they are of demographic factors. While demographic factors suggest an increasing cost in delivering on an existing social contract, public provision of new, higher cost medical technologies would appear to go beyond the existing contract and require future renegotiation of the social contract.

### 5.3 *Initial tax position*

Another variable of interest is the initial tax position of the pre-funding countries. As indicated in Table 5, there appears to be a significant difference between the average tax-to-GDP ratio of the strong pre-funding countries and other OECD countries. The strong pre-funding countries in 2000 had an average tax-to-GDP ratio of 51.7 per cent of GDP. This compares with an average of 40.1 per cent of GDP for the mild pre-funding countries and 42.7 per cent for those OECD countries that are not identified as pre-funders.<sup>20</sup>

Furthermore, no OECD country that is not a pre-funding country had a total tax and non-tax to-GDP-ratio higher than the average of the strong pre-funding

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<sup>20</sup> The qualitative pattern is the same for 1995. In 1995 the average tax-to-GDP ratio of the strong pre-funding countries was 51.7 per cent of GDP, the weak pre-funding countries 38.8 per cent of GDP, and the average of non pre-funders was 42.7 per cent of GDP. Accordingly, the general pattern of ratios does not appear to be particularly sensitive to the choice of the “initial period”.

countries, although there are some countries with relatively high tax-to-GDP ratios that do not appear to be pre-funding.

Section 2.1 of this paper discussed the two major efficiency motivations for pre-funding: tax smoothing and interest rate effects. The magnitude of the benefits of tax smoothing depends in part on the initial level of taxation. The observation that countries with high initial tax rates tend to undertake more pre-funding is therefore in keeping with what would be expected. That said, high tax countries may not have been motivated by tax smoothing. An alternative explanation is that countries that already have high taxes may feel that they have little flexibility to increase future taxes in the future (which could be for a variety of reasons including efficiency, political constraints or international tax competition). Further, it is possible that high tax countries may have institutional arrangements that make it difficult to revise the terms of the social contract, as discussed above. In this respect it may be better to characterise these countries as “high expenditure” rather than high tax.

The above suggests that high tax levels cause pre-funding. That is that countries are pre-funding because they have high tax rates. However, one could argue that the causality runs the other way. That is that the higher taxes result in evidence of pre-funding. We do not think this latter explanation is as convincing. Most of the strong pre-funding countries are pre-funding in the order of 1 to 2 per cent of GDP per year (Norway is the exception given oil revenue). This compares with a tax-to-GDP ratio of more than 10 per cent higher than the OECD average. In addition, the strong pre-funding countries face slightly higher increases in expenditure from their current high base.

#### *5.4 Other explanations*

The three previous sections appear to indicate that there is some evidence that the initial tax-to-GDP ratio influences the likelihood of a country pre-funding. There is also weaker evidence that the expected increase in pension expenditure also influences decisions to pre-fund. However, while no OECD country had a tax-to-GDP ratio higher than the average of the strong pre-funding countries, countries such as Austria and Germany were close (49.8 and 51.1 per cent of GDP respectively compared with 51.7 per cent of GDP for the strong pre-funding countries in 2000 (OECD Economic Outlook 76 Database and Table 5)). Further, a number of other countries have a higher tax-to-GDP ratio than New Zealand and Canada who are part of the strong pre-funding group. Moreover, the mild pre-funding countries have a lower tax-to-GDP ratio than the non pre-funding countries. This begs the question whether there is an alternative explanation.

The most obvious explanation lies in the cultural and political institutions of the countries. It is notable that the strong pre-funding countries are comprised of the Scandinavian countries, two-thirds of the Benelux countries (with the other third very close to the strong pre-funding group) and two English-speaking countries. In the Scandinavian countries there is a well known commitment to the concept of sustainability. In New Zealand and Canada there is a strong commitment to fiscal

responsibility following periods that are now regarded as representing poor fiscal management.

## **6. Summary and conclusions**

In this paper we have developed a framework for analysing pre-funding among OECD countries. This framework is consistent with concepts of fiscal sustainability which require that a government can meet its intertemporal budget constraint on the basis of current policies.

We define weak sustainability as stabilizing the government's net financial asset position over a period of time. The criterion is weak to the extent that the time horizon is finite. The longer the time horizon the stronger is the criterion, converging to full sustainability as the time period approaches infinity. We recognise that the weak sustainability criterion is imperfect, but believe that it forms a useful starting point for assessing sustainability.

We define pre-funding as improving a government's net financial asset position. This involved raising more taxes than is required for current needs, resulting in greater financial resources in the next period to deal with any additional expenditure needs.

This approach privileges the initial financial asset position. We recognise this criticism, but believe that it is still a meaningful approach as governments are in fact faced with a policy decision based on their initial starting point. If governments do improve their net financial asset position then they do reduce future financing costs and create additional flexibility compared with the initial starting point (whatever that may be).

To identify pre-funding in practice we adopt a direct and indirect approach as initial filters. The direct approach looks at the historical evolution of both general government gross and net financial assets. The indirect approach looks at the primary balances of individual countries compared to benchmark primary balances calculate using the condition for stable net financial assets. Finally, we examine each country identified by the filters to establish evidence of pre-funding.

Our analysis identifies two categories which we describe as "strong pre-funding countries" and "mild pre-funding" countries. Strong pre-funding countries are identified by clear evidence of past pre-funding and a forward looking commitment to further pre-funding. Mild pre-funding countries are characterised by less pre-funding in the past, or a forward looking pre-funding policy that implies less pre-funding, or weaker compliance with their own policy.

