

Is the standard micro portfolio approach to sovereign debt management still appropriate?

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Abstract

This paper examines the analytical underpinnings of the standard micro portfolio approach to public debt management (PDM) that aims at minimising longer-term cash-flow based borrowing costs at an acceptable level of risk. The study concludes that two technical key assumptions need to hold for the standard micro portfolio approach to yield optimal (ie cost-minimising) results. We argue that these assumptions do not hold in the current borrowing environment characterised by fiscal dominance with complex links between PDM and monetary policy. By using the principles of portfolio theory we demonstrate that in this borrowing environment cost-risk optimality requires the use of a broader cost concept than employed in the standard micro portfolio approach. This new concept incorporates not only the cash flows of the debt portfolio itself, but also those related to primary borrowing requirements. The resulting broader cost measure includes therefore the interactions with the budget. Finally, the paper demonstrates that the standard cost-risk framework of the micro portfolio approach is nested within this new, broader cost concept.

Keywords: Public debt management, micro portfolio approach, portfolio theory, cost-risk optimality, sovereign asset liability management, fiscal dominance

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1. Introduction

There is a consensus among OECD debt managers that the primary strategic objectives or functions of government debt management are:² (a) securing continuous (and easy) access to markets, while (b) minimising longer-term borrowing costs at an acceptable level of risk. These strategic cost-risk objectives constitute the basis of the so-called standard micro portfolio approach to public debt management (PDM). The recent global financial and economic crises, however, have triggered a growing debate on the need for making possible changes in this standard strategic mandate of PDM. This policy debate is also informed by the (potential) implications of new and complex interactions between PDM, monetary policy and financial instability in the face of serious fiscal vulnerabilities, a perceived increase in sovereign risk and considerable uncertainty about future interest rates – denoted as *fiscal dominance* (Blommestein and Turner (2012)). This situation is likely to last for many years.

Although both these interactions and fiscal dominance are the result of (or were revealed during) the global financial crisis and its aftermath, structural changes in (or features of) the new financial (and business) landscape may be additional structural reasons why some of these new complex links are likely to persist. These developments, in turn, have significantly changed the policy environment for debt management offices (DMOs), central banks (CBs) and fiscal authorities. The size of the balance sheets of CBs has been expanded significantly while their composition has been radically changed.³ The use of unconventional monetary policy has created (potential) conflicts and new interactions between monetary policy, PDM and fiscal policy. Several analysts and policy makers have argued that government debt managers should be more aware of, and/or take explicitly into account, the broader (macro) impact of their policy decisions on the economic policy mix and the financial system as a whole. Several authors have used this perspective as a basis for suggesting a revision of the conventional (micro portfolio) mandate to PDM, including Turner (2011), Hoogduin et al (2010), Surti et al (2010) and Goodhart (2010).

Against this complex, multi-faceted borrowing background, the paper will address the core question as to what extent a conceptual reformulation of the standard micro portfolio approach to PDM is needed. In this context, we will focus on the following specific questions related to the underlying technical assumptions of the micro portfolio approach:

- (i) Under which technical conditions or assumptions is the standard micro portfolio approach to PDM an optimal one in the sense that effective borrowing costs⁴ are indeed minimised subject to a stated preferred level of risk?
- (ii) Do these technical (optimality) conditions remain valid in a situation of sustained fiscal dominance, imperfect asset substitutability, and the (partial) loss of risk-free assets?

Our analysis identifies two key technical assumptions for the standard micro portfolio approach to public liability management to yield optimal (ie cost-minimising) results. In this context we also demonstrate that the standard cost-risk framework of the micro portfolio approach represents a special case of a general framework associated with an alternative (ie broader) cost measure based on portfolio theory. The underlying reasoning demonstrates under which conditions it may be desirable to take a broader view of cost and risk than the

² For further details, see Blommestein (2002), Kreiner (2002) and other contributors in OECD (2002).

³ See Ben S Bernanke, The Federal Reserve's Balance Sheet: An Update, Speech at the Federal Reserve Board Conference on Key Developments in Monetary Policy, Washington, DC. 8 October 2009.

