



Sovereign Asset and Liability Management Framework for DMOs: What Do Country Experiences Suggest?

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Abstract

This paper examines the benefits and challenges of adopting a Sovereign Asset and Liability Management (SALM) framework in debt management from selected country practices and draws lessons that are relevant for and transferrable to developing countries. The paper argues that a stepwise approach would be useful for adopting a SALM framework in developing countries, as there are plentiful practical obstacles in implementing a straight forward model-based, policy oriented balance sheet approach in those economies. Initially, priority balance sheet areas should be identified and assessed in a conceptual balance sheet framework, both from a vulnerability and management perspective. A good starting point in this regard would be considering financial assets such as cash reserves or wealth funds for which DMOs are responsible as well as future assets and liabilities. In a second stage, simplified risk analysis can be applied to elaborate mismatches and determine appropriate hedging options. Finally, in order to address communication and governance challenges among government institutions, establishing new structures, i.e. certain departments and coordinating committees, are recommended.

Keywords: Sovereign Asset Liability Management (SALM), Debt management, Risk management

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1. Introduction

Starting from 1990's, Sovereign Asset and Liability Management (SALM) has been adopted by public debt managers driven by various developments, in particular their increased responsibilities in managing sovereign assets and contingent liabilities. SALM proved to be an efficient tool in capturing and managing long term budget risks and financial risks in a holistic way. Nevertheless, significant practical and governance challenges related to the SALM framework, such as consolidation of a sovereign balance sheet, centralization of risk management, as well as technical and institutional capacity problems, complicate widespread adoption of SALM in developing countries.

In most cases, the largest portfolio in a country is the sovereign balance sheet which is composed of a number of sub-portfolios of assets and liabilities including the government debt, international reserves, state-owned enterprises and fiscal revenues and expenditures. Generally, these items are managed at a sub-portfolio level. Since the sovereign balance sheet is very large and complex, its management has enormous effects on the economy while having strong inter-linkages with the financial and real sectors. Therefore, the analysis and management of the potential risks and opportunities of the overall government portfolio are of great importance for sovereign wealth. Nevertheless, some features of a sovereign balance sheet may be overlooked in the sub-portfolio base analysis. To this end, a comprehensive balance sheet approach to financial risk management would be useful as to capture overall vulnerabilities and prospects.

The balance sheet approach, which offers an integrated evaluation of financial risks, has been widely used in the private sector for a long time. Financial sector agencies - especially banks and insurance companies –favour the Asset-Liability Management (ALM) approach and use it on a day-to-day basis. Moreover, there are some international and domestic regulations for the banking sector based on ALM output. Thus, both modelling and mitigating techniques of ALM have been developed and fine-tuned by these companies. However, compared to private sector practices, the comprehensiveness and adaptation of ALM by sovereigns remains quite limited. It should be stated that the relevant balance sheet for sovereigns is far more complex than the balance sheet for private companies. First of all, there is often a direct connection between assets and liabilities on private company balance sheets. For example, debt instruments are often issued to finance certain investments of a company. Also, the value of assets and liabilities is measured routinely in monetary terms. On the other hand, government's activities are very diversified and often its assets and liabilities do not reveal a direct relationship. For instance, government debt is issued for financing the overall budget deficit -except for project financing. Furthermore, it is complicated to identify financial characteristics of all the assets and liabilities of a government and to value them correctly. Especially, calculation of net present values of future revenues and expenditures are difficult exercises, also because of discount rate choice.

Hence, SALM is more complicated than ALM and development of SALM is still at an early stage. However, the policy implications of a comprehensive sovereign asset and liability management have long been discussed in the literature (Barro 1979, Bohn 1990, Missale 1997, Velandia 2002, Das *et al.* 2012). Based on this literature, it can be stated that the SALM

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approach is not controversial from an analytical point of view. The SALM provides key insights about assets and liabilities of governments, methods to detect sources of financial mismatches among them, as well as tools to reduce detected vulnerabilities to external shocks. Although a perfect match between both sides of the balance sheet cannot be reached, harmonization of the financial characteristics reduces the influences of macroeconomic and financial fluctuations on the sovereign balance sheet. However, practical difficulties and governance concerns persist on its implementation in a sovereign balance sheet. Major challenges are related to the consolidation of individual balance sheets of various public agencies, coordination between those agencies, in particular the central bank and other government institutions, lack of technical capacity for executing risk-based analyses, and limitations on risk mitigating instruments (Velandia 2002, Currie and Velandia 2002).

Against this backdrop, the SALM framework has been increasingly attracting the interest of policy makers and public debt managers in recent years. The main motivation behind this development is the changing structure of the sovereign balance sheet. Recent literature on the SALM underlines that, as sovereign balance sheets get larger in size and more complex in structure, the consideration of adopting ALM approach by sovereigns, specifically debt managers, for risk management purposes becomes more prominent (Blommestein and Koc, 2008, IMF 2011, Das *et al.*2012). Already, some DMOs take other components of sovereign balance sheet into account when designing debt management strategies. Country experiences indicate that SALM applications vary based on the degree of the portfolio coordination. Many DMOs apply partially integrated SALM frameworks which consider some components of the sovereign balance

sheet, due to feasibility and practical considerations. Particularly, financial assets that are managed by DMOs are usually incorporated into debt management strategies. On the other hand, fully integrated management of sovereign assets and liabilities is not yet a common practice.

With regard to the policy making process, some countries use an intuitive approach while a few utilize quantitative methods. In an intuitive framework, risks and vulnerabilities are identified based on the conceptual balance sheet. The key features of the different assets and liabilities are considered when setting strategic objectives. Hence, having complete balance sheet data is not a crucial part of this approach. In an analytical framework, on the other hand, sovereign balance sheet data is required for quantifying risk exposures and for determining the optimal strategy through several methodologies including the Value-at-Risk (VaR) and Cost-at-Risk (CaR) approaches. In terms of complexity, a model-based SALM is considered more complicated than the conceptual form since it necessitates the actual data set and technical analysis of the financial characteristics of assets and liabilities. In this regard, an in-depth examination of available country experiences reveals valuable lessons that can be relatively easy transferred to developing countries.

The main objective of this paper is to elaborate on the benefits and challenges of adopting a SALM framework in debt management. Also, different approaches for handling these challenges will be considered. To this end, this paper reviews sovereign asset and liability practices in selected countries in order to draw practical lessons for developing countries.

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The remainder of the paper is structured as follows. Section 2 presents the ALM framework for sovereigns by discussing key advantages and constraints of its application to public sector as well as a SALM operational toolkit, in light of the literature. Section 3 overviews the experiences of selected countries in applying the SALM framework. Country practices are elaborated in terms of their scope, risk quantification and mitigation techniques. Also, it highlights the complexities arising from dealing with practical challenges. In section 4, developing countries are considered and alternative ways of transferring the experience of developed countries are explored. Suggestions include priority areas, practical steps towards an integrated management, governance arrangements such as coordination mechanisms and/or bodies, and sequence of policy measures for its effective introduction. Finally, Section 5 concludes.