According to this classification we define Belgium, Canada, Denmark, Finland, Luxembourg, New Zealand, Norway and Sweden as strong pre-funding countries and Australia, Iceland, Ireland, Italy, Korea, the Netherlands and Spain as mild pre-funding countries.



We stress that we do not intend to imply that the mild pre-funders are necessarily following poorer policies than the strong pre-funders. The appropriate policy for an individual country depends on their particular circumstances. This point is related to the time period over which weak sustainability is assessed. To the extent that some of the mild pre-funders face smaller future pressures, then the weak sustainability criterion may be met for a much longer period. That is policies can be left unchanged for a longer period of time without the net financial asset position deteriorating. Put another way, if the time period over which the weak sustainability criterion is assessed were extended, then the grouping of countries could change markedly.

We would have expected that pre-funding countries would have been characterised by higher initial net financial liability positions, higher expected increases in expenditure (particularly pensions) and higher initial tax rates. A high net financial liability position may lead to more observed pre-funding, partly motivated by a desire to reduce government-induced risk premia on interest rates, and partly to increase flexibility to adjust to adverse shocks. Higher expected pension expenditure may lead to more pre-funding, particularly to the extent that government's view pension scheme obligations as contractual or quasi contractual in nature. Public sector employee pension schemes may particularly lend themselves to pre-funding. In contrast health expenditure may be viewed as part of the social contract that can be renegotiated over time.

Against the background of these expectations we observe little evidence that the pre-funding countries have higher initial liability positions. Indeed, the opposite appears to be the case to a small degree, although this conclusion is sensitive to the choice of the "initial" period.

The strong pre-funding countries do have slightly higher expected increases in pensions (around 1 percentage point of GDP between 2000 and 2050) than the OECD average. There appears no significant difference between the strong pre-funding countries and the rest of the OECD in terms of the expected increase in health expenditure. Although this accords with what we would expect, we would not want to over-interpret these figures, particularly in the health area.

There does seem to be a substantial difference between the initial tax-to-GDP ratios of the strong pre-funding countries and the OECD average. In 2000 the strong pre-funding countries had an average tax-to-GDP ratio of 51.7 per cent of GDP compared with an average of 42.7 per cent of GDP for the non pre-funders. Furthermore no OECD country outside the strong pre-funding group has a tax-to-GDP ratio higher than the average of the strong pre-funding group.

The observation that the strong pre-funding countries have higher initial tax rates is consistent with policy motivated by the desire to improve efficiency by tax smoothing. It may also reflect the fact that high tax countries may believe that they will have less flexibility to increase taxes in the future. As a result, even a small risk of significant expenditure pressures may lead to an early policy response.

Finally, whilst the conclusion that high tax rates appear to be related to pre-funding activity appears to be clear, it is possible that another common factor explains why particular groups of countries pre-fund. In this respect it is striking that the countries are geographically clustered in Northern Europe and the English-speaking countries. This perhaps suggests that other cultural and institutional factors are the common determinants of pre-funding behaviour. In particular, the strength of the social contract which binds governments to provide a certain level of government services may be a stronger part of the institutional framework of strong pre-funding countries.

Finally, in terms of the policy mix, it is important to ensure that other “no regrets” measures are pursued even if pre-funding is undertaken. In particular, irrespective of the approach to pre-funding, productivity and participation issues should be addressed. The latter may be seen as a variant of options that seek to renegotiate the social contract with a view to reducing unacceptable costs.

**APPENDIX 1  
SUSTAINABILITY AND DEBT STABILITY CONDITIONS**

The government’s budget constraint in any period can be defined as:

$$PSBR_t = (D_t - D_{t-1}) = PD_t + i_t D_{t-1} \tag{A1}$$

where  $PSBR_t$  is the public sector borrowing requirement at time  $t$ ,  $D_t$  is the stock of debt at time  $t$ ,  $PD_t$  is the primary deficit at time  $t$ , and  $i_t$  is the interest rate at time  $t$ . This simply says that the change in the level of debt is equal to the primary surplus (that is the general government balance without net interest payments) plus the cost of servicing the debt inherited from the previous period.

In this presentation we have used the common approach of just referring to “debt”. However, in practice we should distinguish between gross and net debt. The logic of the constraint expressed in equation (A1) means that  $D_t$  should be interpreted as net debt as the net interest payments associated with inherited debt contribute to the government’s borrowing requirements. Furthermore, if there are other financial (non-debt) assets or liabilities then these will also need to be taken into account. We expand further on the issue of assets below.

Multiplying equation (A1) by  $-1$  gives:

$$PS_t = i_t D_{t-1} - (D_t - D_{t-1}) \tag{A2}$$

where  $PS_t$  is the primary surplus of the public sector at time  $t$ . Dividing equation (A2) by  $GDP_t$  and rearranging terms provides an equation that describes the debt dynamics in each period:

$$d_t = \beta_t d_{t-1} - ps_t \tag{A3}$$

where  $ps_t$  is the primary surplus as a ratio of GDP, and

$$\beta_t = \frac{(1 + r_t)}{(1 + g_t)} \tag{A4}$$

where  $r_t$  is the real interest rate and  $g_t$  is the real growth rate.

If we assume that  $\beta_t$  is stable over time (*i.e.*  $\beta_t = \beta_{t+1}$ ) then we can derive the following budget constraint:

$$d_t = \sum_{n=1}^N \beta^{-n} ps_{t+n} + \beta^{-N} d_{t+N} \tag{A5}$$

Equation (A5) establishes the formal condition for sustainability. The fiscal position is sustainable if the present discounted value of future primary surpluses is equal to the outstanding stock of debt on the basis of current policies. In other words, if there is an initial stock of debt, then present value of future primary surpluses are sufficient to pay off this debt.

