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HOW SHOULD GOVERNMENTS INVEST FINANCIAL ASSETS AND MANAGE DEBT?

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TABLE OF CONTENTS

HOW SHOULD GOVERNMENTS INVEST FINANCIAL ASSETS AND MANAGE DEBT?

EXECUTIVE SUMMARY

1. This paper examines how governments should invest financial assets, and manage debt, particularly in an environment when a number of OECD Member countries are running fiscal surpluses. How should these surpluses, and large existing portfolios of financial assets and debt, be invested and managed?

Financial management policy should be determined in the context of the government's overall financial position.

2. Financial management policy should be approached in the context of the government's entire portfolio of assets and liabilities, rather than in the context of a specific portfolio. The government's overall financial position comprises all of its existing assets and liabilities as well as the present value of all additional expected future cashflows (such as tax revenues and social security obligations).

The government should construct its overall financial asset and liability portfolio to hedge permanent shocks to its financial position.

3. The government's financial position is exposed to economic shocks which will affect the government's ability to provide public goods and services without changing the tax rate. Although the government may be able to absorb some temporary shocks, large permanent shocks will require changes in the tax rate. Because these changes are costly, the objective of the financial asset investment and debt management policy should be to hedge the government's exposure to permanent shocks.

4. For example, if the government's financial position is positively exposed to changes in long-term productivity, the government should assemble a financial portfolio whose payoffs are negatively related to these productivity changes. Financial asset investment and debt management policy should follow this "insurance" objective rather than some independent return objective. There is no reason for the government to target a particular risk return combination, independent of this insurance objective.

5. In addition, reducing the exposure of the government's financial position is likely to assist in expenditure management. Governments tend to increase discretionary spending when there is a positive shock but do not reduce spending when a negative shock occurs. This tendency to increase government spending over time may be reduced by better hedging of the government's financial position. This hedging will also reduce the involuntary risk exposure that is imposed on taxpayers – because their tax obligation will be less variable, taxpayers are likely to be better off.

6. In order to implement this hedging policy a centralized policy-setting function is necessary. This central role would see the development of strategic investment guidelines within which decentralized managers would retain operational responsibility for specific financial asset investment and debt management policy.

There are several implementation constraints that indicate that these recommendations above be pursued in a more limited sense.

7. However, there are both technical and political constraints on the ability of governments to implement this hedge portfolio. The technical concerns relate to the amount of information required to calculate the appropriate hedge, and also the unavailability of the financial assets necessary to construct this hedge. However, it should be possible to construct the hedge portfolio in an approximate manner, and this will likely yield superior outcomes to the current policy settings. The political constraints relate to the concerns of risk averse politicians and officials who do not want to be held accountable for volatility in financial asset returns over which they have no direct control.

8. These considerations suggest that this hedge portfolio be restricted to hedging specific balance sheet exposures that are well understood before extending the policy to the full government balance sheet.

This paper was prepared by David Skilling, Senior Analyst on leave from the New Zealand Treasury.

1.0 INTRODUCTION

9. Many OECD governments have accumulated, or are forecast to accumulate, substantial portfolios of financial assets and liabilities. Most OECD governments have accumulated significant portfolios of debt because of a sustained period of fiscal deficits. However, the accumulation of financial assets has occurred for a variety of reasons. Financial assets have been built up by some governments as a response to a specific obligation (such as a public employee pension liability), while other governments (such as in Norway) have been able to accumulate financial assets, to be used for general budgetary purposes, because of the returns from natural resources like oil.

10. This paper examines how portfolios of financial assets and liabilities held by governments should be invested and managed. This paper does not examine whether these holdings of financial assets and liabilities are appropriate but rather, for given government holdings of financial assets and liabilities, considers the composition of these portfolios.[1] What objectives should be followed? Should the governments specify risk and return criteria, or are there other important considerations?

11. Specifically, this paper will:

- Assess the magnitude of the policy issue through an examination of public financial asset and liability portfolios and current investment and management practice;
- Develop and outline an analytical framework to inform policy recommendations on the investment and management of financial assets and liabilities by the government;
- Discuss political economy considerations that may constrain the implementation of these policy recommendations; and,
- Provide specific policy recommendations.

2.0 BACKGROUND

- ***All OECD governments have significant portfolios of financial assets and/or debt.***
- ***Fiscal projections suggests that there will be significant shifts in the size and composition of these portfolios as countries either save for the fiscal burden associated with an ageing demographic structure or experience fiscal deficits and rising debt if they do not alter policy settings.***

12. This section provides background data to support the proposition that financial asset investment and debt management are important policy issues. The importance of the policy issue is a function of the large size of the financial asset and debt portfolios held by OECD governments.

13. One of the most noticeable observations in OECD fiscal policy over the last 30 years has been the persistence of fiscal deficits, as documented in Table 1. Indeed, many OECD governments continue to run fiscal deficits and add to the public debt.

Table 1. Fiscal Deficit/Surplus as a percentage of real GDP, for the G7 countries

Country	1970	1980	1990	1999
USA	-1.1	-1.4	-2.7	0.1
Japan	1.7	-4.4	2.9	-2.6
Germany	0.2	-2.9	-2.1	-2.5
Italy	-4.0	-8.6	-11.1	-2.5
France	0.9	-0.0	-1.6	-3.0
UK	3.0	-3.4	-1.2	-0.4
Canada	0.5	-3.1	-4.5	2.1

Note: A negative number reflects a fiscal deficit; a positive number reflects a fiscal surplus.
Source: OECD Economic Outlook, June 1998

14. These deficits have led to the accumulation of substantial amounts of public debt. In many OECD countries the gross financial liabilities issued are a substantial proportion of GDP, and are likely to remain at high levels for many years. This can be seen clearly in Table 2.

Table 2. Gross and net public debt as a percentage of real GDP, for the G7 countries

	1970		1980		1990		1999	
Country	Gross	Net	Gross	Net	Gross	Net	Gross	Net
USA	41.5	29.5	37.0	21.8	55.5	38.6	59.7	44.9
Japan	10.9	-6.6	49.6	17.3	62.6	9.5	99.5	29.2
Germany	18.1	-11.4	31.1	9.3	45.5	20.7	64.2	50.6
Italy	38.1	33.2	58.1	53.0	104.5	84.4	116.1	103.7
France	n.a.	-0.8	30.9	-3.3	40.2	16.3	66.4	46.0
UK	77.1	52.0	54.0	36.2	39.3	18.8	57.5	41.4
Canada	52.1	11.4	43.3	13.0	71.5	42.6	84.2	41.4

Note: A negative number reflects net financial assets; n.a. = data not available
Source: OECD Economic Outlook, June 1998.

15. From Table 2 we can also see that governments often simultaneously hold large portfolios of gross debt and large portfolios of financial assets. Financial asset holdings are represented by the difference between gross and net public debt. However, this measure of financial assets will include "assets" such as loans to other organisations or students, which may be of poor quality. This paper focuses on the investment and management of financial securities that are traded in organised markets. The levels of financial assets shown in Table 2 therefore represent an upper bound on the government's holdings of financial assets, although governments do hold significant amounts of marketable financial assets.