⁴ The concept of the cash-flow measure based on the standard borrowing costs of the sovereign liability portfolio associated with the standard micro portfolio approach differs from a wider measure referred to in this paper as *effective sovereign borrowing costs*. The latter concept is further explained in section 3.

measure implied by the standard micro portfolio approach to sovereign liability management. We shall refer to this broader measure as *effective sovereign borrowing costs*. In essence we show how the use of this broader measure of sovereign borrowing costs (that explicitly encompasses interactions with the budget) may be a potentially effective response to the complications associated with situations of fiscal dominance.⁵

The paper is structured as follows. Section 2 provides a detailed analysis of the analytical underpinning of the standard micro portfolio approach, thereby demonstrating that this approach has important similarities with the behaviour of private financial institutions guided by micro-economic principles. By comparing the micro portfolio approach to well-established asset management practices in section 3, we are in the position to deduce the two key technical assumptions of the cost and risk framework associated with the standard micro portfolio approach. In section 4, we closely examine each of these technical conditions. In doing so, we evaluate the implications of the financial-cum-sovereign debt crisis for the standard micro portfolio approach. To that end, we are making an explicit distinction between normal (“non-crisis”) periods and more challenging crisis situations. Our analysis shows that in a situation of fiscal dominance⁶ the standard micro portfolio approach does not yield optimal cost-risk results. The final section (section 5) concludes and outlines the next steps in our research programme.

2. The analytical roots of the standard micro portfolio approach

The micro portfolio approach currently pursued by most government debt managers is reflected in the basic functions of PDM (securing market-based financing at lowest cost subject to risk preferences). The organisation of PDM underwent major changes in the 1990s, reflecting the move to a micro portfolio approach to PDM. Debt management operations have been delegated to separate operationally autonomous units (DMOs) sometimes outside the Ministry of Finance (MoF), albeit subject to the policy responsibility of the MoF.⁷ A crucial feature of this institutional set-up is the separation between PDM and fiscal policy on the one hand, and monetary policy (for which independent CBs are responsible) on the other.⁸ DMOs operate as professional and predictable market players sticking to basic market rules, thereby supporting a liquid and transparent market for government securities.

As a result of this institutional set-up, active support by PDM for broader macroeconomic objectives, such as was common in the 1950s and 1960s and which entailed active use of the debt portfolio structure in the conduct of macroeconomic policies, has lost ground.⁹

⁵ As noted, this reflects a situation with challenges and tensions in sovereign debt markets, where policy makers are facing serious fiscal vulnerabilities, a rapid increase in sovereign risk and considerable uncertainty about future interest rates.

⁶ Characterised by critical public debt ratios, perceptions that the risk-free asset condition has been weakened as well as imperfect asset substitutability along the yield curve.

⁷ A more comprehensive treatment of the transformation process, and also of the role and structure of DMOs, is given by Kalderen and Blommestein (2002, pp 109-133).

⁸ After all, this was one of the reasons for the change in the institutional set-up in the 1990s. See Kalderen and Blommestein (2002, p 110) with further references.

⁹ Hain (2004, pp 113-131) provides a historical overview of macroeconomic approaches to PDM (mostly in the 1950s and 1960s), which in particular involved the use of the maturity structure of government debt to influence market interest rates and the level of economic activity. Most notable are the studies of Simons (1944), Musgrave (1959), Rolph (1957) and Tobin (1963). See also Wolswijk and de Haan (2005, pp 7 f) with

Instead, the adoption of a micro portfolio approach entails a narrow focus on cost and risk targets directly linked to the sovereign debt portfolio. This implies that DMOs execute issuance and funding strategies based on a clear set of rules guided by micro-economic principles. These principles are summarised as the strategic objective to “minimise longer-term borrowing costs at an acceptable level of risk”.