## APPENDIX 2 DEBT REDUCTION VERSUS ASSET ACCUMULATION

Improving the net financial asset position of a country can be achieved either by reducing debt or increasing assets. Conceptually there is little difference in terms of providing the financial capacity to meet future expenditure pressures. That said, two factors need to be taken into account in comparing debt reduction with asset accumulation: differences in the rate of interest paid on debt or received on assets; and the nature of governance arrangements for debt and assets.

### A2.1 Rate of interest and rate of return on assets

Recall equation (A3) which describes debt dynamics in each period. In this equation  $\beta$  is implicitly a weighted average of debt costs and asset returns. Alternatively, the equation can be rewritten as:

$$b_t - a_t = \beta_t^B b_{t-1} - \beta_t^A a_{t-1} - ps_t \quad (\text{A6})$$

where  $b_t$  equals the gross debt at time  $t$ ,  $a_t$  equals the gross assets at time  $t$ , and:

$$\beta_t^B = \frac{(1 + r_t^B)}{(1 + g_t)} \quad (\text{A7a})$$

and:

$$\beta_t^A = \frac{(1 + r_t^A)}{(1 + g_t)} \quad (\text{A7b})$$

where  $r_t^B$  is the rate of interest on debt at time  $t$  and  $r_t^A$  is the rate of return on assets at time  $t$ .

The net asset stability condition on the assumption that  $\beta^A$  and  $\beta^B$  are stable becomes:

$$ps^* = \left[ \frac{(r^B - g)}{(1 + g)} \right] b^* - \left[ \frac{(r^A - g)}{(1 + g)} \right] a^* \quad (\text{A8})$$

Equation (A8) summarises some key issues associated with debt reduction versus asset accumulation. If the rate of return on assets is equal to the cost of serving debt, then, at least from a fiscal sustainability perspective, we should be indifferent between reducing debt or increasing assets. However, if there is a systematic difference between the rate of interest and the return on assets, then this will need to be taken into consideration.

It is beyond the scope of this paper to discuss fully this issue. However, we can make a number of observations. First, the relevant rate of interest and rate of return on assets is that faced by the government. Therefore the particular composition of the government's debt portfolio and asset portfolio will influence

both returns.<sup>21</sup> Second, where equities are held as assets, the most important issue will be the size of the equity risk premium. The higher the assumed equity risk premium, then the higher the expected difference between the return on government bonds and equities. Third, the relative risk of alternative assets should also be taken into account as governments are not indifferent to volatility in returns. Fourth, the two rates may differ if the fiscal policy of the government directly affects the rates themselves. The narrower the asset class, then the greater the likely effect of government activity. For example, changes in government debt stocks (which with debt reduction would be favourable) may have a greater impact on interest rates than changes in investment activity in a diversified portfolio.

## **A2.2 Assets and governance issues**

Both maintaining a debt portfolio and managing an asset portfolio involve important governance issues. That said, the issues associated with managing assets are arguably more difficult for three main reasons.

First, the range of assets in an asset portfolio is likely to be greater than that in a debt portfolio. This increased complexity needs to be appropriately managed.

Second, in some political systems a pool of assets may result in a temptation to direct investments to achieve other goals. This issue does not arise with debt portfolios as funds are being provided to the government.

Third, large pools of assets may lead to a relaxation of fiscal discipline.

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<sup>21</sup> If the rate of interest faced by government affects the rate of interest faced by other actors (as we would expect), then there will be second round effects through changes in growth rates.

### APPENDIX 3 EXPENDITURE PRESSURES AND SUSTAINABILITY

In flow terms we can re-express equation (A6) to show the independent influence of expenditure and taxes:

$$b_t - a_t = \beta_t^B b_{t-1} - \beta_t^A a_{t-1} - (pt_t - pe_t) \quad (\text{A9})$$

where  $pt_t$  is equal to primary tax and non tax receipts at time  $t$  and  $pe_t$  is equal to primary expenditure at time  $t$ .

The net asset stability condition then becomes:

$$pe^* - pt^* = \left[ \frac{(r^B - g)}{(1 + g)} \right] b^* - \left[ \frac{(r^A - g)}{(1 + g)} \right] a^* \quad (\text{A10})$$

Expected expenditure pressures correspond to an expected increase in primary expenditure. Without other policy adjustments the debt stability condition will not be met and weak sustainability will not be maintained. If the government wishes to return to a sustainable path, then either taxes will need to be increased or expenditure will need to be reduced.

Thus expected additional spending pressures lead to an expectation that the weak sustainability criterion will not be met. This prompts a possible policy response.<sup>22</sup>

#### A3.1 Stock treatment

The stock equivalent of this is the budget constraint which becomes (on the assumption of a constant  $\gamma$ ):

$$b_t - a_t = \sum_{n=1}^N \gamma^{-n} (pe_{t+n} - pt_{t+n}) + \gamma^{-N} (b_{t+N} - a_{t+N}) \quad (\text{A11})$$

where:

$$\gamma = \left[ \frac{(1 + r_t^B)}{(1 + g_t)} \right] \left[ \frac{b_t}{b_t - a_t} \right] - \left[ \frac{(1 + r_t^A)}{(1 + g_t)} \right] \left[ \frac{a_t}{b_t - a_t} \right] \quad (\text{A12})$$

Equation (A11) is the government budget constraint allowing for both assets and liabilities and separately identifying the contribution of primary expenditure and taxation. The discount factor,  $\gamma$ , is a weighted average of the rate of interest on bonds and the rate of return on the government asset portfolio.

<sup>22</sup> This paper focuses mainly on the policy responses of changing primary expenditure or primary taxation in order to change the trajectory of the net financial asset position. A third alternative is to increase the rate of growth,  $g$ . The higher the growth rate, the lower the required primary surplus for net financial asset stability.