16. This data shows that issues relating to financial asset investment and debt management are of high policy significance. However, in order to fully appreciate the policy significance of these financial management policy issues it is necessary to look into the future. What is expected to happen to the size of these financial asset and debt portfolios over the next 50 years?

17. Looking forward, significant pressure will be placed on many OECD governments to improve their financial positions in advance of the increased public spending associated with an ageing population [refer Roseveare *et al*. (1996)]. The demographic structure in many OECD nations is such that, over the next 50 years, they will have a large increase in the number of retired people relative to people in the work force. If current policy settings are maintained this will result in significant increases in government spending and therefore in government revenue requirements. Unless the government significantly increases the amount of tax revenue raised or cuts projected spending, large fiscal deficits and increasing public debt levels can be expected.

18. In response, forward-looking governments may begin to accumulate financial assets now by generating fiscal surpluses, so as to be able to meet these obligations without having to make sharp changes in future policy settings. Indeed, over the past 5 years a number of OECD governments have tightened fiscal policy and reduced fiscal deficits or, in some cases, registered fiscal surpluses (refer Table 1). This process of fiscal adjustment has been aided by recent economic growth, but some progress has also been made in reducing the structural element of the fiscal deficit [Alesina, Perotti & Tavares (1998)].

19. However, even governments which are not that forward-looking, as is the case for many, are still likely to accumulate some level of financial assets (refer Table 2). Moreover, there is increasing policy discussion of pre-funding existing liabilities (like social security in the USA) which is likely to require the government holding a larger financial asset portfolio. Thus, it seems apparent that under many plausible policy settings, OECD governments will be accumulating large portfolios of financial assets and liabilities. To the extent that the government holds these portfolios, the important policy question is how these portfolios should be managed and invested. This paper seeks to answer this question.

20. In summary, the motivation for this paper is the magnitude of these portfolios and the remaining conceptual and policy uncertainty as to how to invest and manage these financial assets and liabilities. The processes underlying optimal individual and corporate investment decision making are well understood. At a normative level, individuals and households invest according to their risk preferences so as to maximize expected utility, while corporations generally invest to maximise shareholder value. However, the normative basis for government investment decision making is less clear. Specifically, should governments have a preference for specific risk-return combinations and should the risk preferences of the population (current and future generations) be taken into account when making the investment decision?

3.0. OBSERVED PRACTICE

- ***There is some consensus with respect to an objective for public debt management that relates to the optimality of a low cost, low risk debt portfolio. However there is a wide range of debt management practices in OECD governments.***
- ***There is less consistency with respect to the investment of financial assets. There is no single explicit objective, and there is a wide range of investment practices ranging from very conservative asset holdings to aggressive equity positions.***

3.1.0 Introduction

21. This section discusses observed financial asset investment and public debt management practice among OECD governments. This will allow an assessment to be made of whether there are common features in these policies that provide some suggestion of optimality. Financial asset investment and debt management are discussed separately because there are significant differences in the ways that these portfolios are managed.

3.2.0. Public debt management policy

22. As most OECD governments have significant portfolios of gross public debt, there are a number of observation points of debt management practices. At an operational level, debt management practices vary across several dimensions; for example, maturity structure, the nature of instruments issued (e.g. nominal or real, domestic or foreign currency denominated), and the degree of operating autonomy possessed by the debt management agencies. Given these operational differences, the comparative examination of public debt management is commenced in terms of the operational objectives that guide debt management agencies.

23. Indeed, there appears to be some convergence on an objective for public debt management. The objective of debt management is commonly argued to be the minimisation of efficiency costs associated with debt servicing, which is thought to be enhanced by tax smoothing [Missale (1997)]. The operational goal derived from this objective is generally stated as the minimisation of costs associated with debt management, taking into account the risks associated with the borrowing strategy. Accordingly, there is some policy convergence around a low risk rule where the portfolio is managed so as to achieve a portfolio with low volatility in the costs of funding (e.g. minimise interest rate risk, exchange rate risk). Most OECD debt management agencies appear to subscribe to some variant of this definition. In addition, many debt management agencies seek to promote the liquidity and efficiency of the domestic bond market.

24. Given this shared objective, it may be that a portion of the variation in observed operating practice can be explained by country-specific factors. To assess whether these differences are an appropriate response to country-specific factors or whether they represent deviations from the optimum an analytical framework is developed in Section 4.

Table 3. Examples of debt management objectives

UK	After a comprehensive debt management policy review in 1997, the objective is to "minimise over the long term the cost of meeting the government's financing needs, taking account of risk, while ensuring that debt management policy is consistent with monetary policy".
New Zealand	Manage the government's debt, overall net cash flows, and some interest bearing assets within an appropriate risk management framework (which is interpreted as a low risk tolerance).
Australia	Manage debt within a comprehensive risk management framework, which is primarily concerned with minimising the expected cost of debt financing.

3.3.0. Financial asset investment policy

25. As described above, many OECD governments have significant holdings of financial assets. Four typical reasons for governments' holding financial asset portfolios are:

- hedging and timing reasons associated with debt management;
- establishing a specific fund to satisfy defined government obligations such as public employee pension expenditures or catastrophic losses;
- managing foreign exchange reserves; and,
- less commonly, financing a deliberate public savings policy for future spending obligations (as in Norway).

26. Table 4 provides some examples of the types and uses of financial assets held by governments.

Table 4. Examples of financial asset portfolios

Norway	The Norwegian Petroleum Fund has accumulated a significant portfolio that represents the proceeds of its oil wealth. This portfolio is intended to provide a buffer against budgetary uncertainty and is intended to provide for an ageing population. By the end of 1998, the fund is expected to reach 16.5 per cent of GDP and by 2001 the Fund will total about 50 per cent of GDP. This Fund is invested in bonds (50-70 per cent) and equities (30-50 per cent) in both European and other markets.
Canada	The Canada Pension Plan Investment Board is mandated to achieve a "maximum rate of return without undue risk of loss", to provide a source of revenue for public pensions. The current portfolio comprises C$37 billion of risk-free securities. By 2007 the portfolio is projected to grow to C$80 billion, as tax revenues are directed into the Plan, of which half is expected to be invested to replicate a broad equity market index.
United States	According to the Social Security Administration, the Social Security Trust Fund had assets of approximately $570 billion in 1997. These assets are invested in government bonds.
New Zealand	Has set up dedicated portfolios to finance private catastrophic losses (NZ$3 billion) and a public employee pension obligation (NZ$4 billion). These funds are invested primarily in risk-free assets.

27. There is a variety of observed financial asset investment practice, ranging from funds that hold a low risk portfolio comprised entirely of government bonds to funds that hold portfolios comprised primarily of risky assets such as equities and property. The same government often simultaneously holds some high-risk portfolios and some low-risk portfolios, with no clear overarching objective. However, there appears to be a systematic relationship between the motivation for holding a specific portfolio of financial assets and the way in which the assets in this portfolio are invested. For example, financial assets held by central government agencies are generally invested in low-risk assets whereas assets held as part of a public pension fund are often invested more aggressively. A portfolio-specific hedging motive provides an explanation for why different investment policies are used for different portfolios held by the same government.

28. However, given that all of these portfolios impact on the government's financial position, it would seem reasonable to think that there should be some consistency between the investment policies applied to different portfolios. The analysis in the next section examines the nature of an appropriate objective function, and assesses whether it is appropriate to have these different funds guided by different objectives.