2. Sovereign Asset Liability Management Framework

Asset Liability Management (ALM) is an integrated approach to managing financial risks of balance sheet items. ALM has been in use in the financial sector since the 1970s when the financial institutions' exposure to interest rates risk increased. In parallel with innovation and extensive exercise of financial hedging instruments including options, swaps, futures and forwards in markets, the ALM framework has been developed further to manage currency risk, liquidity risk and credit risk as well as interest rate risk during the last couple of decades. Today, the ALM is broadly adopted by the financial and non-financial sector to minimize risk exposure and maximize profit of overall balance sheet. For instance, by adopting ALM,

mining companies can effectively reduce their exposure to commodity prices by hedging their assets against changes in commodity prices. Another example would be related to market risk on imported crude material, like jet fuel. In this case, transactions can be hedged via plain vanilla call options, and put on currency forwards.

Sovereigns, like private companies, are exposed to various financial risks on their assets and liabilities due to domestic and external markets' volatilities. Deteriorated structures of sovereign balance sheets may either be the causes or the results of financial crises due to the inter-linkages between financial stability and sovereign risk. In this regard, risk management of a sovereign balance sheet is an important element for both economic performance and financial stability of any given country. Accurate identification, measurement and monitoring of risks, as well as developing and implementing strategies are essential for addressing a government's balance sheet exposure.

Governments, unlike private companies, generally manage sovereign balance sheet items separately. Sub-portfolio items on the balance sheet correspond to separate public institutions and these items are typically being managed on the basis of each individual institution's objectives, functions, as well as legally and politically sanctioned mandates. From a financial management perspective, each institution has its own strategies in terms of risk, cost and return, shaped by its objectives and distinct functions. Among public institutions, Central Banks are considered as highly autonomous agencies guided by monetary policy targets and financial stability objectives. Typically, they invest foreign reserves in relatively safe and high-quality liquid assets so as to protect their capital base and to be in a position to

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provide required liquidity at very short notice. Debt management offices, on the other hand, with a lower degree of autonomy, are largely driven by cost-risk objectives. As a result, borrowing strategies are set up with a goal of cost minimization over the medium to long term, subject to a prudent degree of risk (IMF 2003, OECD 2005).

One can argue that each institution has greater expertise and better incentives for managing its own financial risks appropriately. Furthermore, management strategies of the different agencies may be optimal in terms of local risk-returns/costs terms. However, as sovereign assets and liabilities are managed on the basis of distinct objectives, functions and governance mandates of each public institution, various financial risks and opportunities that can be observed in an integral sovereign balance sheet are regularly overlooked. For example, the government's balance sheet risk would increase if foreign currency reserves are invested in short-term dollar deposits and financed with long-term borrowing in local currency. This in turn would cause maturity and currency mismatches on the balance sheet.

Unlike private companies, most of the governments do not construct and report comprehensive sovereign balance sheets. Nevertheless, examination of the conceptual structure of the sovereign balance sheet provides significant information about balance sheet exposures to financial and economic shocks. That is to say that a general assessment regarding their financial features can be done without actually computing the balance sheet items. Against this backdrop, a conceptual form of the public sector balance sheet is presented and recent changes in some of the core items are elaborated in the following two sections: i) Recent Trends in Public Sector Balance Sheets

Conceptual Public Sector Balance Sheet

As mentioned above, public sector balance sheets comprise a number of sizable assets and liability items. Furthermore, government balance sheets are more diversified, as public economic agents involve in plentiful activities, ranging from infrastructure investments to reserve management. One of the main assets of a government is usually the flow of tax revenues over several years. Other important assets include foreign exchange reserves, cash reserves and State Owned Enterprises (SOEs). The main obligations of a government are the fiscal expenditures and the government debt.

Conceptual balance sheets vary based on the range of items covered. Financial and non-financial assets and liabilities are usual segments of a conceptual balance sheet. In comprehensive frameworks, contingent liabilities² such as state guarantees and deposit insurance are also part of government's balance sheet besides the direct assets and liabilities described above. When/if a particular event occurs, the government has to face an immediate increase in financing requirements due to contingent liabilities. Given this significant fiscal risk, ideally both explicit and implicit contingent liabilities should be considered in an SALM framework.

In the literature, there are different illustrations of conceptual sovereign balance sheets that vary from highly simplified to detailed versions. Wheeler (2004) lists a typical set of government assets and liabilities. Based on his work, components of the balance sheet can be classified under three categories as (i) financial, (ii) non-financial and (iii)

²Contingent liabilities are usually defined as costs that the government will have to face if a particular event occurs. While implicit contingent liabilities sources from moral obligations such as bailouts of the financial sector, explicit contingent liabilities are contractually acknowledged by the governments such as loan guarantees, guarantees provided under Public Private Partnership (PPP) agreements (Currie and Velandia (2002).

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future assets and liabilities as it is shown in the Figure-1. This categorization is applicable for all countries and is particularly helpful for discussing the integration scope of the SALM. Generally, the components of sovereign balance sheet assets are categorized as financial and non-financial assets versus liabilities (Das et al., 2012, Australian of Financial Management, 2012). To the best of our knowledge, “future assets and liabilities” has not been used in previous studies. The main objective of this classification is to distinguish between the current and future components of the balance sheet.

FIGURE 1: MAIN COMPONENTS OF THE PUBLIC SECTOR BALANCE SHEET

Assets	Liabilities
Financial Assets Cash Reserves International Reserves SWFs Loans to other government agencies Other Financial Assets(*)	Financial Liabilities Government Debt Deposits by local authorities and commercial banks Other Financial Liabilities(*)
Non-Financial Assets Net worth of the SOE’s Infrastructure Investments	Future Liabilities Fiscal Expenditures Social Security System Deficits Contingent Liabilities
Future Assets Fiscal Revenues Receivables	

Source: Based on Wheeler G. (2004)

(*) Other Financial Assets and Liabilities include derivatives, repos, payments owing to suppliers and receivables.

Typically, the major financial assets on the government’s balance sheet are international reserves, cash balances and other sovereign funds. On

the liability side, government debt which consists of securities and loans is the largest financial item. Debt instruments differ in terms of currency denomination, maturity and interest rate structure. Thus, financial features of these items are easily recognizable. Naturally, while international reserves are mostly invested in safe and high-quality liquid assets in foreign currencies, cash reserves are kept primarily in local currencies. Sovereign funds on the other hand with higher risk tolerance can invest in a wide range of asset classes including government bonds, asset-backed securities, corporate bonds, equities, real estate and foreign direct investment³. As they tend to invest their assets abroad in order to reduce inflationary pressures, as well as to avoid excessive appreciation of their currency, their assets are mostly in foreign currencies.