It should be noted that the objectives “minimising borrowing costs” and “managing the associated risks” cannot be seen in isolation from each other. Maturities are the main components or features to manage the cost and (interest-rate) risk profile of the sovereign debt portfolio.¹⁰ The shorter the average term to maturity of the debt portfolio, the more frequently refinancing at new market conditions will be necessary. Thus, portfolios with a larger share of short-term financing instruments are subject to a higher level of interest-rate risk than those with a larger share of longer-term instruments. On the other hand, considering the commonly observed upward-sloping yield curve, longer-maturity securities provide on average higher yields than shorter-term securities. In other words, the basic PDM strategy entails the need to manage a cost-risk trade-off in structuring the (optimal) debt portfolio.¹¹

In this context, we will refer to the underlying conceptual framework as the standard micro portfolio approach to sovereign liability management and argue that there are important analytical similarities with asset management (allocation) concepts.¹² Specifically, both the micro portfolio management of sovereign liabilities and private asset (or investment) management require making decisions under conditions of uncertainty regarding:

- (a) the (optimal) structure of a debt (or investment) portfolio, which involves
- (b) the optimisation of the micro cost (or return)/risk relationship, by taking into account
- (c) the existing portfolio (with liabilities or assets) and nothing else.

Point (c) implies that the primary budget balance is treated as an *exogenous* variable in the standard micro portfolio approach. Hence, the level of debt is largely determined by changes in the primary budget balance. The budgetary balance, reflecting the stance of fiscal policy, therefore constitutes exogenous input for simulations associated with the sovereign debt strategy (*while payments for servicing the debt are endogenous*). Hence, within the context of the analytical framework of the standard micro portfolio strategy, there is a clear functional separation between PDM and fiscal policy, while the PDM strategy is also functionally separated from monetary policy. Consequently, such an institutional set-up implies that PDM is in principle not integrated into the conventional macroeconomic framework. In section 4 we will discuss whether this is an appropriate approach.

additional remarks on conventional macroeconomic debt management objectives (such as macroeconomic and deficit stabilisation as well as tax smoothing).

¹⁰ In altering the cost-risk profile of debt portfolios, DMOs also make use of interest-rate swaps. These derivative instruments enable the government to optimise the risk structure of the debt portfolio structure, while simultaneously proceeding with a demand-driven issuance strategy focused on lowest possible borrowing costs (see, for example, Daube (2009, p 79)).

¹¹ See also Risbjerg and Holmlund (2005, p 41) and Bolder (2003, p 4). The UK DMO provides an insightful analysis of the Principles and Trade-Offs When Making Issuance Choices; see OECD (2011).

¹² However, we will also show that there are fundamental *differences* between sovereign liability management and asset management.

3. Technical conditions underlying the micro portfolio strategy

In order to identify the key technical assumptions associated with the current cost and risk framework of PDM, we will take a closer look at the underlying micro portfolio management strategy. In essence, a long-term debt management strategy is *broadly similar* to passive private investment or asset management strategies (based on the principles of portfolio theory for managing the risk/return relationship¹³). Instead of replicating a broad market bond index as in a passive asset management strategy, the approach used in strategic government debt management is to follow a predefined benchmark portfolio¹⁴ (reflecting the long-term cost and risk preference) as closely as possible. The PDM strategy is characterised by risk-aversion and diversification, thereby mirroring the spirit of risk optimisation in passive bond portfolio strategies. This usually also involves the implementation of a buy-and-hold strategy.¹⁵

There are, however, also substantial differences between strategic government debt management and a private asset or investment management strategy. A PDM strategy:

- (a) focuses on medium- to long-term borrowing costs vs short-term market value considerations of private asset or investment management;
- (b) cannot maintain a risk-free position (a sovereign debt portfolio is always exposed to changes in interest rates¹⁶ due to the need to undertake refinancing activities);
- (c) requires the formulation of expectations about the evolution of interest rates (not implicit in current market prices) over a longer-term horizon.¹⁷

Consequently, DMOs need to tailor the analytical basis of passive private investment or asset management strategies to their specific situation. In short, DMOs use sophisticated portfolio and risk management techniques, in particular simulations of debt strategies based on a stochastic framework for the development of key risk measures (especially interest rates).¹⁸

Nevertheless, strategic debt management can to an important degree be considered as the mirror image of an extended or adapted form of passive portfolio management. For this reason, strategic PDM, firmly based on the principles of portfolio theory,¹⁹ is primarily concerned with the micro-optimisation of the portfolio structure based on the cost (return)/risk

¹³ The principles of portfolio theory, introduced by Markowitz (1952, 1959), were further developed by Sharpe (1964), Lintner (1965) and Mossin (1966) in the Capital Asset Pricing Model (CAPM), which became the simplest standard for measuring risk and return.