4.0. A FRAMEWORK FOR ANALYSIS

- ***Financial asset investment policy and debt management policy should be determined in the context of the government's comprehensive balance sheet. The objective of financial management policy is to enhance the welfare of citizens.***
- ***Specifically, the government should construct financial asset and liability portfolios that will hedge the government's exposure to permanent shocks, to the extent that this is more efficient than otherwise reducing balance sheet risk or levying precautionary taxation.***
- ***The government may also be able to reduce the welfare costs of agents' involuntary risk exposure to the government, and to engineer a more efficient risk allocation, through financial management policy.***

4.1.0. Introduction

29. In the context of the diversity of public sector financial management policy described above, this section develops an analytical framework to answer the policy question of how governments should invest financial assets and manage debt.

30. This paper develops a financial management policy framework in the context of the government's overall financial position or "balance sheet". Financial assets and liabilities represent one part of the government's overall financial position and it is necessary to consider fully the impact of the financial asset investment and debt management on the overall position. Once this is done and the relationship between the welfare of agents and the government's balance sheet is outlined, we will be in a position to discuss what an optimal financial management policy might look like.

- ***Financial asset investment and debt management policy needs to be determined in the context of the government's overall financial position.***

4.2.0. The nature of the government's balance sheet

31. This paper defines the government's balance sheet in a comprehensive fashion. A useful working definition of the government's balance sheet is the sum of all the assets that the government currently owns and all the liabilities that the government owes, supplemented with any additional expected discounted cashflows in the future (for example, cashflows from future tax revenues and government transfer payments).[2] This balance sheet is simply the aggregate financial representation of the government's activities and is analogous to the market capitalisation of a private corporation.

32. This comprehensive balance sheet can be seen as comprised of two different classes of assets and liabilities; real and financial. "Real assets and liabilities" are those that are held by the government in order to provide goods and services to the population through time. Real assets may be held and real liabilities incurred because the government is providing public goods, is engaging in regulatory and redistributive activities, is involved in commercial activities, or is providing some social insurance services. Real assets and liabilities may include buildings, state-owned enterprises, the roading network, the tax stream, and the public employee pension liability.

33. Financial assets and liabilities are not held because they contribute directly to some stream of benefits that the government is providing. Rather financial assets and liabilities are accumulated on the

balance sheet because there are differences in the timing of cash inflows and outflows. These financial assets and liabilities are the aggregation of each period's residual cashflows after the government has levied taxes and provided a stream of benefits to the population.

34. For any given level of government spending and taxation, the composition of the government's balance sheet can potentially have significant additional effects on the welfare of citizens in the population, both current and future generations. Although there are many dimensions to a welfare function, it seems plausible to argue that an assessment of the welfare impact of the management of the government's balance sheet should focus on two primary dimensions:

- the efficiency with which the balance sheet is financed; and,
- the impact of the government's balance sheet on the risk exposure of people in the population.

35. These two dimensions are now examined.

- ***The government's financial position should be measured in terms of a "comprehensive balance sheet", which is calculated in terms of the present value of future expected cashflows. This balance sheet is comprised of real and financial assets and liabilities.***
- ***The comprehensive balance sheet affects welfare in two ways; through the efficiency of balance sheet financing and through the impact of the government's balance sheet on the risk exposure of taxpayers.***

4.2.1. Efficient financing of the balance sheet

36. In order to finance the government's activities and operations, revenues need to be raised. Governments raise most of their revenue through levying taxes on the population. However, non-lump sum taxes such as income taxes, wage taxes, and consumption taxes, are distortionary as they alter relative prices within the economy. Although these distortions cannot be avoided if the government has some positive revenue requirement to finance the provision of goods and services, the government can take actions to reduce these deadweight losses and thereby enhance welfare (individual agents cannot reduce deadweight losses personally).

37. Broadly speaking, the imposition of deadweight losses on the economy can be minimised, for any given income tax revenue requirement, by smoothing marginal tax rates through time [Barro (1979)]. This result is obtained because the deadweight losses are roughly proportional to the square of the tax rate, meaning that volatility around a mean is worse than a constant rate at the mean.

38. This suggests that there are welfare costs associated with the shocks that affect the government's financial position if these shocks require the government to increase the tax rate to finance its spending requirements through time. This increase in the tax rate will generate deadweight losses.[3] The government's balance sheet is exposed to two major types of economic shocks; temporary shocks (e.g. changes in commodity prices or other cyclical phenomena) and permanent shocks (e.g. an increase in the trend rate of productivity growth).

39. The balance sheet is exposed to these risks because of the nature of the government's activities and operations; for example, the government absorbs risk from the population through providing social insurance services. Although some risk pooling and risk spreading will occur on the government's balance sheet, the government's financial position is likely to become more vulnerable to shocks as more risks are absorbed as these risks are unlikely to be independent.

40. The nature of the policy response to an observed shock will depend on the nature and size of the shock that is observed. A temporary shock should not lead to any immediate change in policy settings. Indeed, one feature of the government is its ability to use its balance sheet to absorb risks and to diversify shocks across time. This capacity to self-insure is a function of the government's size and it's ability to access capital markets (based on its power to tax). It is possible that some temporary shocks may result in immediate policy settings, if the shock is sufficiently large or if the government is unable to raise further finance (e.g. if it already has a large debt stock). Further, if it turns out that the temporary shocks are serially correlated some eventual policy change may be needed. As a general statement, however, temporary shocks should not be expected to have significant effects on policy settings.

41. Permanent shocks will change the expected cashflows in every future period. If the shock is negative, the government would have to increase the tax rate in order to satisfy the intertemporal budget constraint *ex ante*. Although the government may be able to postpone this tax rate increase by using existing financial assets, or issuing new debt, to finance its spending, permanent shocks are more likely to cause changes in policy settings and therefore to have welfare effects. Thus, the more exposed the government's balance sheet is to these permanent shocks, the more likely it is that policy settings will have to be changed and the less able the government will be to smooth taxes through time.

42. It appears that the most significant sources of risk to the government's comprehensive balance sheet are permanent and temporary shocks to economic growth. The government essentially "holds the economy" through the tax base and also has obligations whose value is negatively correlated with growth.[4] In addition, the government is also likely to be subject to a number of independent ("non-systematic") risks where the government has exposures to certain sectors of the economy and to particular risks (e.g. catastrophic losses). The government may be able to reduce its exposure to these non-systematic risks through on-balance sheet diversification.

43. The speed with which permanent (and temporary) shocks are translated into policy adjustments is related to the state of the government's balance sheet. For example, if the government has a significant debt burden a negative shock is likely to require a more immediate tax rate increase than for a government with a healthy financial position. Thus, one way in which the government can avoid regular adjustments in the tax rate is by building up a buffer of liquid assets on its balance sheet, by levying additional "precautionary" taxation. Although this buffer of assets may reduce the probability that tax rates will need to be unexpectedly adjusted, and thereby reduce welfare losses, the levying of this additional tax will impose some deadweight losses itself (and may induce poorer quality government spending). The government can reduce the amount of precautionary taxation that should be levied by reducing its exposure to permanent shocks in particular.