The second category on the asset side is non-financial assets, which refer to the assets with physical values. In terms of sovereign balance sheet, major non-financial assets are the net worth of the state owned enterprises (SOEs) and infrastructure investments. Typically, these assets do not create cash flows and usually lack explicit financial features that are required for risk quantification in the ALM framework. Therefore, it is also difficult to measure sensitivities of non-financial items to changes in financial variables such as interest rates and exchange rates (Das *et al.*, 2012). Nevertheless, one of the main characteristics of non-financial assets that can be simply identified is that these are usually long-lived assets like lands and buildings. Since, an attempt to match maturity profile of government debt with that of

³ The asset and currency composition of sovereign wealth funds are estimated as: 23% in bonds, 55% in equities, 7% in real estate, 7.5% in hedge funds, 7.5% in private equities; 38% in US Dollar, 14% in Euro, 14% in Pound, 10% in JPY, 24% in other assets (IMF, 2008).

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non-financial assets can imply an unrealistic lengthening of average maturity of borrowing.

Prospective assets and liabilities of the governments such as receivables, fiscal revenues and expenditures labelled as the future assets and liabilities. Also, being one of the major sources of sovereign risk, contingent liabilities are treated as on-balance sheet items. Since they represent potential claims against the government which have not yet materialized, contingent liabilities such as government guarantees fall under this category.

Typically, fiscal expenditures and tax collections are denominated in local currency. In that sense, expected incoming and outgoing budget flows are not affected significantly from currency fluctuations. Nonetheless, it should be noted that interest payments of government debt which is a part of the budget expenditures could be a source of exposure to currency risks. Specifically, in countries where foreign currency denominated securities are large in government debt, currency fluctuations would impair fiscal expenditures via interest payments. A similar case applies for the floating rate instruments due to under interest rate volatility.

Fiscal expenditures and revenues are particularly sensitive to economic shocks. For example, when there is a negative demand shock caused by a global economic downturn, government's revenues would fall due to lower tax collections. Hence, budget balance would be deteriorated and this would, in turn, endanger tax stability. Similarly, a negative supply-side shock caused by a rise in oil prices would be a source of budget risk for an oil dependent economy. Clearly macroeconomic shocks affect different

economies in different ways. The impact of a shock on an economy can also change over time. Therefore, making a robust assessment about sensitivities of fiscal revenues and expenditures is a difficult task.

Materialization of contingent liabilities is also highly correlated with economic shocks. In periods of crisis, as financial situations of beneficiary institutions get weaker, governments have to take over obligations from guaranteed loans. Also, governments involve in financial sector bail-outs in case of a systemic risk. For example, the collapse of many banks during the 2001 crisis in Turkey costs the State \$39.3 billion which was equal to 26.6 percent of GDP and to 20 percent of the government debt at the time. Contingent liabilities are also sensitive to interest rate and currency movements. Typically, most of the beneficiary institutions' assets are denominated in local currency. If a substantial part of the liabilities is denominated in foreign currencies, currency fluctuations have substantial valuation effects on the balance sheet and may force the beneficiary to call the guarantee. Interest rate shocks may have similar effects as currency shock, if there is a maturity mismatch between assets and liabilities.

2.2. Recent Trends in Public Sector Balance Sheets

Developments over the past few decades in global economic and financial environment have further highlighted the significance of balance sheet risks. Empirical studies show that balance sheet vulnerabilities are strongly associated with a higher probability of crises (Ghosh A., 2006 and Eichengreen et al. 2003). The capital account crises that struck a number of emerging economies in the 1990s showed the importance of currency and maturity mismatches between sovereign assets and liabilities. In Mexico

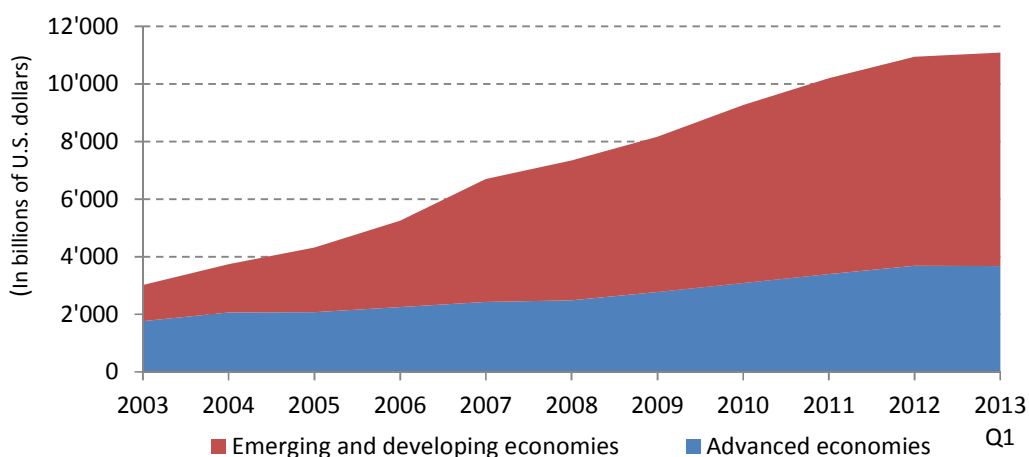
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(1994), Brazil (1999) and Russia (1998), the crises were mainly caused by government high foreign currency denominated debt vis-à-vis low foreign reserves. Moreover, high level of short term debt (Mexico (1994) and Turkey (2001)) and floating rate debt (Brazil 1999) have increased the vulnerability of sovereign balance sheet to external shocks. Under such cases, a loss of confidence can result in capital outflows and large adjustments in exchange rates and interest rates in a short period of time. In this regard, it can be stated that the balance sheet mismatch can transform one type of risk, like currency risk, into credit risk. In turn, this can further deteriorate the balance sheet significantly. On the other hand, a sufficiently strong sovereign balance sheet can eliminate the possible impact and propagation of shocks in an economy.

After a decade, the global financial crisis of 2008 has once again indicated the significance of balance sheet weaknesses. During the past decade, there have been important changes in government balance sheets in many countries. Specifically, sovereign balance sheets have become larger in size and more complex in structure. Prior to the onset of the global crisis, sovereign financial assets had increased due to the considerable rise in international reserves and the creation of wealth funds (e.g. in Russia, South Africa, Brazil, Turkey, Australia, Denmark and Norway). In the wake of the global crisis, the size of sovereign liabilities has also grown substantially. Together with an increase in government guarantees, new fiscal stimulus packages, as well as bail-out programs have played an important role in inflating the liability sides of the government balance sheets in some countries (OECD Borrowing Outlook 2012).