¹⁴ Most governments with well-developed financial markets establish strategic portfolio benchmarks to guide the long-term management of their debt portfolio (Jensen and Risbjerg (2005, pp 64 f) and IMF and World Bank (2001, p 129)).

¹⁵ A passive investment strategy implies that active trading on market views will *not* take place. The counterpart of a “buy-and-hold” strategy in debt management can be viewed as holding debt to maturity, although these strategies might include (tactical) buy-back operations and the use of swaps (see, for example, Risbjerg and Holmlund (2005, p 50) and Jensen and Risbjerg (2005, p 64)).

¹⁶ The possible implications of a more critical perception of sovereign risk by market participants and its impact on interest rates is excluded here. However, we come back to this particular point in section 4.2.

¹⁷ It is not possible to define or formulate an optimal long-term financing strategy using only information implicit in current market prices. This feature substantially distinguishes debt management from passive investment or asset management strategies because the latter do not require the formulation of market expectations regarding the actual development of interest rates.

¹⁸ For a comprehensive treatment of debt strategy simulations, see Risbjerg and Holmlund (2005). These authors discuss also the standard analytical framework for government debt and risk management.

¹⁹ For a similar view, see Jensen and Risbjerg (2005, p 66).

relationship. We will use this insight to identify the key technical assumptions of the standard micro portfolio approach to PDM.

Portfolio theory is associated with the following core assumptions:²⁰

- Core assumption 1: Rational financial decision makers that act as risk-averse expected utility (or wealth) maximisers.
- Core assumption 2: Perfect or efficient capital markets implying perfectly competitive markets²¹ that are frictionless.²²

Clearly, the first assumption can easily be applied to public sector decisions such as those relating to PDM since they are also concerned with the allocation of scarce resources, thereby rationally weighing costs against benefits.²³ However, the second assumption cannot so easily be justified in the public sector. Governments have considerable market power, especially in the market for government securities. This means that the price-taker assumption needs to be further scrutinised. We will return to this particular point in the next section.

In addition to these two core assumptions, there is another, specific feature of the standard micro portfolio approach to PDM. As noted, PDM treats the “primary budget balance” as exogenous since fiscal policy is functionally separated from PDM. This implies that the key optimisation parameters only refer to the outstanding debt portfolio. The OECD Borrowing Outlook²⁴ makes a policy distinction between *funding strategy and borrowing requirements*. The total central government marketable gross borrowing needs are calculated on the basis of budget deficits (the outcome of fiscal policy decisions that determine the primary borrowing needs) and redemptions. The funding strategy of DMOs entails decisions on how total borrowing needs are going to be financed using different instruments (eg long-term, short-term, nominal, indexed, etc) and distribution channels.

In sum, total borrowing requirements, and the associated funding strategy, are in part independently determined via the fiscal strategy of the government. In other words, they are in part exogenous for DMOs. For example, the funding strategy of DMOs may be informed by the central government’s preferences to enhance fiscal resilience by seeking to mitigate refinancing and rollover risk.²⁵ However, in particular by treating the “primary budget balance” as exogenous, the standard micro portfolio approach to PDM implies that the interactions between the debt portfolio on the one hand, and the *budgetary position*²⁶ on the other, are irrelevant for the standard micro portfolio optimisation framework.

In conclusion, we have identified the following two (related) key technical assumptions that drive the optimality results of the standard micro portfolio approach to public liability management:

²⁰ For a rigorous treatment of these assumptions, see Fama and Miller (1972), especially pp 189-214 (expected utility maximisation) and p 21 (notion of perfect or efficient capital markets).

²¹ Where the prices of securities contain all available information while they are taken as given by buyers, sellers and issuers of securities.

²² This in turn implies infinitely divisible securities, no transaction costs or taxes, while information is costless and available to everybody.

²³ See, for example, Fuguitt and Wilcox (1999, especially pp 35-42), who provide a comprehensive treatment of cost-benefit analysis for public sector decision makers.

²⁴ See OECD Sovereign Borrowing Outlook 2012.

²⁵ See Annex A of OECD Sovereign Borrowing Outlook 2012.

²⁶ The budgetary position encompasses all public expenditures and revenues minus the debt servicing payments, as measured by the primary budget balance (or *primary borrowing requirements*).