44. This analysis has assumed that the government acts as a social planner. However, in reality, the government is likely to respond differently to shocks – often for political reasons. Governments are observed not to respond to permanent shocks for prolonged periods, and delay fiscal adjustments in response to negative shocks to the comprehensive balance sheet [refer Alesina & Drazen (1991) and Velasco (1997)].

45. Moreover, there is some empirical evidence that suggests that governments respond to temporary shocks by making permanent changes in spending [Goff (1998)]. However, there appears to be an asymmetry where government spending increases in response to positive shocks, but does not subsequently reduce (a "ratcheting" effect on spending).[5] In this sense, the distinction between permanent and temporary shocks may be artificial. One implication of this analysis is that a government balance sheet which is more exposed to shocks may have a higher growth rate in government spending, for reasons of political economy.

- ***Shocks to the government's financial position may lead to changes in policy settings, particularly where these shocks are permanent.***
- ***These policy changes reduce welfare. This provides an argument for attempting to reduce the need for the government to do this, for example by reducing the exposure of its financial position to these shocks or by levying precautionary taxation.***

4.2.2 Risk exposure of "agents" or citizens

46. Every taxpayer has some involuntary financial exposure to the government's balance sheet, as taxpayers cannot escape the obligation to pay taxes (absent death or migration). The risk exposure that taxpayers have is to changes in the tax rate, caused by permanent and temporary shocks to the government's financial position. As a general statement, this risk exposure is borne in a proportionate manner to the individual's tax burden.[6]

47. For example, taxpayers have a greater exposure to fluctuations in domestic economic activity because of their exposure to the government. In addition to the direct exposure of taxpayers to domestic economic activity (e.g. wage income, asset returns) they have an indirect exposure because of their exposure to government. During periods of lower growth the government is likely to raise the tax rate because the tax base will be smaller and because the level of transfer payments (e.g. unemployment insurance) will increase.

48. The initial effect of this additional, involuntary, risk exposure is to reduce the welfare of agents to the extent that they are risk averse. Risk averse agents prefer a certain tax rate to an uncertain tax rate, even when the expected values are the same. Uncertainty in the tax rate causes welfare losses to risk averse agents that are additional to the deadweight losses discussed above (indeed, these losses would accrue even with non-distortionary taxes).

49. However, it is theoretically possible for taxpayers to reduce these welfare losses by taking corrective action to reduce their risk exposure to the government. For example, citizens may be able to offset the additional systematic risk by reducing the systematic risk profile of their existing asset holdings and offset the additional non-systematic risk exposure by constructing a "corrective portfolio" that diversifies this risk away. This is directly analogous to the standard argument that corporations should not attempt to manage their systematic and non-systematic risk exposure because shareholders can do this efficiently through creating diversified portfolios. Although, the holding in the government is non-marketable, this argument may still hold if citizens can efficiently rearrange their other asset and liability holdings.

50. If citizens can offset their exposure to the government, the welfare losses from the exposure to the government may not be significant. However, many people will not be able to offset this exposure. Indeed, household financial data suggests that very few households have significant financial asset portfolios [Poterba (1994)]. However, there is little direct empirical evidence on whether people do attempt to offset exposure to the government. Although there is some evidence that citizens do attempt to partially offset some non-marketable risks through precautionary savings [(Guiso, Jappelli, and Terlizzese (1996)], some recent empirical evidence suggests that it is difficult for citizens to undertake this diversification process using risky securities [Baxter & Jermann (1997)]. These empirical observations weaken the argument that the welfare effects of the government risk exposure are small.

51. Moreover, even if citizens had existing financial asset holdings they would face difficulties in offsetting the government exposure. The necessary financial securities may not be available (market incompleteness) and there may be significant informational problems and transaction costs. As a result, all

are likely to bear some residual risk exposure to the government. This exposure may also have redistributive implications as the citizens who are least able to diversify their unwanted government exposure away are likely to be those on low incomes.

52. The exact nature of the involuntary exposure to the government will be different for every citizen, which makes it difficult to estimate the welfare effects. The exposure is contingent on the profile and size of the citizen's existing portfolio of assets and liabilities (for example, human capital, property) and the tax burden. There is little direct empirical evidence as to the extent of this exposure.

53. However, in most cases it is likely that the effect of this government risk exposure is to move citizens further away from their preferred risk exposure. This is because most of the risks that the government is exposed to are strongly correlated with risks that individuals face. For example, increasing the exposure of citizens to domestic economic activity or domestic catastrophic risk losses will likely move them away from their preferred risk exposure. This is in addition to the direct risk allocation effect of the government's tax and transfer policies.

- ***The government imposes an involuntary risk exposure on citizens that operates through volatility in the tax rate. Agents are constrained in their ability to offset this exposure, and will therefore suffer welfare losses.***

4.3.0. Welfare Effects of Public Financial Management

54. In the context of the above analysis, this section examines how the government should invest and manage financial assets and liabilities and is normative in content. Specifically, this section outlines the welfare effects of public financial management policy in terms of the policy's ability to mitigate the welfare effects of deadweight losses from tax rate volatility and the inability of agents to obtain their desired risk exposure. The implicit assumption is that the appropriate objective for public financial management is to enhance welfare. As we will see below, there is likely to be a trade-off in terms of the ability of the government to pursue both goals simultaneously.

- ***The objective for public financial management policy is to enhance welfare by reducing volatility on the government's balance sheet so as to avoid forced changes in policy settings.***

4.3.1. Efficient financing of the balance sheet

55. In this paper, tax rate volatility is the result of shocks to the government's comprehensive balance sheet. Accordingly, the more exposed the government's financial position is to permanent shocks (and large temporary shocks) the more likely it is that the government will have to alter the tax rate in order to finance its spending. Thus, to the extent that the government can structure its financial asset portfolio so as to hedge its exposure to these shocks, the government will be better able to smooth tax rates which will enhance agent welfare.

56. The population is assumed to consist entirely of risk averse "agents". Accordingly, both the expected value and variance of these deadweight losses will affect their welfare. If the government can construct a financial asset and liability portfolio that reduces both the expected value and variance of deadweight losses, the welfare losses from deadweight losses will be unambiguously reduced. If, however, the reduction in expected deadweight losses comes at the expense of increased variance the welfare effects may be ambiguous. The initial discussion focuses on reducing the expected value of deadweight losses.

Expected value of deadweight losses

57. In order to reduce the expected value of deadweight losses the exposure of the comprehensive balance sheet to permanent shocks needs to be reduced. This can be done by constructing a portfolio of financial assets and liabilities whose expected payoffs are negatively correlated with the real balance sheet effects of permanent shocks. This will mean that when a permanent shock (e.g. such as a reduction in productivity which lowers trend economic growth) reduces the "payoff" from the real balance sheet, the expected payoffs from the financial portfolio are high. In the limit this will occur when the correlation between asset returns and the tax rate is zero [Bohn (1990a)]. State contingent financial assets and liabilities can therefore act as a welfare-enhancing insurance policy against shocks which affect the government's cashflow stream through time [refer Lucas & Stokey (1983) for examples].[7]

58. If such hedging can occur completely there will be no expected variation in the government's comprehensive balance sheet through time, as aggregate payoffs will be equalized across states and through time. This generates an expectation that the tax rate can be fully smoothed through time. The literature regards this outcome as representing optimal financial management policy.[8]

59. The analysis above has also suggested another way in which hedging may reduce the incidence of deadweight losses -- by reducing the exposure of the balance sheet to shocks, the tendency of the government to increase spending after experiencing a positive shock may be reduced. Thus, hedging may also enable better expenditure management.