The government budget constraint brings future spending pressures to account in the current period. Higher expected primary expenditure requires either a higher initial net asset position, or higher future taxes, or measures to reduce future expenditure.

**General Government Total Outlays**  
(percent of nominal GDP)

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Australia	38.9	36.3	35.5	36.2	37.9	39.7	39.8	39.3	39.1	37.9	36.8	36.7	35.8	35.7	37.2	36.3	36.0	35.7	35.8	35.4
Austria	54.4	53.2	51.9	51.6	52.3	53.2	56.4	56.0	56.0	55.4	53.1	53.4	53.2	51.4	50.9	50.6	50.8	49.9	49.4	48.2
Belgium	57.0	55.1	53.4	53.4	54.4	54.7	55.7	53.4	52.9	53.1	51.4	50.7	50.0	49.3	49.3	50.2	51.0	49.2	49.5	49.1
Canada	46.1	45.4	45.8	48.8	52.3	53.3	52.2	49.7	48.5	46.6	44.3	44.4	42.5	41.1	41.8	40.9	40.5	39.4	38.9	38.9
Czech Republic (a)	-	-	-	-	-	-	-	-	54.4	42.8	42.4	43.8	42.9	42.1	45.0	46.9	54.5	46.1	45.8	45.2
Denmark	55.0	57.2	57.3	57.0	57.8	59.0	61.7	61.6	60.3	59.8	58.0	57.6	56.3	54.9	55.3	55.8	56.1	55.6	54.6	54.1
Finland	48.5	47.0	45.1	48.7	57.6	62.9	64.1	62.8	59.5	59.8	56.4	52.8	52.1	49.1	49.1	50.1	51.0	50.5	50.6	50.4
France	51.9	51.4	50.4	50.7	51.5	53.0	55.3	55.0	55.1	55.4	54.9	53.7	53.5	52.5	52.5	53.4	54.5	54.5	54.4	53.9
Germany (b)	45.8	45.3	44.0	44.5	47.1	48.1	49.3	49.0	49.4	50.3	49.3	48.8	48.7	45.7	48.3	48.7	48.8	47.8	47.2	46.1
Greece	45.1	44.0	45.4	50.2	46.7	49.4	52.0	49.9	51.0	49.2	47.8	47.8	47.6	52.1	50.2	49.1	48.3	49.8	48.4	48.1
Hungary	-	-	-	-	56.7	60.3	59.8	63.4	56.9	53.9	51.8	52.5	50.2	47.8	49.0	52.6	49.7	51.3	50.7	50.0
Iceland	37.4	42.5	45.0	42.4	43.7	44.6	44.5	44.3	43.7	43.2	41.6	42.4	43.5	43.1	44.1	45.8	48.0	45.9	44.5	43.6
Ireland	52.0	48.5	42.1	43.2	44.8	45.3	45.1	44.3	41.5	39.6	37.1	34.9	34.5	32.0	33.5	33.8	34.3	33.9	34.0	34.3
Italy	50.8	51.5	52.8	54.4	55.5	56.7	57.7	54.5	53.4	53.2	51.1	49.9	48.9	46.9	48.7	48.0	48.9	48.7	48.3	48.7
Japan (c)	31.5	30.9	30.2	31.7	31.5	32.5	34.2	34.8	35.8	36.3	35.1	36.1	37.7	38.2	37.7	38.1	37.6	36.7	37.2	37.5
Korea	17.7	17.9	19.0	19.5	20.6	21.8	21.4	20.9	20.8	21.8	22.4	24.7	23.9	23.8	25.0	24.8	27.3	27.9	28.2	28.3



Luxembourg	-	-	-	43.2	44.4	46.0	45.7	44.5	45.5	45.6	43.3	42.0	41.2	38.7	38.8	43.1	44.9	45.3	45.6	45.6
Netherlands (d)	58.4	56.6	54.5	54.8	54.8	55.8	56.0	53.6	51.4	49.6	48.2	47.2	46.9	45.3	46.7	47.8	49.0	48.9	48.6	47.8
New Zealand	53.6	52.7	51.9	53.3	51.5	49.5	46.0	43.0	41.9	41.0	41.7	42.7	41.0	39.8	38.6	38.5	38.3	38.2	38.7	39.1
Norway	50.5	52.6	52.2	54.0	54.9	56.2	55.1	54.1	51.5	49.0	47.2	49.6	48.1	42.7	44.3	47.4	48.7	46.7	45.1	45.3
Poland	-	-	-	-	-	-	-	-	51.3	51.2	50.2	48.5	48.1	44.9	47.6	48.9	48.2	47.7	46.6	45.1
Portugal	40.0	38.5	38.8	42.1	45.1	46.2	47.8	46.0	45.0	45.8	44.8	44.1	45.3	45.2	46.3	45.9	47.7	48.0	47.3	47.3
Slovak Republic	-	-	-	-	-	-	-	57.8	54.1	61.5	65.0	60.8	56.9	59.9	51.5	51.0	39.4	39.2	39.0	38.1
Spain	41.0	40.9	42.2	43.4	44.9	45.9	49.4	47.3	45.0	43.7	41.8	41.4	40.2	40.0	39.6	39.9	39.6	41.0	40.2	40.1
Sweden	62.3	62.5	62.4	63.5	65.5	70.2	72.9	70.9	67.6	65.2	62.9	60.7	60.3	57.3	57.0	58.2	58.2	57.5	57.2	56.7
Switzerland	-	-	-	30.0	31.8	33.9	34.8	34.8	34.6	35.3	35.6	36.1	34.6	34.0	34.8	35.4	36.0	36.0	35.7	35.2
United Kingdom	43.6	41.1	40.5	42.2	44.0	46.1	46.1	45.3	45.0	43.0	41.4	40.2	39.7	37.5	41.0	41.8	43.7	44.4	45.0	45.2
U.S. (e)	37.0	36.1	36.0	37.0	37.8	38.5	38.0	37.0	36.9	36.5	35.3	34.6	34.2	34.0	35.1	36.0	36.1	35.6	35.6	35.7
Euro area	48.9	48.4	47.9	48.7	50.1	51.3	52.9	51.8	51.4	51.5	50.2	49.3	48.9	47.1	48.1	48.5	48.9	48.6	48.2	47.7
Total OECD	40.4	39.6	39.3	40.3	41.5	42.6	43.1	42.3	42.3	41.9	40.7	40.3	40.0	39.2	40.2	40.8	41.1	40.6	40.5	40.4