Technical assumption 1: the actions of the government (in particular planning and executing the funding strategy) have no impact on the market prices of government securities and the term structure of interest rates derived from them (price-taker assumption).

Technical assumption 2: the budgetary position and the debt portfolio are statistically independent from each other (zero dependency or correlation).

These two assumptions or conditions are related to each other and need to be satisfied in order for the micro portfolio approach to PDM to yield optimal cost-risk choices, as explained in detail in the annex of Blommestein and Hubig (2012). If they do not hold, decisions based on the associated cash-flow cost measures do *not* lead to the same result as decisions taken on the basis of present value (or market value) considerations derived from portfolio theory.

More specifically, our analysis implies that cost-risk optimality (in the portfolio theoretical sense) can only be achieved if we broaden the cost-risk perspective of the standard micro portfolio approach by including not only the cash flows associated with the debt portfolio itself, *but also those related to primary borrowing requirements*. In this way, a direct link is established between the debt portfolio (with its composition determined by the underlying funding strategy) and the government's capacity to service it via future budget surpluses. The main objective can then be formulated as *"to minimise the net burden of the debt portfolio"* (as measured by the present value of the net fiscal position²⁷) given a desired level of risk, via the choice of the funding strategy of DMOs. This adjusted funding perspective corresponds to the *"minimisation of the effective interest costs"* associated with the government's net fiscal position.²⁸ Clearly, this total effective sovereign borrowing cost measure is broader than the standard borrowing cost measure²⁹ because, as explained, it also captures the (potential) impact of the DMO funding strategy on the primary borrowing requirements of the budgetary position over the planning horizon. This in turn implies that the standard micro portfolio approach represents a special case of a more general framework based on the total effective borrowing costs associated with the inter-temporal fiscal position.

4. Empirical validity of technical assumptions of the standard micro portfolio approach

After having identified the two key technical conditions supporting the standard micro portfolio approach, we will analyse in this section their empirical validity. To that end, two general situations will be explored. In *world situation one* (**World 1** for short) we have in mind the "normal"³⁰ circumstances such as those that existed in the two decades or so prior to the

²⁷ The *net fiscal position of the government* equals the net present value (NPV) of all cash flows. This means that we take into account the cash flows of both the existing and the planned or expected future sovereign debt portfolio and those associated with the primary borrowing requirements. Note that the portfolio of government liabilities does not only include the stock with already issued securities, but also those that will be issued in the future (ie over the "life time" of this portfolio). See for further details the annex in Blommestein and Hubig (2012).

²⁸ The mathematical derivation of this and also the standard cost measure is given in the annex of Blommestein and Hubig (2012).

²⁹ As noted, this is the measure associated with the standard micro portfolio approach (based on the cash flows of the debt portfolio itself).

³⁰ This statement is not as straightforward as it seems. It has been argued that these circumstances were "not normal" (therefore the use of expressions such as the Great Moderation) and that, indeed, they laid the basis for asset bubbles and macroeconomic imbalances that ultimately triggered the Great Crash (see Blommestein, Hoogduin and Peeters (2010); Blommestein (2010)). We will ignore this complication and simply assume that the two decades or so prior to the crisis represent the normal conditions for PDM.

2008-2009 crisis: low volatility and strong liquidity in financial markets (including government securities markets), primary dealers with strong balance sheets and excellent capacity to make markets, relatively low borrowing costs, moderate government borrowing requirements, low sovereign risk,³¹ perfect or high asset substitutability across maturities, and low or moderate government debt levels. The first key question can then be formulated as follows: does the standard portfolio approach, with its criterion of “minimising the long-term borrowing costs subject to risk” (using the cash flows associated with the portfolio of existing and planned government liabilities), constitute an adequate basis for the sovereign debt and funding strategy in World 1? Special attention will be paid in this context to the practical implications for DMOs of the assumption of exogenous primary borrowing requirements.

World situation two (**World 2** for short) represents crisis conditions, in particular serious fiscal vulnerabilities, a perceived increase in sovereign risk and considerable uncertainty about future interest rates. Another feature of the current crisis situation is the (potential) implications (for the underpinning of the standard micro portfolio approach) of new and complex interactions between PDM, fiscal policy, monetary policy and financial instability with (ultra-)high borrowing costs.