Variance in the incidence of deadweight losses

60. However, it is important to note that unless the government has access to financial assets and liabilities whose payoffs offset the payoffs of the real balance sheet with certainty, there may still be some variation in the government's overall financial position. That is, it is possible to have a situation where hedging eliminates the expected balance sheet effect of the permanent shock but widens the distribution of payoffs that may, in fact, occur. For example, a financial portfolio that is expected to return a high payoff when economic growth is hit by a negative permanent shock may occasionally return a low payoff. If this is the case, the effect of the negative shock on the government's balance sheet is amplified. This can occur when the hedge portfolio is constructed on the basis of expected relationships, calculated from historical data.

61. Without deterministic hedging, the government's overall balance sheet will only be risk free in an expected sense. Although risk averse agents benefit from the reduction in deadweight losses, they will be subject to welfare costs from the increased uncertainty in these losses. We know that risk averse agents are interested in the certainty equivalent value of the deadweight loss rather than the expected value of the deadweight loss, and that the certainty equivalent is lower than the expected value.

62. This means that attempting to minimise expected deadweight losses might not maximise welfare relative to a policy that generates a higher expected value of deadweight losses but also a lower certainty equivalent value of these losses. As a consequence, agents may prefer that the government does not engage in full hedging. This suggests that in setting policy the government should trade-off the welfare gains from reducing the expected value of deadweight losses and the welfare losses associated with reductions in the certainty equivalent of these gains.

63. Introducing this possibility greatly complicates the process of optimal financial portfolio construction, as the government has to focus on more than equalising expected payoffs across states and through time. However, although both expected value and variance are relevant considerations, it is likely that most hedging will result in both reduced deadweight losses and reduced variance. Therefore, as a

general statement, it appears appropriate to concentrate on reducing the exposure of the balance sheet to permanent shocks, at least partially.

- ***Financial assets and liabilities have an important insurance role in hedging the exposure of the government's balance sheet to shocks. Portfolios can be constructed which have state-contingent payoffs negatively correlated with expected shocks. This can enhance welfare by reducing the expected value and certainty equivalent value of deadweight losses.***

4.3.2. Risk exposure of citizens

64. This section examines whether there is an additional risk preference-based motivation for public financial management policy. In the previous section, the introduction of risk preferences became important in determining what type of hedging activity should be undertaken to reduce the welfare costs of deadweight losses. The risk-based arguments in this section are different, and focus on whether the risk imposed on taxpayers through the direct tax burden has any welfare implications. The welfare effects of financial management policy are examined in this context. This section also considers whether the government can use financial management policy to better allocate risk within the economy.

Involuntary government risk exposure

65. Changes to policy settings are a source of risk to agents in the economy as well as a source of deadweight losses. This risk is a source of welfare losses to risk averse agents because they are unlikely to be able to fully offset their direct exposure to the government. As noted above, using financial assets and liabilities as an insurance mechanism may reduce volatility in policy settings and therefore the risk exposure of agents. This will enhance their welfare.

66. This suggests that there is an additional source of welfare gain from the government's hedging activities. In addition to a potential reduction in the distortions imposed on the economy by the tax system, hedging may generate further welfare gains for risk averse agents. The importance of these policy suggestions is determined by the extent of the likely welfare gains. However, given that individual risk exposures will vary, it is necessary to have information on the nature of agents' residual government exposure after their hedging decisions and the nature of the agents' other unhedged risk exposures, to understand the welfare effects. This information is difficult to obtain, even at an aggregated level. This makes the design of the correct financial management policy problematic, as it may not be clear whether any given policy will enhance welfare in the aggregate.

67. There may also be redistributive implications because some citizens, such as low-income earners, may be less able to offset their government exposure, and accordingly will receive more benefit from enhanced tax smoothing. However, this argument will not be significant in terms of policy recommendations because public financial management policy is unlikely to represent an efficient policy instrument to further the government's redistributive objectives. The government has more direct ways in which to transfer resources.

68. These additional welfare gains may alter the degree of hedging deemed optimal after considering the welfare arguments in the previous section. In addition to the effect of hedging on the certainty equivalent value of deadweight losses, this hedging will affect the direct risk exposure of agents to tax rate changes. This welfare effect is likely to change the amount of hedging that is undertaken and the way in which the financial portfolio is constructed. However, it is not immediately clear that this additional welfare effect will result in the optimality of more aggressive government hedging. It may be the case, for example, that agents do not want a greater exposure to the securities available to the government for

hedging. This is an empirical issue and it is not possible to make any general statements, other than that this welfare effect may be significant and should be considered in constructing the financial portfolio. This question is not addressed directly in mainstream discussions of public financial management.

Efficient risk allocation

69. This discussion focuses on an additional welfare aspect of the government's financial management policy. Specifically, given that incomplete markets constrain the ability to insure against risks, can the government structure its financial portfolios in such a way as to provide payoffs that substitute for such missing markets? The objective of such a policy is to allocate risk more efficiently and deliver a more optimal risk exposure to agents.

70. Risk averse agents face many risks and uncertainties against which they would like to obtain some insurance, such as risks to the value of human capital over time, productivity shocks, real estate price changes and asset return volatility. However, insurance and financial markets are very incomplete and citizens are often unable to purchase this desired insurance [Shiller (1993, 1998), Hens (1997)]. As a general statement, agents will bear unwanted risk that reduces their welfare. Although some existing social insurance programs, such as public pensions, arguably improve the risk allocation, market incompleteness has significant negative welfare implications.

71. It may be that the government can substitute for some of these incomplete markets through its financial management policy. The insight is that the government can use financial management policy to construct a tax and transfer policy that generates the same payoffs as the missing market. A common example of this is with respect to intergenerational risk sharing. Bohn (1997, 1998b) and Shiller (1998) provide examples of this possibility in the context of the Social Security Trust Fund's investment decision.[9] Bohn finds that investing the Trust Fund in equities may be appropriate where the young generation pays the taxes to support a defined benefit to the old. In this situation, the old are partially sheltered from market risk, while the young, who are better placed to absorb the market risk, face an increased exposure through the tax system but also benefit from the higher expected return on the equity investment made by the Trust Fund.

72. However, where the taxes used are distortionary, there will be a trade-off between the welfare gains from completing important markets and the welfare losses from deadweight losses and the involuntary risk exposure. In this sense the sets of policy recommendations may be inconsistent [Bohn (1997)]. In order to advance our understanding of optimal financial management policy, the nature of this trade-off needs to be better defined. Although the exact nature of this trade-off is unclear, the insight that the financial management policy decisions will affect the risk allocation in the economy is an important one and should be borne in mind, especially when governments are engaged in large-scale hedging activities.