(a) In 1995 data reflect the large privatisation campaign which transferred some public enterprises to private ownership through vouchers distributed to the population. In 2003 the activation of State guarantees, mainly for the banking sector, accounts for about .7 per cent of total outlays.

(b) The 1995 outlays are net of the debt taken on this year from the Inherited Debt Funds.

(c) The 1998 outlays would be 5.3 percentage points of GDP higher if it included central government's assumption of the debt of the Japan Railway Settlement Corporation and the National Forest Special Account. The 2000 outlays include capital transfers to the Deposit Insurance Company.

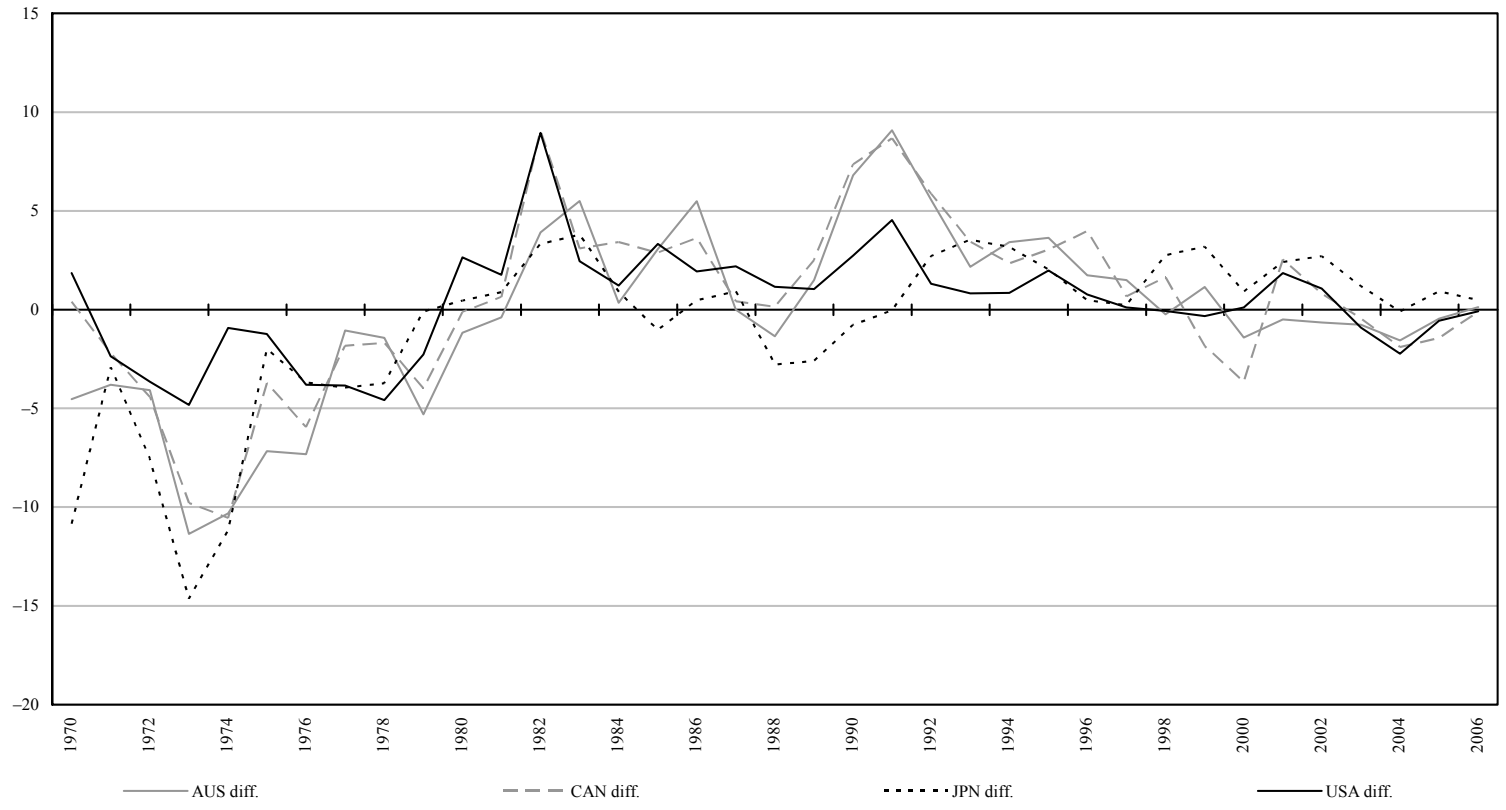
(d) The 1995 outlays would be 4.9 percentage points of GDP higher if capital transfers to a housing agency offering rentals to low income people were taken into account.

(e) These data include outlays net of operating surpluses of public enterprises.

Source: OECD Economic Outlook 76 database.