4.1 Evaluation of assumptions under normal (non-crisis) conditions (World 1)

The normal conditions of World 1 are characterised by low or moderate government deficits and debt levels (implying sustainable debt levels and perceptions of low sovereign risk) and well-functioning liquid debt markets with efficient access by DMOs to borrow funds at “normal” (“risk-free”) costs. Under World 1 conditions public debt managers – although they (and central bankers) have potentially substantial market power – can be treated as price-takers. However, this presupposes a specific institutional set-up of DMOs and CBs. In many countries, the core of this institutional arrangement consists of institutionally independent CBs with strong anti-inflation mandates and operationally autonomous DMOs.

It was further assumed that potential policy conflicts between monetary policy and sovereign debt management could be avoided by following two “separability principles”.³²

CBs should not operate in the markets for long-dated government debt, but should limit their operations to the bills market.

Government debt managers should be guided by a micro portfolio approach based on cost minimisation mandates, while keeping the issuance of short-dated debt to a prudent level.

In World 1, these institutional arrangements and principles conveniently simplified the lives of policy makers in CBs and DMOs. More importantly, CBs and DMOs were judged as being fairly successful in executing their respective mandates. Moreover, they allowed each institution to be held accountable for their distinct mandates. And they provided considerable insulation from short-term political pressures. In such an environment, government debt managers do not (need to) mobilise their power to move markets. Instead, DMOs act as professional and fair market players (largely by following the market rules of private financial

³¹ We refer here to perceptions of low (or high) sovereign risk without going into the complications associated with the fact that there are quite different views on what exactly sovereign risk is (see Blommestein, Guzzo, Holland and Mu (2010)).

³² See Blommestein and Turner (2012) for a comprehensive discussion.

institutions). In addition, the direct interactions between DMOs and CBs (setting monetary policy conditions and controlling interest rates³³) are minimal.

Hence, in the non-crisis conditions of World 1, PDM activities can be expected to have a minimal impact on market prices (and, hence, on the yield curve derived from them). Moreover, given exogenous primary budget balances (known with certainty), the first technical precondition, that actions of the government have no impact on the yield curve, is certainly met in the standard micro portfolio approach. The dependence between technical conditions 1 and 2 implies that the second condition of zero correlation between the budgetary and the debt position is also valid.³⁴ Hence, in World 1, the standard portfolio approach minimises longer-term borrowing costs (being equivalent to minimising the net present value of the debt portfolio) and therefore provides in principle an appropriate basis for the sovereign funding strategy.

4.2 Evaluation of technical assumptions under crisis conditions (World 2)

The previous section shows that in normal circumstances the interactions between the budgetary and the debt positions are assumed to be negligible. This assumption is clearly not valid in crisis periods with highly volatile government securities markets with fiscal dominance periods and sovereign balance sheets very vulnerable to shocks. In that case, a sovereign asset-liability management approach becomes more important. Put differently, the more likely that the structure of the government debt portfolio may help in providing an effective protection of the sovereign balance sheet against possible shocks, the more important an integrated management of sovereign assets and liabilities becomes. Moreover, this approach³⁵ is closely related to (the macroeconomic objectives of) tax smoothing and budget stabilisation.³⁶ But even outside the framework of an integrated management of the balance sheet it has to be acknowledged that both the budget and sovereign debt position are basically driven by the same macroeconomic variables (inflation, GDP and economic growth). This perspective puts pressure on maintaining the zero-correlation assumption even in periods that cannot be classified as extreme crisis periods.³⁷

World 2 conditions are associated with a structurally reshaped monetary, financial and fiscal environment, notably fiscal dominance characterised by high debt levels, a more critical perception of the underlying sovereign risk (leading to a weakening/loss of the risk-free rate assumption) and, associated with these features, greater uncertainty about the (future)

³³ In World 1, short-dated and long-dated instruments are close substitutes and control of the overnight interest rate is sufficient for CBs to affect the near end of the yield curve (Blommestein and Turner (2012)).

³⁴ This feature follows directly from treating the primary borrowing requirements as an exogenous variable in the strategic framework for funding and debt management.

³⁵ Sovereign asset-liability management is concerned with the management of the overall risk exposure of the entire sovereign balance sheet, comprising financial assets (mainly tax-paying capacities) and financial liabilities (government debt portfolio). See also Risbjerg and Holmlund (2005, pp 42 f) and Blommestein and Koc (2008).