- ***Citizens are unable to completely offset risks that they face, including the exposure imposed on them by the government. This imposes welfare losses on risk averse agents. This provides an additional argument for the government engaging in hedging activities on the balance sheet.***
- ***The government may be able to enhance welfare by constructing a financial portfolio whose payoffs allow it to provide a tax and transfer policy that substitutes for missing markets.***

5.0 POLICY RECOMMENDATIONS

Dimension	Existing practice	Recommendation
Objective	Reduce budgetary risk so as to enable better tax smoothing	Manage balance sheet risk so as to enable better tax smoothing and a more efficient risk exposure for taxpayers
Focus	Specific financial asset and liability portfolios	The comprehensive balance sheet
Efficiency of balance sheet financing	Risk/return trade-off	Hedge exposure of the comprehensive balance sheet to permanent shocks (insurance rather than return)
Risk exposure	No clear practice	Reduce the involuntary risk exposure of taxpayers

5.1.0 Introduction

73. This section details the policy recommendations with respect to the financial asset investment and debt management by the government that are generated by the above analysis. These recommendations are also compared with existing practice, as detailed in Section 2.

74. Specific policy recommendations are made in four areas:

- Objective of financial management policy;
- Focus on the comprehensive balance sheet;
- Financial portfolios should be constructed for insurance rather than return; and,
- Reduce the involuntary risk exposure.

5.2.0. Objective of financial management policy

75. The objective of financial management policy is to enhance welfare through reducing deadweight losses and involuntary exposure to government risk. This extends the objectives for financial management policy, passed the traditional concern with minimizing deadweight losses. The impact of public financial management on the risk exposure of agents has not traditionally been incorporated into the analysis.

- ***The objective of public financial management policy is to enhance the welfare of agents through reducing the welfare costs associated with deadweight losses and the involuntary government risk exposure.***

5.3.0. Focus on the comprehensive balance sheet

76. This paper has argued that financial asset investment and debt management policy should be focused on the government's comprehensive balance sheet, rather than on specific portfolios.

77. Indeed, implementing the objective of financial management policy with respect to only part of the comprehensive balance sheet may lead to incorrect policy settings. However, much of existing financial management practice appears to be portfolio-specific in focus. For example, debt management policy generally concentrates on the debt portfolio alone and is therefore concerned only with reducing the exposure of this portfolio to permanent shocks. Similarly, financial asset managers typically focus only on the performance of their specific portfolio. This difference in focus is a major reason why the policy recommendations described below differ from existing practice, even when the objectives are similar.

78. In the context of debt management, it may be that a more volatile cost of debt (e.g. issuing foreign currency denominated bonds) is consistent with an effective hedge of another risk on the balance sheet, thereby reducing aggregate risk. It is necessary to consider more than just the volatility in the costs of debt management. Similarly, financial asset investment policy should be determined by the hedging requirements of the comprehensive balance sheet rather than investing to match a specific liability or to attain a particular risk-return pair.

79. However, there are difficulties and challenges in implementing the comprehensive balance sheet approach. It demands a lot of knowledge of the characteristics of the government's balance sheet. Indeed, given the current state of knowledge, it may not be possible to fully implement these recommendations for some time. Even with significant amounts of information, implementing the optimal hedge may be problematic if the required securities are not available. A less ambitious recommendation is therefore proposed.

80. This recommendation is to focus initially on hedging shocks to well-understood parts of the portfolio before extending the policy to the full balance sheet. For example, the determinants of a public pension liability are likely to be better understood, and therefore hedged, than the determinants of the unemployment insurance liability or the tax asset. However, this raises some concerns. The danger in focusing on specific parts of the balance sheet is that a given portfolio may exactly hedge a specific risk but exacerbate overall balance sheet volatility. In order to reduce the chance of this, the policy settings derived from this process should be compared against the basic understanding of the relationship with the rest of the balance sheet to ensure that it appears consistent [refer Huther (1998)].

81. These recommendations have direct institutional implications. Specifically, it suggests that the strategic financial management policy function should be centralised within the government. This is because it is only the center that has access to the aggregate balance sheet information that is necessary to make the correct financial asset investment and debt management decisions. This is consistent with observed private sector practice. However, this role of the center should be seen as more of a strategic co-ordinating role rather than as a centralised investment and management function.

82. Indeed, centralising all the operational functions is unlikely to be appropriate. There are many operational advantages from having this strategic policy implemented by a number of decentralised funds managers within the public sector. For example, decentralised managers have superior information about local situations and may be able to respond more flexibly to unanticipated events. However, the center should take the lead in co-ordinating these decentralised units so as to achieve the desirable overall hedge. This can be done by issuing guidelines on the types of assets and liabilities that they are permitted to hold.

- ***The focus of public financial management policy should be on the comprehensive balance sheet, as opposed to specific portfolios, except where the information necessary to implement a balance sheet-wide policy is unavailable.***
- ***Empirical work should be undertaken so as to better understand the balance sheets of OECD governments.***

5.4.0. Insurance rather than return

83. The financial asset and liability portfolio should be constructed so as to hedge shocks to the government's real balance sheet rather than to earn some required return. A primary welfare effect of the hedging financial portfolio accrues in terms of its ability to reduce volatility in policy settings; to act as an "insurance policy". The portfolio of financial assets and liabilities should be constructed to offset the exposure of the government's real balance sheet to permanent shocks, to the extent that this exposure cannot be dealt with more efficiently through self-insurance.

84. This policy can be implemented by changing the composition of existing portfolios or by using other sources of finance to purchase new securities. For example, a possible policy conclusions is that governments should not apply fiscal surpluses to retiring public debt. Rather, fiscal surpluses, and possibly new borrowing, should be used to finance the construction of a financial asset and liability portfolio that will hedge against shocks to the government's financial position.[10] This means that a government may have a large stock of gross debt and a low or negative level of net debt.

85. However, given that the government is unlikely to be able to obtain all the securities required to implement a perfect hedge, the government's financial position will remain exposed to some shocks. This suggests government should take other steps to reduce the exposure of its real balance sheet to permanent shocks, in addition to constructing a financial asset and liability portfolio.

86. For example, the government may be able to shed some risks, which are not negatively correlated with the remainder of the balance sheet, on market terms.[11] This is beneficial because the government obtains or pays the expected value but eliminates a risk of changes to policy settings. The government can probably receive better terms by transferring some risks to other agents whose existing assets are not strongly correlated with these risks (e.g. country-specific catastrophic risk) or by securitising of streams of risky cashflows. Some insurance and reinsurance contracts may also be optimal, although strong counter-arguments may be made that the government can self-insure at lower cost. There is a clear trade-off between the benefits from reducing risk and the possible costs associated with reducing expected value.

87. These welfare effects from hedging can be contrasted with those from a financial management policy that adopts a risk-return target. In short, a return target is unlikely to have any direct welfare effect. In a world of efficient capital markets the government should be indifferent between every risk, return pair along the efficient frontier. This is because the returns generated by any portfolio located on this frontier should return exactly the required rate of return and therefore generate a net present value of zero. On the assumption that the government is unlikely to outperform the market this means that returns generated from investments will exactly cover the contingent liability that the government has imposed on taxpayers when it makes the risky investment.