Figure 1a

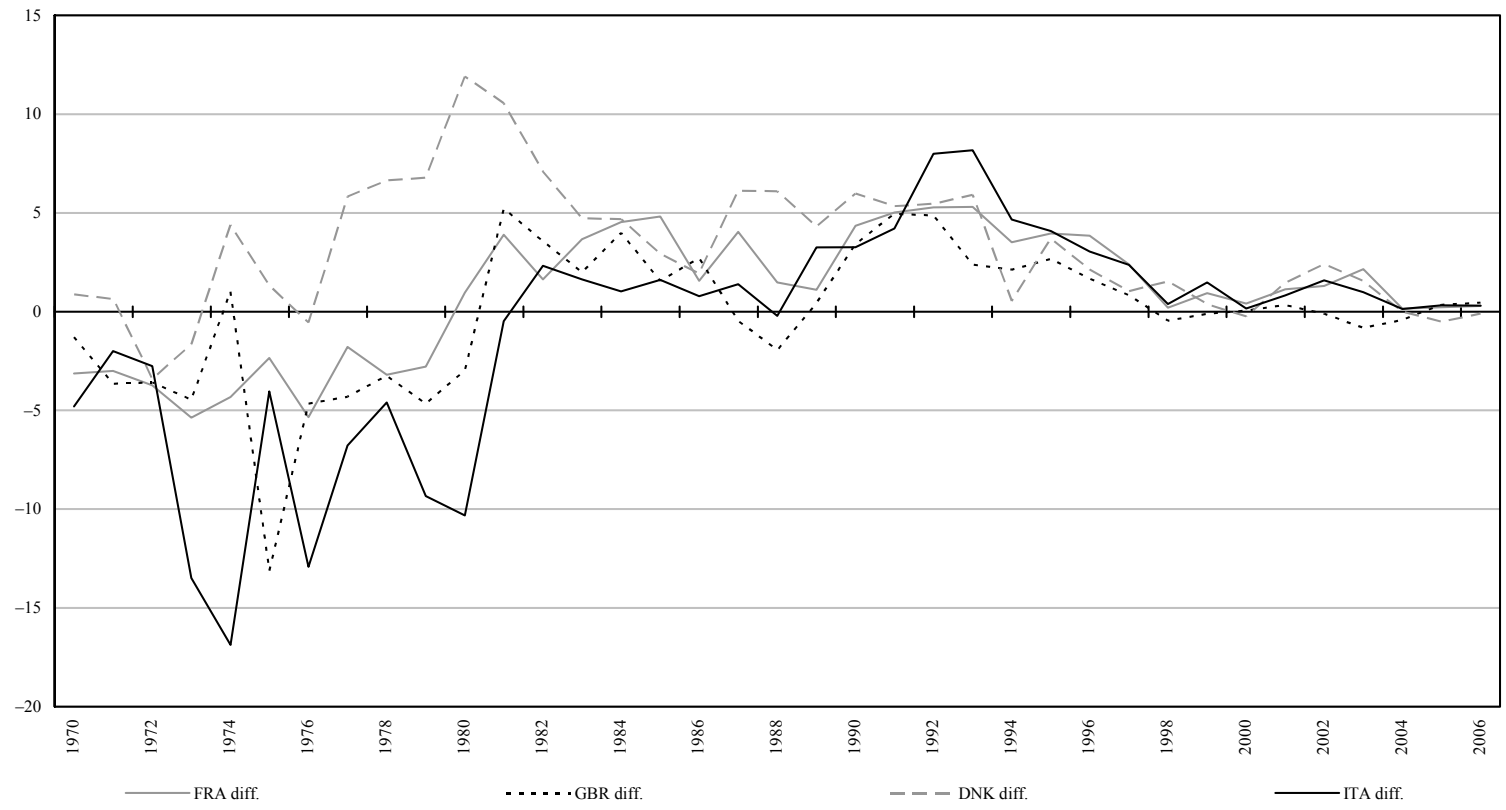
Growth and Interest Rate Differentials for Australia, Canada, Japan and the United States



Source: OECD.

Figure 1b

Growth and Interest Rate Differentials for France, United Kingdom, Denmark and Italy



Source: OECD.