³⁶ These theories are focused on lowering the variability of the budget balance, thereby avoiding fluctuations in tax rates in response to economic developments. Such a policy framework is welfare-improving because changes in tax rates may create economic distortions. See the early contributions by Barro (1979) and Missale (1997). More recent contributions include Missale (2011), Faraglia et al (2008, 2010), Lustig et al (2008), Nosbusch (2008), Bacchiocchi and Missale (2005), Buera and Nicolini (2004), Barro (2003), Angeletos (2002).

³⁷ Nevertheless, treating the primary budget balance as an exogenous variable known with certainty may be a good starting point for debt strategy simulations under fairly normal market conditions. As noted by Risbjerg und Holmlund (2005, p 48), a general lesson from building simulation models is to start out simple and gradually expand the model (eg allowing for the stochastic modelling of the budget balance). Such an approach, however, is certainly not appropriate in World 2.

development of interest rates. In World 2, the actions of government debt managers may become a critical element in the overall conduct of macroeconomic policy.³⁸ For these reasons we will take a closer look at how World 2 conditions might affect the key technical assumptions underlying the standard micro portfolio approach.

First, the price-taker assumption is unlikely to hold in World 2, although price-making may not be the intention of debt managers. However, under less liquid and highly volatile market conditions, market operations by the DMO (a very large player vis-à-vis the market) may lead to *de facto* shifts in markets.³⁹ Moreover, strategic decisions (in particular about the portion of short-term vs long-term borrowing amounts) may also have a significant impact on relative market prices of government securities and, as a result, influence the shape of the yield curve. This also applies to debt levels having reached a critical limit (eg 90% of GDP and above⁴⁰), which could put upward pressure on interest rates (due to increased supply and crowding-out effects) and downward pressure on economic growth.

In such an environment – and in spite of the separation of mandates – PDM and monetary policy may start to have a direct influence on each other.⁴¹ The main reasons are decreased substitutability along the yield curve and the existence of illiquid and dysfunctional market segments, which may hamper the monetary transmission process. As a consequence, the CB's use of the overnight rate to control the shape of the yield curve in order to influence economic activity becomes less effective.⁴² At the same time, purchases and sales of government bonds by CBs become more effective. However, by shifting their emphasis from the short end to the longer-term segment of the yield curve, the monetary authorities inevitably interact directly with government debt management decisions. These operations also change the maturity of government bonds in the hands of the public.⁴³ DMOs (and the fiscal authorities) therefore need to have greater awareness that their operations may also affect economic activity through new and at times complex interdependencies with monetary policy measures.⁴⁴

Finally, the perception that sovereign risk has increased and the associated weakening of the “safe (or risk-free) asset” assumption has resulted at times in a significant credit risk premium implicit in the yield curve for government securities. Through this new channel, actual and expected changes in sovereign liabilities (or changes in fiscal policy) can directly affect the term structure of interest rates. This may also entail contagion to third countries, in particular

³⁸ This is the reason why several authors suggest a revision of the conventional or standard micro portfolio approach, including Hoogduin et al (2010), Surti et al (2010), Goodhart (2010) and Blommestein and Turner (2012).

³⁹ Also the accumulated (borrowing) effects of DMOs are likely to contribute to at times significant market moves.

⁴⁰ Based on an empirical study, incorporating data on 44 countries and covering the time period 1946 to 2009, Reinhart and Rogoff (2010, p 577) demonstrate that across both advanced countries and emerging markets, high debt/GDP levels (90% and above) are associated with considerably lower growth. See also the more recent BIS study by Cecchetti et al (2011).

⁴¹ See section 3 of Blommestein and Turner (2012) and also Hoogduin et al (2010, pp 15-17) for additional detail.

⁴² For the same reasons, PDM operations become more effective. In this context, the increasing use of short-term borrowing by government debt managers to secure additional funding during the global financial crisis is viewed critically. See, for example, section 8 of Blommestein and Turner (2012) and Hoogduin et al (2010, p 2). Short-term issuance has the same effect as monetary expansion, and therefore might complicate the control of the policy rate by the monetary authorities.

⁴³ As argued by Turner (2011, pp 5 f).