88. Accordingly, there is no apparent reason why the government should attempt to construct a portfolio with a high expected return. Although an investment in higher yielding securities may reduce the taxes that need to be levied in the future, this has no positive direct welfare implications as taxpayers continue to be exactly compensated for the change in the risk that they are bearing (i.e. they earn exactly the risk-adjusted rate of return). In other words, there are no welfare gains associated moving along the efficient frontier.

89. This means that selecting a particular position on the efficient frontier, as is done by individual agents and by funds managers investing on behalf of individuals, is not the appropriate way to approach financial management policy.[12] There is no "social indifference curve", derived from some aggregation of social risk preferences, which can be used in making optimal portfolio allocation decisions.

90. This conclusion is inconsistent with the observed practice of many public sector financial asset portfolios that specify some return objective so as to generate investment income which can provide an alternative source of budgetary financing (refer Table 3 for examples). To the extent that this is the case, these objectives should be reviewed and revised.

- ***The government should aim to construct a financial portfolio with the desired hedging properties, and otherwise seek to reduce balance sheet risk, rather than target a return objective.***

Implementing the hedge

91. The first step in implementing the hedge (i.e. constructing the financial portfolio) is to examine empirically which securities best hedge against permanent shocks to the government's financial position. The approach is to isolate the factors that drive these shocks, and purchase financial assets and issue debt whose payoffs are driven by the same factors. For example, if shocks to the social security liability are the major cause of forced changes to policy settings, then the government should hedge against these shocks. For example, if the social security liability is positively related to productivity and inflation then the government should purchase financial assets whose returns are positively linked to productivity and issue nominal debt as the real value of this obligation is reduced when inflation exceeds expectations. Such a policy will act to hedge against unexpected movements in the social security liability.

92. Bohn (1990a) was the first to examine this question empirically by estimating the shocks that the United States government's financial position was exposed to. He argued that in order to better smooth taxes, the government should issue large amounts (multiples of GDP) of some financial assets, including taking short equity positions and issuing foreign currency denominated debt.

93. Hawkesby & Wright (1997) build on this theoretical model and empirically estimate the optimal public debt portfolios for nine OECD countries. They argue that "supply side shocks" are more likely to generate permanent changes in the government's cashflows (which require tax rate changes) than demand side shocks which are more likely to be temporary and reverse out. The best hedge against these shocks is found to be short-term nominal domestic debt, because the price level moves in a counter cyclical fashion (which means that the real value of this nominal debt will be reduced when there is a supply side shock).

94. These examples are illustrative only. The specific policy conclusions will depend on country-specific circumstances and are likely to change through time. However, some general statements can be made. In terms of debt, if the most common shocks are supply-side (e.g. productivity) then nominal debt should be issued as this generates a positive relationship between growth and the real value of the government's debt obligations. If the shocks are largely demand-side in nature indexed debt is preferable. In terms of the financial asset portfolio, taking short positions in domestic equity markets or long positions in independent offshore equity markets may be appropriate.

95. As noted above, the government will be unable to fully implement the desired hedge because of the unavailability of the required securities. Although the government may be able to issue new debt instruments, this is often not easy especially for smaller economies where introducing new securities may result in trading in illiquid markets that involve large risk premia [Allen & Gale (1994)]. This will also be true for financial assets, which suggests that the government will need to rely on existing securities to implement the hedge. Given that these securities are traded in efficient markets, the government will be able to trade at efficient market prices and thereby implement the hedge at small cost.

- ***The government should construct a financial asset and debt portfolio that can act as a hedge against permanent shocks that affect the government's financial position, to the extent that this is more efficient than self-insurance or otherwise reducing risk on the real balance sheet. The government should not specify independent return targets.***
- ***The composition of these portfolios will be determined by the nature of the exposures that are facing the government's real balance sheet, but plausibly will include some (offshore) equity exposure and nominal debt.***
- ***It may be appropriate for the government to use fiscal surpluses to purchase financial assets rather than to pay down public debt.***

5.5.0 Reduce the involuntary risk exposure

96. This paper has argued that the involuntary risk exposure of risk averse taxpayers to the government provides an argument for hedging balance sheet risk, in addition to the deadweight loss argument. These additional gains accrue because agents are severely constrained in their ability to hedge this involuntary government exposure, as a result of market incompleteness and the absence of hedging opportunities for many. The magnitude of this problem is an empirical matter and it is not currently well-understood.

97. There may also be an argument for using financial management policy to more efficiently allocate risk within the economy, particularly in an intergenerational context. Although there are no immediate policy recommendations generated by this argument, it is a relevant issue to be borne in mind when constructing the financial asset and liability portfolio.

- ***In assessing the optimality of the hedging policy, the government should consider the effect of this policy on the risk exposures of agents.***

5.6.0. Summary

98. The central policy theme is that the government should invest financial assets and manage debt so as to minimise the welfare impact of deadweight losses and also to better allocate risk within the economy. As a general statement, the policy recommendation is that the government should construct a financial asset and liability portfolio whose payoffs are such that they hedge against permanent shocks to the government's real balance sheet. Over immediate ranges of risk, it seems that hedging this exposure will both minimise the certainty equivalent value of deadweight losses and better allow agents to attain an optimal risk exposure.

6.0 POLITICAL ECONOMY

- ***Constraints should be placed on the degree to which financial assets are invested and financial liabilities are managed to better ensure that the recommended policy represents a "political equilibrium".***
- ***It may be appropriate to start with specific portfolios, and actively hedge local shocks, before getting acceptance for some level of implementation for the whole of government.***

6.1.0. Introduction

99. The policy recommendations detailed above may involve a dramatic departure from existing practice. However, aside from considering issues of technical feasibility (such as informational requirements and the availability of securities) this analysis abstracted from the real world environment in which such policies must be implemented. The constraints imposed by the environment, and the behaviours of the people implementing the recommended policies, are important factors which may significantly alter the nature of these recommendations.

100. This section discusses political economy considerations and examines how this environment affects the set of policy recommendations. Specifically, issues of political feasibility and the behaviour of the voting public, politicians and officials are discussed. For example, if the population is unlikely to accept a major change in the way that governments manage their financial position, then these recommendations may not represent a stable political equilibrium. A sustainable policy must take voters, politicians, and officials "as they are". This section, then, considers both political and institutional constraints on implementing the normative recommendations.

The policy recommendations must represent a stable political equilibrium.

6.2.0. Discussion

Political environment

101. In one sense, technical arguments relating to the composition of the financial asset and liability portfolio may not be thought to be a politically contentious issue. However, politicians may be concerned that aspects of these recommendations will have significant political implications. Some of these are listed below.

The role of government in capital markets

102. Investing the government's financial asset portfolio in domestic equities may lead to the government holding a large stake in the domestic equity market. This presence may lead to greater political pressure for corporate social responsibility, demands for political control of the board, demands for domestic rather than foreign investments, and using these corporations to make public investments. More generally, it will be necessary to distance the investment and management of these portfolios from political intervention. Although it is possible to construct institutional arrangements to address these concerns, it is unclear that these arrangements will be robust to determined political intervention in the future. This possibility may lead to voter opposition to the government making significant equity investments.13

Loss aversion

103. Although constructing a hedge portfolio should reduce government balance sheet volatility, there may be some increase in the distribution of some portfolio payoffs with the potential for significant negative payoffs. Voters may interpret lower-than-market returns as a signal of incompetence, even if the portfolio has been designed to generate counter-cyclical payoffs. Accordingly, voters may be more inclined to dismiss a government who has suffered poor returns on its (deliberately constructed) financial asset portfolio than in response to a negative shock to the government's cashflow stream that necessitates a policy change.