The international reserves reached about \$11.0 trillion at the end of 2012, up from \$3.0 trillion in 2003. In the same period, the share of the developing countries in total reserves increased by around 25 basis points. Traditionally, official foreign reserves are kept in low-yielding, liquid and secure asset classes such as high sovereign bills and bonds. However, the large increase in foreign exchange reserves in recent years has shifted the Central Banks' investments towards more return-oriented strategies (BIS 2007). This situation implies a composition change in foreign reserve portfolios.

FIGURE 2: OFFICIAL FOREIGN EXCHANGE RESERVES FOR THE PERIOD 2003-2013



Source: IMF Statistics Department Currency Composition of Official Foreign Exchange Reserves(COFER)

In addition to the international reserves, sovereign assets have also increased in different forms of wealth funds. Both the number of wealth funds and the amount of their assets have been growing substantially in

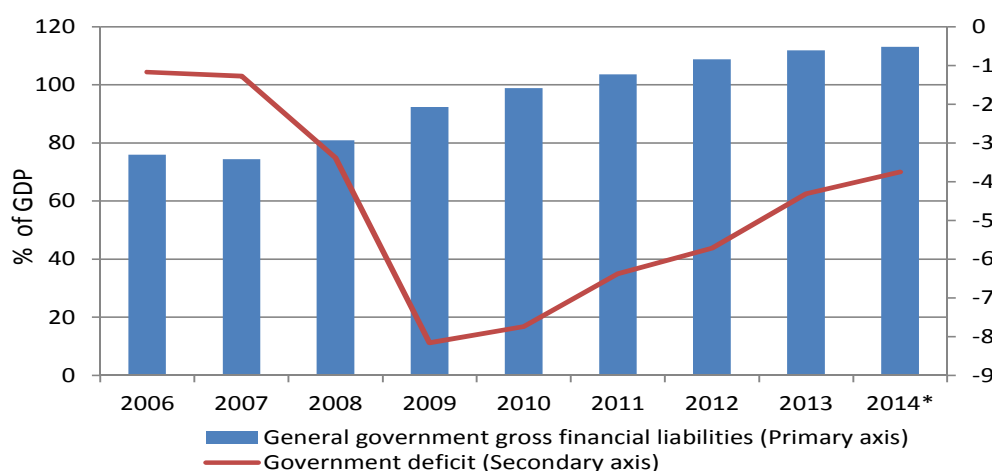
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recent years. Compared to traditional official reserve managers, sovereign fund managers can be expected to have a higher risk tolerance, as they can invest in a broad range of asset classes⁴. Also, it should be noted that wealth funds vary in their investment styles based on their mandates and governance structures.

On the liability side, government debt stocks have increased significantly particularly in those countries that were severely affected by the crisis. Figure 2 indicates that in OECD countries the gross financial liabilities to GDP ratio has increased by about 35 basis points since 2007 and reached 109 per cent as of 2012. Besides the level, the composition of the debt has also been adversely affected due to higher shares of foreign currency and short term debt issuances, particularly during the 2008 and 2009 when the yield curves steepened. Thus, while the global financial crisis caused the government deficits and liabilities to surge, high levels of public debt raised sustainability concerns and put downward pressure on the economic growth in those countries.

⁴ According to the SWF Institute, there are more than 60 SWFs around the world most of which created in the last ten years. As of June 2012, SWFs' asset amount reached to \$5.5trillion. (<http://www.swfinstitute.org>)

FIGURE 3: FISCAL AND BORROWING INDICATORS IN OECD COUNTRIES FOR THE PERIOD 2006-2013



Source: OECD Economic Outlook No. 93 database

As a result of these developments, the balance sheets of many sovereigns have further deteriorated. This situation has increased the importance of taking balance sheet risks into account when designing borrowing strategies. Therefore, the ALM approach is today capturing the greater attention to the analysis and management of risks in the public sector (Blommestein and Koc, 2008 and Das et al., 2012). Hence, the Stockholm Principles⁵ underline that the scope of debt management should be defined in a way that also accounts for any relevant interactions between the nature of financial assets, explicit and implicit contingent liabilities, and the structure of the debt portfolio. These principles, in essence, reflect a move towards a broader definition of risk than traditional debt management objectives imply.

⁵“Stockholm Principles” emerged from the 10th Annual IMF consultations on “Policy and Operational Issues facing Public Debt Management,” co-hosted by the Swedish National Debt Office in Stockholm, June 2010.

2.3. Key Opportunities of Adopting the SALM Approach

2.3.1. Understanding the Risks on the Balance Sheet

The sovereign balance sheet provides comprehensive information to better understand a nation's overall position. An examination of the nature of the sovereign assets and liabilities can be a valuable guide for managing government balance sheet risks. Testing the impact of different types of macroeconomic risks would give valuable evidence that can significantly improve the management policies. In sovereign debt management, the risk tolerance of the government can change over time depending on the size of the government debt and assets as well as the government's vulnerability to economic and financial shocks. The Guidelines for Public Debt Management (IMF 2003) underlie that the larger the debt portfolio and the vulnerability of the country to economic shocks, the larger the potential risk of loss from financial crisis or government default, and the greater the emphasis should be on reducing risks rather than costs.

While some governments construct comprehensive sovereign balance sheets, most of them do not. As it will be discussed in the following section, governments face difficulties in valuation of some of the assets and liabilities such as present values of fiscal revenues and expenditures. However, it should be observed that producing a comprehensive balance sheet would be useful but not essential for application of the SALM. IMF WB Guidelines for Public Debt Management (IMF 2003) and Wheeler (2004) note that a government balance sheet framework can be used as a conceptual structure for considering the risk characteristics of a government's main asset and

liability portfolios with a view to reducing the government's overall balance sheet risk.

Tax smoothing links debt management to current and future economic assets and liabilities, such as the present value of future revenues and expenditures which play an important role in the conceptual balance sheet of SALM. Barro (1979) argues that tax smoothing contributes to long-term social welfare. Depending on the countries' main structural features (e.g. oil exporting or importing countries), economies are sensitive to demand and supply side shocks which can substantially alter tax revenues. From the perspective of tax smoothing, not only the level but also the structure of the debt has important implications for minimizing budgetary risk. Furthermore, it is argued that the mere selection of borrowing instruments in a way to provide a correlation between interest expenditures and tax receipts may decrease the volatility of the balance sheet against demand and supply shocks, and contributes to reduce budget risk (Bohn, 1990). For example, inflation-indexed instruments can be used to hedge against demand side shocks to the economy. Likewise, fixed rate bonds are more suitable for economies that are susceptible to negative supply shocks. However, as noted previously, it is not always a straightforward exercise to estimate which type of shock will hit the economy. Therefore, a diversified debt portfolio with nominal and indexed securities would be a simple hedge against macroeconomic shocks.