⁴⁴ See section 9 of Blommestein and Turner (2012).

among countries within a monetary union.⁴⁵ Furthermore, changes in perceptions about sovereign risk may be transferred to the holders of the government debt within and across borders (in particular by affecting the balance sheets of financial institutions⁴⁶).

This implies that the interactions between the debt portfolio and the budgetary position need to be incorporated in the analytical framework of PDM. Put differently, the second technical assumption needs to be dropped. The previously described link between fiscal policy (reflected in the primary budget balance) and the development of interest rates needs to be taken into consideration within the simulation framework of the debt strategy (for example, via specific macroeconomic/fiscal scenarios). Moreover, high debt levels (eg above the critical level of 90%) directly feed back into the government's fiscal position due to increasing debt servicing costs. In extreme cases, this chain of events may lead to a negative debt-deficit spiral. To prevent these negative feedback situations, the government needs to maintain control over the risks associated with the entire balance sheet. This can be accomplished by using a sovereign asset-liability management approach, because, as noted, in this way policies can be identified to insulate the fiscal position in part or fully against supply and demand shocks.

In sum, the two key technical assumptions underpinning the standard micro portfolio approach to PDM do not hold in World 2. Micro-optimisation of cost and risk using the standard approach would result in funding decisions that are suboptimal. We believe that the following World 2 conditions will remain in force for a considerable period of time: (a) high debt ratios, (b) perceptions of elevated sovereign risk levels, and related to this, (c) greater uncertainty about future interest rates, accompanied by critical interactions between PDM and monetary policy.

5. Concluding remarks

Although the standard micro portfolio approach to PDM has worked well for a long time, rapidly changing conditions associated with the current period of fiscal dominance has prompted a major re-think of the underlying framework. Our paper draws the following main conclusions:

- (a) The widespread use of the standard micro portfolio approach is associated with government debt management having become a distinct discipline, operationally independent, and guided by transparent micro-economic principles and rules, which seeks to ensure that the government is able to secure the required funding at the lowest possible costs subject to a preferred or acceptable level of risk. The standard approach is well-anchored in the principles of portfolio theory.
- (b) The underlying core objective to “minimise longer-term (cash-flow based) borrowing costs at an acceptable level of risk” leads to optimal financing decisions, provided the following two key technical assumptions hold:
 1. Actions by the government (including the execution of its borrowing and funding programme) have no impact on market prices of government securities and the term structure of interest rates derived from them (price-taker assumption); and

⁴⁵ For example, rating changes in country X may have a systemic impact on other countries, even when the latter countries are not formally downgraded; for example, in the form of higher funding rates.

⁴⁶ See also Hoogduin et al (2010, pp 14 f).

2. The budgetary and debt positions are statistically independent from each other (zero dependence or correlation).
- (c) The identification of these two key technical assumptions allows us to make a distinction between:

World 1: Normal (non-crisis) period. Minimising standard cost measures (ie cash flows based on the borrowing costs of the sovereign liability portfolio as in the standard micro portfolio approach) yields optimal results.

World 2: Crisis period (fiscal dominance). Minimising standard cost measures leads to suboptimal results. More specifically, violations of assumptions 1 and 2 are caused by critical public debt ratios, perceptions that the risk-free asset condition has been weakened as well as imperfect substitutability along the yield curve. Especially the weakening and (partial) loss of the risk-free asset condition has profound implications. In response, our suggestion is to minimise a broader cost measure so as to achieve optimal results during crisis periods.

What are the practical implications of these conclusions for PDM? The answer is less straightforward than one would perhaps think. On the one hand, it can be noted that the standard borrowing cost measure can be directly influenced by the debt manager through the choice of the funding strategy. On the other hand, we have shown that when World 2 conditions determine the borrowing environment, then we may need a broader cost objective for ensuring optimal funding decisions.⁴⁷ However, the adoption of a broader borrowing framework may also have implications for the current institutional set-up. Clearly, the pros and cons of any institutional change need to be carefully examined so as to avoid implementation decisions that may carry too much risk. We will assess these institutional issues in follow-up research.

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⁴⁷ It was also shown that the cost-risk objective of the standard micro portfolio approach is nested within this broader borrowing framework that uses a cost concept that ensures optimal funding decisions in World 2.

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