104. Thus, politicians may not want to proceed with this proposal because of a concern that loss averse voters may punish them for poor payoffs. Risk averse politicians may be reluctant to commit their political fortunes to a complex and little-understood technical process whose outcome they cannot control. The costs associated with being voted out of office are likely to be significant for politicians to the extent that they will face a loss in compensation, prestige, and will lose the ability to implement policies they value. Thus, it is precisely the high degree of loss aversion exhibited by voters and politicians that may lead to politicians preferring not to implement the hedge.

105. This possibility may also mean that politicians may take extreme actions to avoid negative payoffs on the overall portfolio. For example, if losses are likely they may undertake high-risk negative value investments in an attempt to make a profit.

A displacement effect

106. Attempts to counteract the increase in the distribution of possible payoffs can be imagined in cases where risk averse politicians inherit these policies in the future. For example, a "displacement effect" may be seen in which politicians reduce a risk exposure elsewhere in response to being required to be politically accountable for a risky hedge portfolio. For example, this could involve not proceeding with a program whose cashflows are pro-cyclical. It may be that the welfare losses from this displacement effect outweigh a portion of the gains from better hedging of the government's financial position.

107. In summary, there are a number of reasons why politicians may be hesitant to implement (or continue to support) these policy recommendations. This is an important consideration, given that a majority of politicians generally have the power to alter the institutional arrangements. It may be difficult to sustain the recommended polices and institutions over a prolonged period of time, unless they clearly represent some form of political equilibrium.

Institutional environment

108. In addition to considering the political environment, it is also necessary to consider the incentives and behaviours of the officials who will implement the policy in an operational sense. These officials can be seen as the funds managers or debt managers.

109. If we imagine that the official's set of incentives relate, at least in part, to career concerns then we can imagine some incentive misalignment to the extent that the government's financial management policy generates investment guidelines that differ from similar private sector funds. Their career incentives may lead them to align the management of their fund with standard private sector practice. Accordingly, they may be less inclined to pursue an investment strategy aimed at hedging a broader balance sheet exposure, as potential private sector employers may be less able to verify their performance.

110. It may be possible to respond to some of these concerns by providing an explicit objective, ensuring transparency with full disclosure, and benchmarking the performance of this fund against any other comparable funds. This will allow for greater observability of funds managers' performance. This will also assist the government in providing the correct financial incentives to these officials.

111. It is also important to note that implementing these recommendations may require the government to employ officials with a different skill set than their current employees. The ability to access people with the appropriate knowledge and expertise may also be a constraint on implementation.

Other factors

112. Implementing the policy recommendations may also generate two additional welfare effects:

- A more complex balance sheet structure may make the monitoring of politicians and officials more difficult, as it may be difficult to know where a poor fiscal performance is the result of mismanagement or bad luck. To the extent that the government faces a reduced monitoring disciplining, less efficient government may result through time. The opposite result may also obtain if reduced volatility in the government's financial position makes monitoring more straightforward.

- There may be some potential for morally hazardous behavior by the government, to the extent that its financial position is insured against economic shocks. For example, the costs associated with poor macroeconomic policies may be lessened.

6.3.0 Summary

113. The conclusion of this analysis is that, even if the government were able to overcome the technical constraints sufficiently well, there are reasons to suspect that implementing this policy fully may not be feasible, or indeed optimal. This is because real world politicians and officials must implement this policy. Politicians are unlikely to be comfortable with a significant risk exposure that they do not fully understand, and which yields benefits that are difficult to observe. Officials are unlikely to be comfortable with pursuing an investment strategy that differs from otherwise-comparable private sector funds. The extent to which these political and institutional constraints are binding is likely to be country-specific.

114. These political economy concerns suggest that it may be appropriate to recommend that substantive constraints be imposed on the recommended policy. Plausibly, a policy that aims to implement the hedge fully may not be sustainable in a political environment. If this is true, superior results may be obtained by reducing the amount of hedging that is undertaken and restricting it to certain parts of the balance sheet. This lower level of hedging may protect the policy against political changes.

7.0 CONCLUSION

115. We are now in a position to make the final policy recommendations with respect to the optimal financial asset investment and debt management policy.

1. The objective of financial asset investment and financial liability management policy is to enhance the welfare of the population by:

- ***Minimising the deadweight losses associated with changes to the tax rate caused by the exposure of the government's balance sheet to shocks; and,***
- ***Reducing the welfare costs of the involuntary government risk exposure that is imposed on agents.***

2. The government should adopt a "whole of balance sheet" approach to thinking about financial asset investment and debt management policy. This means that a partial focus, except where there are compelling operational or informational reasons, is probably sub-optimal. A centralised risk management strategy should be established which will inform the operating guidelines that are provided to decentralised portfolio managers.

3. The types of assets and liabilities that should be held will be contingent on the nature of the government's financial position through time and the nature of the permanent shocks that the government is exposed to (e.g. demand side, supply side). Converting this objective into specific policy recommendations requires empirical work aimed at understanding the nature of the exposures that the government's balance sheet is exposed to as well as the nature of exposures of individual taxpayers.

4. Constraints should be imposed on the size of the hedge portfolios, as a full implementation of the recommendations is unlikely to represent a political equilibrium.

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NOTES

1 Specifically, this paper does not consider the appropriate level of government spending, or how the government should levy taxes through time so as to finance its spending.

2 For further discussion of the comprehensive balance sheet, refer to Bradbury, Brumby & Skilling (1997).

3 A simplifying assumption is made that there is an exogenous stream of government spending which does not change. Further, the government is assumed to respond to a shock by altering the tax rate or by adjusting its holdings of debt and/or financial assets.

4 The hedging argument will be more important for small, open economies to the extent that they are more vulnerable to shocks [Rodrik (1996)].

5 If the negative shock is sufficiently large, however, a discipline will be imposed on the government to reduce spending.

6 To understand the total welfare impact of the government on each agent, it is necessary to assess both the public goods and services that are provided by the government and the risk exposure that is imposed by virtue of the agent's exposure to the government's balance sheet. Thus, each agent should be seen as both a consumer in, and an "owner" of, the government.

7 Government securities also have a number of other welfare enhancing properties such as the provision of a risk free security to the market [Allen & Gale (1994)] and enhancing the time consistency of monetary and fiscal policy [Lucas & Stokey (1983)].

8 Refer Barro (1979), Lucas & Stokey (1983), Lucas (1986), Bohn (1988, 1990a), Missale (1997).

9 Refer also Stiglitz (1983), Fischer (1983), and Allen & Gale (1994).

10 Such a policy may also have the added advantage of keeping domestic debt markets open, liquid and efficient even during an extended period of fiscal surplus. Many governments identify this as a major concern. However, it may also have the effect of increasing the size of the government's balance sheet.

11 For an example of this in a private sector context, refer Froot & Stein (1998).

12 Except where the government is investing on behalf of agents; for example, as part of a defined contribution scheme.

13 It should be noted that many public sector funds have large existing equity positions.