The conceptual SALM approach can reveal important vulnerabilities that are hidden when considering sub-portfolio balance sheets. In some cases, uncoordinated management of assets and liabilities may cause a currency mismatch on the balance sheet. Clearly, large changes in the real

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exchange rate cause fluctuations in the values of foreign currency assets and liabilities. When a high level of foreign currency debt is not accompanied by foreign currency assets, this situation is assessed as a significant risk factor especially for developing countries because of the “original sin” arguments (Eichengreen, Hausmann and Panizza, 2003). Given the governments' limited ability to generate foreign currency revenues, an unexpected depreciation of the exchange rate deteriorates the government's fiscal position due to amplified debt service. Another example for currency risk exposure would be related to international reserves that are being financed through issuing foreign currency debt. This strategy may be optimal at the sub-portfolio level. However, if the central bank borrows in foreign currency to build up reserves without taking into account the eventual foreign currency debt of the government; this may create a currency risk exposure on the overall balance sheet. In that framework, SALM approach adopted by DMOs can contribute in identifying and managing the macroeconomic risks of uncoordinated monetary and debt management policies (Togo, 2007).

The SALM framework can also contribute to capture the risk of contingent liabilities. The contingent liabilities such as guarantees provided under Public Private Partnership (PPP) or loan agreements are often not recognized in official debt figures and fiscal reports including the budget. However, the materialization of contingent liabilities, both explicit and implicit ones, can significantly deteriorate sovereign balance sheets (IMF 2007 and 2011), and is therefore increasingly recognized as an important risk factor by DMOs. Already, some DMOs including the Chilean Debt Management Office, the South Africa National Treasury, the Brazilian Treasury, the Colombian National Treasury and the Turkish Treasury have important roles in managing government guaranteed debt. In those

countries, scenarios related to the materialization of contingent liabilities are placed in debt sustainability analyses and different risk mitigation options are discussed. These exercises provide important information about the long term fiscal risks and help to raise the risk awareness among the policy makers.

Most of the fiscal sustainability analysis focuses on government's financial liabilities, particularly government debt. Indeed, this may lead to an overstatement of the risks to fiscal sustainability. Hypothetically, debt repayments can be made through the liquid financial assets such as cash reserves and funds. Some DMOs carry high levels of cash reserves against re-financing risk. Moreover, in some countries, the governments that run budget surpluses continue to issue debt securities to support domestic financial markets. In such cases, governments own large amount of financial assets (e.g. SWFs). Therefore, in order to better evaluate the ability to fulfil debt obligations in the short run and fiscal sustainability in the long run, the asset side of the balance sheet needs to be taken into account. In this regard, "Net Debt" and "Net Worth" metrics that will be elaborated in the following section are useful indicators for indebtedness.

2.3.2. Identification of Natural Hedges in the Balance Sheet

Reducing the outright exposure with passive hedging or active hedging instruments depends on several factors including risk management unit's capacity, institutional choices and development of financial markets. Both hedging strategies can be used to mitigate currency risk, interest-rate risk and re-financing risk exposures of balance sheets. Active hedging instruments require the use of sophisticated financial products that vary

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from buy back and switch operations of sovereign bonds to interest-rate and currency swap operations. Operating this kind of products entails specific legal and IT system arrangements which will be elaborated in the following section. On the other hand, natural hedges are implemented through borrowing policies; therefore they do not entail additional activities after primary issuances.

By applying natural hedging methods sovereign debt can be structured to hedge against macroeconomic shocks so that the government does not need to adjust fiscal policy. Indeed, tax smoothing could provide a theoretical motivation for a debt management strategy aimed at minimizing balance sheet risks. As mentioned previously, this suggests that the selection of borrowing instruments in a way to provide a correlation between interest expenditures and the primary balance may decrease the volatility of the balance sheet. Missale (1997) argues that debt management should focus on the objective of reducing the exposure of the government budget to macroeconomic risks unless this leads to an excessive cost. For example, inflation-indexed bonds help mitigate the budgetary impact of negative demand side shocks. So, when governments face a sharp decrease in their budget revenues in the event of a macroeconomic shock, their interest payments would move suitably and help minimize budget disturbances if they select the correct financing instrument. This in turn, would support a stable public debt to GDP ratio.

Traditionally, the objective of public debt management is to borrow at the lowest cost and with a reasonable risk level without considering other items on the sovereign balance sheet. Blommestein and Koc (2008) consider possible implications of the implementation of the SALM framework on debt

management and argue that it is sub-optimal for sovereigns to manage their balance sheet via non-integrated risk view. Particularly, borrowing strategies can play an important and flexible role in eliminating interest, currency and maturity mismatches on the balance sheet. For instance, when the average maturity of assets is longer than that of sovereign liabilities, even though borrowing at the long end of the yield curve is associated with higher costs, issuing long term debt may be a desirable strategy so as to avoid balance sheet mismatches. Also, long term borrowing mitigates refinancing risk of the debt, as well as maturity mismatches on the balance sheet.

When the SALM approach is handled on a conceptual base (e.g. Hungary, Greece, South Africa and France), debt strategies are set up primarily based on debt dynamics, however general characteristics of assets are also considered on decision making level. As noted previously, most of the government revenues are denominated in domestic currency. So, DMOs should be very careful about the issuance of foreign currency denominated debt especially in emerging countries where exchange rate fluctuations have been an important source of concerns. Past experiences in many emerging markets indicate that currency mismatches on the sovereign balance sheet expose those economies to deep financial crises. In that sense, issuance of local currency denominated debt is more appropriate for those economies to minimize external vulnerability. In fact, exchange rate risk on government debt and foreign reserves can be managed jointly without a specific need for modelling. In that case, decision on natural hedging of portfolios is taken on a principle level. A natural hedge against currency risk can be constructed by accumulating the same amount of foreign currency assets as foreign currency debt in the form of international reserves and/or wealth funds. Nevertheless, given the fact that many emerging market countries still lack the ability to

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borrow in local currencies, currency mismatches cannot be entirely avoided. The conceptual SALM approach emphasises a coordinated management of foreign debt and foreign exchange reserves focusing on the net foreign debt.

Moreover, sovereign assets can be used for early repayments of outstanding foreign debt to reduce currency risk exposure. Given that the interest rate on sovereign borrowings—particularly of countries with a high debt burden— is higher than the interest rate on the sovereign assets, such strategy may also be cost effective from the balance sheet perspective. For example, in 2005 almost USD 23.6 billion from Russia’s Stabilization Fund was used to make early external debt payments to the IMF and the Paris Club.