**Age-related Spending**  
(levels in percent of GDP, changes in percentage points)

	Total Age-related Spending			Old-age Pension			Early Retirement Programmes			Health Care and Long-term Care			Child/Family Benefits and Education		
	Panel A			Panel B			Panel C			Panel D			Panel E		
	Level 2000	Change 2000 peak <sup>(a)</sup>	Change 2000-2050	Level 2000	Change 2000 peak <sup>(b)</sup>	Change 2000-2050	Level 2000	Change 2000 peak <sup>(c)</sup>	Change 2000-2050	Level 2000	Change 2000 peak <sup>(d)</sup>	Change 2000-2050	Level 2000	Change 2000 peak <sup>(a) (e)</sup>	Change 2000-2050
Australia	16.7	5.6	5.6	3.0	1.6	1.6	0.9	0.2	0.2	6.8	6.2	6.2	6.1	0.0	-2.3
Austria <sup>(f)</sup>	10.4	4.6	2.3	9.5	4.3	2.2	-	-	-	-	-	-	-	-	-
Belgium	22.1	5.4	5.2	8.8	3.7	3.3	1.1	0.1	0.1	6.2	3.0	3.0	6.0	0.0	-1.3
Canada	17.9	8.7	8.7	5.1	5.8	5.8	-	-	-	6.2	4.2	4.2	6.4	0.0	-1.3
Czech Republic	23.1	6.9	6.9	7.8	6.8	6.8	1.8	-0.7	-0.7	7.5	2.0	2.0	6.0	-	-1.2
Denmark <sup>(g)</sup>	29.3	7.3	5.7	6.1	3.6	2.7	4.0	0.8	0.2	6.6	2.7	2.7	6.3	0.3	0.0
Finland	19.4	8.5	8.5	8.1	4.8	4.8	3.0	-0.1	-0.1	8.1	3.8	3.8	-	-	-
France <sup>(h)</sup>	-	-	-	12.1	4.0	3.8	-	-	-	-	-	-	-	-	-
Germany	-	-	-	11.8	5.0	5.0	-	-	-	-	-	-	-	-	-
Hungary <sup>(i)</sup>	7.1	1.6	1.6	6.0	1.2	1.2	1.2	0.3	0.3	-	-	-	-	-	-
Italy	-	-	-	14.2	1.7	-0.3	-	-	-	-	-	-	-	-	-
Japan	13.7	3.0	3.0	7.9	1.0	0.6	-	-	-	5.8	2.4	2.4	-	-	-
Korea	3.1	8.5	8.5	2.1	8.0	8.0	0.3	0.0	0.0	0.7	0.8	0.5	-	-	-
Netherlands <sup>(j)</sup>	19.1	10.1	9.9	5.2	5.3	4.8	1.2	0.4	0.4	7.2	4.8	4.8	5.4	0.1	0.0
New Zealand	18.7	8.4	8.4	4.8	5.7	5.7	-	-	-	6.7	4.0	4.0	7.2	0.0	-1.3
Norway	17.9	13.7	13.4	4.9	8.2	8.0	2.4	1.6	1.6	5.2	3.5	3.2	5.5	0.5	0.5

Poland <sup>(i)</sup>	12.2	-2.6	-2.6	10.8	-2.5	-2.5	1.4	0.2	-0.1	-	-	-	-	-	-
Spain	-	-	-	9.4	8.0	8.0	-	-	-	-	-	-	-	-	-
Sweden	29.0	3.4	3.2	9.2	2.2	1.6	1.9	-0.2	-0.4	8.1	3.2	3.2	9.8	0.0	-1.2
United Kingdom	15.	0.8	0.2	4.3	0.0	-0.7	-	-	-	5.6	1.8	1.7	5.7	0.0	-0.9
United States	11.2	5.5	5.5	4.4	1.8	1.8	0.2	0.3	0.3	2.6	4.4	4.4	3.9	0.0	-1.0
<b>Average of countries above <sup>(k)</sup></b>	<b>16.9</b>	<b>5.9</b>	<b>5.5</b>	<b>7.4</b>	<b>3.8</b>	<b>3.4</b>	<b>1.6</b>	<b>0.3</b>	<b>0.2</b>	<b>6.0</b>	<b>3.3</b>	<b>3.3</b>	<b>6.2</b>	<b>-</b>	<b>-0.9</b>
<b>Average of countries which provide all or nearly all spending components</b>	<b>18.7</b>	<b>7.2</b>	<b>6.9</b>												
Portugal <sup>(l)</sup>	15.6	6.6	4.3	8.0	4.5	4.5	2.5	0.4	-0.4	-	-	-	-	-	-

- (a) The peak values are in 2050 except for Denmark (2030), Sweden and the United Kingdom (2035) and Belgium, Norway and the Netherlands and Korea (2040).
- (b) The peak values are in 2050 except for Japan (2015), the United Kingdom and Italy (2030), the United States, Sweden, Austria, Denmark and France (2035), and the Netherlands, Norway and Belgium (2040).
- (c) The peak values are in 2050 except for Belgium and Denmark (2025), Finland (2010), the Netherlands (2020), Poland (2035) and Sweden (2005). For Czech Republic the highest level is in 2000.
- (d) The peak values are in 2050 except for Denmark and Korea (2035), Norway and the United Kingdom (2040).
- (e) 0.0 indicates the highest levels in 2000. The peak values are in 2035 for Denmark and in 2040 for Norway and the Netherlands.
- (f) Total pension spending includes other age-related spending which does not fall within the definition in Panels B to E. This represents 0.9 per cent of GDP in 2000 and rises by 0.1 percentage point in the period to 2050.
- (g) Total includes other age-related spending not classifiable under the other headings. This represents 6.3 percent of GDP in 2000 and increases by 0.2 percentage points from 2000 to 2050.
- (h) For France, the latest available year is 2040.
- (i) Total includes old-age pension spending and “early retirement” programmes only.
- (j) “Early retirement” programmes only includes spending on person 55 or over.
- (k) OECD average excludes countries where information is not available and Portugal which is less comparable than other countries.
- (l) Portugal provided and estimate for total age-related spending but did not provide expenditure for all of the spending components.

Source: OECD (2001).

**Participation and Dependency Changes in the Baseline Scenario Definition of the Working-age Population**  
(percentage point changes)

	Participation rate		Old-age dependency ratio		Overall dependency ratio		Share of older workers (aged 55-64)	
	2000-2025	2025-2050	2000-2025	2025-2050	2000-2025	2025-2050	2000-2025	2025-2050
Australia	-0.3	-0.6	13.2	12.0	10.9	17.2	3.9	1.1
Austria	-4.6	0.4	11.1	16.7	25.3	25.2	4.8	-1.2
Belgium	1.7	0.4	9.9	10.1	6.4	14.8	4.3	-0.1
Canada	1.2	0.2	15.8	8.3	11.9	8.9	5.7	1.1
Czech Republic	-1.4	-5.3	15.8	25.3	19.7	66.8	2.9	3.8
Denmark	-2.3	0.3	10.3	4.3	15.5	5.3	3.5	-0.8
Finland	0.3	1.4	21.0	5.3	29.8	1.8	4.7	-0.8
France	-2.6	0.3	12.4	9.1	24.6	12.5	4.5	-0.4
Germany	2.2	0.3	13.3	10.0	9.6	12.9	4.6	-1.9
Greece	8.4	0.6	9.3	12.0	-17.4	16.9	4.6	0.9
Hungary	-1.9	-5.7	18.2	24.4	30.0	87.1	2.2	3.02.3
Iceland	2.3	-0.9	10.4	10.1	-0.8	13.7	5.7	2.5
Ireland	9.7	1.1	8.0	15.5	-22.8	16.2	6.9	2.5
Italy	2.9	0.2	13.9	24.6	5.9	43.2	9.3	-1.4
Japan	1.4	-0.3	22.6	19.2	24.2	28.2	2.6	1.3