Another example of managing the financial risk exposure of debt stock by forming a natural hedge is “Liquidity Buffer”⁶ policy. Issuing short term securities carries lower cost than issuing long term securities. On the other hand, over reliance on short term debt⁷ carries exposure to significant re-financing risk. Also, following a benchmark issuance policy results in massive redemptions in certain months of a year, and disturbs the repayment profile. In that case, keeping a certain amount of cash reserves serves as a cushion against short-term market volatilities and also provides flexibility to DMOs during the auctions. In that framework, liquidity buffers created by DMOs are proved to be an effective policy to mitigate re-financing risk of public debt in some countries including South Africa, Turkey, Denmark and Spain.

⁶A “Liquidity Buffer” can be defined as the level of cash or other highly liquid assets readily available to cover financing needs (e.g. cash deficits or debt service obligations) and to withstand severe liquidity strains for shorter periods of time (e.g. for 30 days). LB may be kept in line with the cash management and/or debt management objectives.

⁷In less developed financial markets where DMOs are unable to lengthen the borrowing maturity, budget deficit is heavily financed through short term issuances.

Finally, it should be noted that the SALM approach in debt management suggests a comprehensive assessment of risks and costs over a long term horizon to identify natural hedges. Bernaschi *et al.* (2009) highlights the importance of the time horizon over which alternative funding strategies are evaluated. This implies that possible outcomes of different borrowing strategies should be calculated for a long period of time. Generally, DMOs set strategic benchmarks for the medium term, and the risk and cost indicators of borrowing strategies are tested for the following 3-5 years in simulation models. However, the maturities of the borrowing instruments are usually longer than that of strategic benchmarks. In order to make a better assessment, debt strategies should be tested for the entire life time of the securities. This would change the value of risk and cost indicators of different strategies, and change the efficient frontier.

2.4. Key Challenges of Implementing the SALM Approach

Besides the potential benefits of adopting an ALM approach in the public sector, there are practical challenges and management concerns regarding its implementation. Major operational difficulties arise from a compilation of financial statistics, measurement of non-financial items and risk analyses of the sovereign asset and liability portfolio which are required by a model-based SALM approach. Moreover, management concerns, including a centralization of financial risk management of sub-portfolio items and institutional capacity for risk management, create important obstacles for the adoption of ALM by sovereigns. Following subsections elaborate these challenges and discuss the fact that most of these challenges are not binding

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when the natural hedging strategies are followed in a conceptual form of SALM.

2.4.1. Operational Difficulties

Unlike private companies, governments in general do not produce comprehensive balance sheets. As for fiscal reports, while every government issues a budget as a quantified financial plan, only a few construct a sovereign balance sheet. A government budget largely measures cash flows of revenues and expenditures for an accounting period. Thus, the budget, which is a mere financial plan, cannot capture stock values of sovereign assets and liabilities. An accounting form of sovereign balance sheet, on the other hand, provides stock values of all assets and liabilities on accrual accounting bases. In this regard, it enables both policy makers and voters to much better monitor and assess government's ex-post overall performance. However, as an accounting tool, a sovereign balance sheet runs into problems.

As mentioned above, a model-based SALM framework is based primarily on financial statistics of balance sheet items. Nevertheless, governments in general do not produce comprehensive balance sheets which require consolidation of individual balance sheets of various public institutions. Regarding the definition and classification of the government balance sheet, international standards⁸ set valuable guidelines for governments. Besides international standards, national accounting standards

⁸Statistical Reporting Standards on public financial statements initially set by UN, with the introduction of System of National Accounts (SNA) in 1953. SNA 1993 European System of national and regional Accounts (ESA 95) and IMF Government Financial Statistics 2001 (GFS). International Public Sector Accounting Standards (IPSAS) and International Financial Reporting Standards (IFRS) are commonly used international accounting standards today.

also exist in many developed countries. Based on those standards, advanced economies' governments (e.g. the US, Canada, New Zealand, Australia) report comprehensive balance sheets. It is not a widespread practice yet in developing countries, although a few countries such as South Africa and Brazil report public sector balance sheet. In this respect, one of the main difficulties about implementing a model-based SALM approach is about obtaining comprehensive, timely and homogeneous data of sub-portfolio items for constructing the entire balance sheet. Moreover, complications arise in the pricing of financial and non-financial assets in a consistent way since there are different accountings principles (e.g. mark-to-market accounting, cash based and accrual based accounting may be in use).

On the asset side, some of the assets are not well reported. In many countries, there is a lack of comprehensive inventory problem associated to non-financial assets. Even if they are recorded, in most cases book values of these assets do not reflect their market value. Furthermore, not all of these assets have a market price. Some of the non-financial assets like lands and parks are non-marketable, thus valuation of these assets at market prices is challenging. The relevance of the volatility of these assets to fiscal analysis is therefore questionable.

As mentioned previously, there is usually no information on the future asset and liability components of the balance sheet, such as future revenues and expenditures. From an accounting perspective, the future amount of these real assets and liabilities needs to be estimated and discounted to reflect its current value. Estimation of future revenues and expenditures requires projections of several macroeconomic variables including price levels and growth rates. Moreover, the calculation of the present values of

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future taxes and outlays entails certain difficulties including the choice of the discount rate.

There is also a measurement problem related to contingent assets and liabilities to the extent that they are not recorded in the balance sheet. For example, valuation of contingencies which stem from Public Private Partnerships (PPPs) is a complicated issue given that complex structure of these projects. Estimation of project cash flows along with the possibility of losses can be a source of complexity. On the other hand, measuring government direct loan guarantees is a relatively easy practice, since it only requires institutional assessment of financial capacity together with the repayment profile attached to the guarantee agreements. As mentioned above, in some countries including Brazil, Chile, Colombia, Indonesia, South Africa, Sweden and Turkey, DMOs monitor and manage risks arising from explicit contingent liabilities. However, no common methodology is available on how to incorporate contingent liabilities into debt management strategies (OECD 2005).

In practice, measurement, recording and reporting of financial assets and liabilities are usually better designed and more standardized than other assets and liabilities. Therefore, compared to future assets and liabilities, the inclusion of currently existing financial assets and liabilities into a model-based SALM framework is considerably more practical. For example, since the value of foreign currency debt and foreign reserves are generally well reported in many countries, they can be modelled together so that strategies regarding to composition and maturity of the foreign currency debt portfolio can be set based on that analytical framework.

2.4.2. Institutional Capacity

Another operational difficulty in applying a model-based SALM approach would be related to the level of technical capacity and technological information systems. SALM use diagnostic toolkits such as financial ratio analyses, gap analyses, and stochastic models to identify mismatches. The risk analysis of the balance sheet calls for specialist staff and an advanced technical capacity. As mentioned above, compared with the other public institutions, debt offices usually have higher capacity and more experience in financial management. In general, DMOs have a good quality of staff with a combination of financial market, economics, and public policy skills for developing and executing an effective strategy in debt management. Moreover, most of debt management offices use sophisticated techniques to analyse and to control the risks associated with the debt stock. Many DMOs employ computer based information systems for debt management activities. So, existing technical capacity and information systems of a DMO can be enhanced for SALM requirements. Nevertheless, analytical capacity of DMOs in many developing countries is still limited. This, on the other hand, could be a challenging obstacle only for a model-based SALM. When the SALM approach is handled in an intuitive framework, decision on natural hedging of portfolios is taken on a principle level.

Finally, some difficulties are also encountered in the use of derivative instruments for risk management with the aim of overcoming disharmonies. Derivative instruments such as interest and currency swaps and forward/future contracts are often used for hedging specific risk factors in financial markets. For example, debt management at Denmark's Nationalbank heavily uses swaps to eliminate currency and interest risk of

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the portfolio. On the other hand, in some cases legal regulations forbid DMOs to use derivative instruments to avoid counterparty risks which arise from derivative operations. In that framework, legal documents such as ISDA Master Agreement needs to be signed and IT systems should be modified to enable recording, monitoring and reporting of these activities. Also, swap arrangements which involve a third party (e.g. investment banks) demand a careful management of counterparty risk. Besides these considerations, the high cost of active hedging instruments is another source of concern for developing countries whose debt is below investment grade. However, it should be emphasized that use of active hedging instruments is not crucial for the adoption of SALM since natural hedging which was discussed previously can be very effective in eliminating major balance sheet mismatches. Furthermore, compared to active hedging strategies using derivative instruments, the design and implementation of natural hedging methods are quite simple processes.

2.4.3. Centralization of Risk Management

The government is composed of a wide range of administrations and agencies with their own risk and administrative culture. Traditionally, sub-portfolio balance sheets are being managed on the basis of each individual institution's objectives and functions, based on legally and politically sanctioned mandates. Therefore, application of the SALM framework may create important practical, governance and political challenges. It can be argued that some government-owned companies have significant expertise in managing their risk. Centralized risk management may pose important challenges to the coordination and communication among various institutions.

An example is foreign currency risk management. Foreign reserve management is usually done by the central bank that operates independently from fiscal policy. Although separation of monetary policy and fiscal policy may improve the effectiveness and accountability of both parts of the economic policy, this situation can make successful cooperation on risk management more difficult since the objectives are quite different. However, as foreign currency risk is one of the major vulnerabilities that many countries face, policy makers need to design coordination mechanisms to avoid adverse impacts of decentralized management of foreign reserves and foreign currency denominated debt.

In the SALM framework, a high degree of coordination is needed between agencies having responsibility for the management of different elements of the sovereign balance sheet. This in turn leads to the general question to what extent the management of balance sheet risks should be centralized and how these challenges can be best addressed. Another key issue is what priority needs to be given to the management of the risks related to the assets and liabilities in the government's balance sheet relative to other policy objectives for the use of financial assets.

2.5. Operational Toolkit of the SALM

2.5.1. Coordination Mechanisms

One of the major challenges of joint management of sovereign assets and liabilities is to the need of coordination and communication among various institutions within the country. The IMF (2012) emphasises that

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enhanced sovereign risk monitoring will require collaboration and information sharing across key institutions and may require cross-institutional arrangements such as coordination committees. Some countries have already established macro-prudential committees that serve effectively for prudent financial oversight regarding overall balance sheet risks (e.g. Chile, Mexico, Turkey, the United Kingdom and the United States). These committees typically comprise the central bank and supervisory authorities, the Ministry of Finance (MOF) and the Treasury, and tend to have extensive information gathering powers. In that framework, policy coordination among the member institutions is pursued through information sharing and discussions. Moreover, these high level committees are sometimes supported by expert level working groups.

In order to enhance coordination and communication mechanisms among the different departments, special units/bodies dedicated to the SALM can be established within the DMOs. A unit that is responsible for collecting necessary information and data as well as organizing meetings with relevant departments both inside and outside the institution would make a significant difference in practice. Also, “Asset Liability Management Coordination Committee” which comprises the key financial institutions (such as DMO, CB and MoF) could serve as an official platform for senior level officials to exchange their information and knowledge on operational issues. South Africa has a division in the National Treasury called Asset Liability Management that is responsible for managing the government’s asset and liability portfolio in order to ensure prudent cash management, asset restructuring, financial management, and optimal management of government’s domestic and foreign debt. Within the Turkish Treasury, the Debt and Risk Management Committee, was created to set debt management strategies within

the SALM framework in 2002. In Turkey, financial assets are considered when debt management strategies are formulated in the process of developing borrowing strategies.

Moreover, financing guidelines can be an effective tool to overcome adverse impacts of a decentralized risk management. In particular, a general set of criteria for government institutions can be designed by DMOs, the institution with the best know-how, in order to manage the overall credit risk exposure of the government. Such guidelines can provide specific rules and limits as regards to guarantee and PPPs agreements of ministries, local governments and SOEs.

2.5.2. Analytical Framework

The SALM concept is not directly used on an operational day-to-day basis; ALM principles are applied when it comes to developing the long-term strategy of debt management. More precisely, when DMOs set up borrowing strategies, they assess the financial characteristics of debt instruments from a broader perspective in a way to evaluate their impact on the government's fiscal position against changes in government tax revenues and spending resulting from macroeconomic shocks (Wheeler 2004).

As most DMOs set up debt management strategies based on cost-risk analysis (OECD 2005), it is reasonable to integrate assets into these analyses. Significant progress has been made in the analytic capabilities of DMOs during the last decade. Generally, DMOs employ models such as Value at Risk (VaR) and Cost at Risk (CaR) models for developing strategic benchmarks which state desired risk characteristics of the optimal debt portfolio in a quantitative manner. They complement these models with other analytical tools including Debt Sustainability Analysis (DSA) and sensitivity tests. Moving from liability management to portfolio management naturally leads

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to integration of assets into these risk-based analyses. In fact, some of these models implicitly take sovereign assets into account through the modelling of the primary budget surplus. As a result, the risk measures depend on the correlation between interest payments and the primary surplus. In particular, this kind of models show how correlations between interest charges and tax receipts can be exploited to result in budget smoothing, i.e. in less variable deficits. Therefore, to the extent that budget smoothing can be considered as an ALM objective (although it is based on flows and not on stocks or present values), most DMOs implicitly apply a partial ALM approach in the cost and risk assessments of debt financing strategies. Considering that many DMOs take budget deficits into account when setting up their debt strategies, even if they do not adopt SALM formally it can be stated that they employ a partial form of SALM in practice. In that sense, SALM by DMOs is more common application than it is commonly thought.