Korea	-3.2	0.9	22.9	31.5	42.9	46.4	8.7	-2.1
Luxembourg	2.0	1.8	11.7	7.5	11.8	5.9	7.8	-2.4
Mexico	6.5	0.2	6.5	13.8	-42.9	13.6	5.3	4.9
Netherlands	2.2	1.6	14.8	7.3	11.2	6.5	6.7	-1.5
New Zealand	-2.3	-0.9	14.5	12.1	17.2	18.3	7.5	-0.2
Norway	1.7	1.1	8.7	3.6	2.7	1.1	5.9	-0.8
Poland	-0.7	-6.2	19.1	18.9	22.4	66.8	2.7	4.2
Portugal	1.4	0.4	6.5	16.4	3.6	24.1	4.0	-0.1
Slovakia	-1.3	-5.8	15.3	27.6	13.9	68.4	2.6	3.1
Spain	3.2	1.7	9.0	20.7	1.1	26.5	9.3	-1.7
Sweden	-5.0	0.0	10.9	1.7	27.5	1.0	2.8	-0.2
Switzerland	1.7	-0.6	10.5	5.6	5.8	10.0	5.4	-1.2
Turkey	-10.2	-2.4	4.3	13.1	52.8	50.2	2.2	1.0
United Kingdom	-1.2	0.8	9.7	6.4	11.8	5.4	5.5	-1.2
United States	-1.7	0.8	12.6	2.2	21.7	1.3	5.7	-1.2
<b>OECD unweighted average</b>	<b>0.3</b>	<b>-0.5</b>	<b>12.7</b>	<b>13.2</b>	<b>12.5</b>	<b>23.9</b>	<b>5.1</b>	<b>0.3</b>

**Participation rate:** calculated as the ratio of the active (employed and unemployed) to the total population aged 15 to 64.

**Old-age dependency ratio:** calculated as the ratio of the population aged 65 and over to the population aged 15 to 64.

**Overall dependency ratio:** calculated as the ratio of the inactive population (total population less labour force aged 15 to 64) to the labour force aged 15 to 64.

**Share of older workers (aged 55-64):** Calculated as the share of the active population aged 55 to 64 to the total labour force aged 15 to 64.

Source: Burniaux *et al.* (2004).

**The Old-age Dependency Ratio and the Share of the Very Old in the Total Elderly Population**  
*(percent and change in percentage points)*

	Old-age Dependency Ratio			Very Old Persons Ratio		
	2000	2050	Percentage point	2000	2050	Change
Australia	20.4	47.0	26.6	23.3	34.0	10.7
Austria	25.2	58.2	33.0	22.7	42.7	20.0
Belgium	28.1	49.5	21.4	21.5	39.7	18.2
Canada	20.4	45.9	25.5	23.8	36.2	12.3
Czech Republic	21.9	57.5	35.6	17.0	29.0	12.0
Denmark	24.2	40.3	16.2	26.8	37.4	10.6
Finland	25.9	50.6	24.7	22.0	35.2	13.2
France	27.2	50.8	23.6	22.2	37.5	15.3
Germany	26.6	53.2	26.6	21.1	37.5	16.4
Hungary	23.7	47.2	23.5	16.9	26.6	9.7
Iceland	20.3	44.0	23.7	23.9	34.3	10.4
Ireland	19.7	45.7	26.1	23.1	27.1	4.0



Italy	28.8	66.8	38.0	21.0	37.1	16.1
Japan	27.7	64.6	36.9	21.9	42.2	20.3
Korea	11.3	45.4	34.2	13.7	33.2	19.6
Netherlands	21.9	44.9	23.0	23.3	37.3	14.0
New Zealand	20.4	48.3	27.9	23.6	36.3	12.7
Norway	25.6	41.2	15.7	29.0	34.7	5.7
Poland	20.4	55.2	34.8	15.2	26.6	10.4
Portugal	26.7	50.9	24.2	19.1	30.7	11.6
Spain	27.1	65.7	38.5	21.8	33.2	11.4
Sweden	29.4	46.3	16.9	28.0	35.7	7.7
Switzerland	25.1	45.3	20.3	26.5	40.4	13.9
United Kingdom	26.6	45.3	18.7	25.0	37.3	12.3
United States	21.7	37.9	16.2	26.5	36.1	9.6
<b>Average</b>	<b>23.8</b>	<b>49.9</b>	<b>26.1</b>	<b>22.4</b>	<b>35.1</b>	<b>12.7</b>

Note: Old-age dependency ratio is equal to (persons aged 65+)/((persons aged 20-64) and the very old persons ratio is the equal to (persons aged 80+)/((persons aged 65+)).  
Sources: Casey *et al.* (2003). Eurostat: National data for Norway, Switzerland, Canada and the United States, United Nations' *World Population Prospects 1950-2050 (The 2000 Revision)* – February 2001 for Iceland.

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