The operational toolkit of SALM contains techniques that are used for balance sheet analysis and formulation of Medium Term Debt Strategy (MTDS). In practice, risk management uses several techniques to analyse the risk characteristics of the assets and liabilities of the government balance sheet such as sensitivity, gap and duration calculations. Besides that, analytical tools are developed by DMOs to quantify the costs and risks associated with alternative financing strategies including Cost at Risk (CaR) and Value at Risk (VaR) models⁹. These tools are commonly used in the process of setting up medium term strategic benchmarks for a relevant

⁹The VaR model assesses the maximum potential loss of a portfolio resulting from an unfavorable market fluctuations for a given time horizon at a specific confidence level. The CaR model is originally derived from the VaR concept provides an estimation of expected cost and risk values of alternative strategies under various macroeconomic scenarios.

portfolio (examples include Sweden, Denmark, Indonesia, South Africa, Colombia, Turkey and Brazil). In line with medium term targets, alternative hedging strategies are considered to mitigate financial risks. The process of developing and discussing models can be an efficient capacity-building process since relevant concepts and trade-offs are part of the debate. At the beginning of the adoption process of the SALM framework, these techniques should be carefully reviewed by DMOs in order to avoid inaccuracies and time-consuming corrective actions.

Debt sustainability and sensitivity analyses can also be used within the SALM framework. Long term projections of the debt level can be tested under different shock scenarios related to future primary surplus ratios, GDP growth as well as interest and currency rates. Besides that, the IMF (2011) states that materialization of contingent liabilities can be considered as a scenario in stress testing the evolution of the debt stock. The results of the analysis can be discussed with other policy makers in a SALM framework regarding the appropriate set of risk mitigation options. Consequently, credit risk from explicit contingent liabilities can be handled through various mechanisms. For instance Canada, Sweden, Hungary, Poland, Turkey and Colombia set limits for guarantee issuances and charge fees on guarantee amounts.

Within the SALM framework, the net financial position of the balance sheet is measured by net worth and net debt calculations. Both definitions are useful measures for assessing the government's fiscal sustainability. As financial assets of sovereigns increase, these types of indicators become more and more valuable. While the net value of the sovereign balance sheet, which is computed by deducting all liabilities in the balance sheet from the

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market value of all tangible and intangible assets, is a comprehensive and complex analysis, net debt is calculated in a simpler manner by netting down public debt by the financial assets. The net figure becomes more important when a government has a significant amount of liquid assets as in the case of New Zealand, Australia and Japan. Also, net debt can be calculated separately for domestic and foreign currency denominated financial assets and liabilities. In that framework, net foreign debt, that is mainly the difference between gross foreign debt and international reserves, is a valuable indicator to assess external vulnerability of government debt. However, it should be noted that neither net debt nor the net worth figures elaborate financial characteristics of balance sheet items; rather they provide insights for evaluating the ability of the government to meet all financial commitments with its available assets.

3. Sovereign Asset and Liability Practices: Selected Country Notes

In this section, selected country SALM practices are elaborated in terms of their organizational structure and risk mitigation techniques. Although the SALM is not a widespread practice, a number of DMOs have started effectively formulating debt management strategies in a SALM framework by placing debt management within a broader financial analysis of the government balance sheet.

In the 1990s, some advanced economies moved towards SALM frameworks, as they have achieved a low level of debt or/and built some form of wealth funds. During this period, the risk management instruments such as swaps have become more available in the financial markets. Against this backdrop, the strategic objective has changed over time and overall

portfolio risk management became more relevant for debt management offices (e.g. Australia, New Zealand and Denmark).

The global financial crisis in many developed countries has underscored a number of arguments in favour of integrated management of sovereign assets and liabilities. In the wake of the crisis, both the size and structure of many countries' balance sheets have been adversely affected by large rescue packages, capital injections and extensive guarantee issuances. Many DMOs played a key role in connection with the financing of rescue packages, capital injections to banks and buy-back of assets. As sovereign balance sheets have grown and become more complex portfolios and the role of DMOs in their management has increased, SALM as a governance model has become more relevant for those countries. The Stockholm Principles of 2010 assert that any relevant interactions between the nature of financial assets, explicit and implicit contingent liabilities, and the structure of the debt portfolio should be considered by DMOs.

Mostly adopted by developed countries in a more comprehensive way, the ALM approach is utilized in a narrow scope in the developing countries due to data problems, weak institutionalization and the difficulties in the use of derivative instruments. Together with Turkey, countries like Hungary, South Africa and the Czech Republic employ a relatively narrow definition of SALM which takes into account part of their assets as well as the debt stock. In terms of scope and risk mitigation techniques, New Zealand is the pioneer in adopting SALM. In this regard, ALM experiences of New Zealand, Denmark and Turkey are discussed in detail in what follows.

3.1. New Zealand Debt Management Office within the Treasury

The New Zealand Debt Management Office's (NZDMO) strategic objective is "to maximize the long term economic return on the Crown's financial assets and debt in the context of the Government's fiscal strategy, particularly its aversion to risk"(New Zealand Treasury, 2013). Based on this objective, New Zealand is the only country which has developed a fully integrated SALM approach. Within the SALM framework, the NZDMO is responsible for managing New Zealand dollar and foreign currency assets and providing derivative transactions for government entities, in addition to financing the government' gross borrowing requirement.

In New Zealand, a comprehensive government balance sheet is prepared on an accrual basis and published every quarter in accordance with generally accepted accounting practice. Financial statements are prepared (published) by Ministers, Departments, the Parliament, the Reserve Bank of New Zealand, SOEs, and other Crown entities. Indeed, construction of consolidated financial statements in the early 1990s was one of the driving factors of adoption of balance sheet approach since comprehensive information on the structure of the Government's assets and liabilities enabled debt managers to better analyse and understand the balance sheet risks. In 1993, the NZDMO made an attempt to examine risk characteristics of government's assets including non-financial assets such as highways, lands and buildings. Wheeler (1996) states that the results indicated a quite long duration which implies that duration of government debt should also be long. It was also concluded that asset prices were not very sensitive to exchange rate changes; therefore foreign-currency debt may cause variability to the government's net worth. Although the NZDMO did not pursue this exercise

further for practical reasons¹⁰, it had some important implications for debt management policies regarding currency and interest rate mismatches.

Exchange reserves of the Reserve Bank (RBNZ) are immunized by foreign currency debt of NZDMO (Grimes, 2001). In order to maintain a net zero foreign-currency debt position, the proceeds of foreign currency borrowing are used to meet refinancing needs of existing foreign debt and to build up foreign reserves. This sets a good example of a natural hedging practice which eliminates the currency risk exposure of the balance sheet. With respect to local currency debt, the NZDMO has the goal of lowering the cost subject to risk considerations.

Besides the natural hedging techniques, the NZDMO makes use of derivative instruments such as currency swaps, interest rate swaps, and futures contracts as well. Market risk exposure is measured by the VaR approach and the limit is expressed over daily, monthly and annual time horizons at 95% confidence level and reflects the risk tolerance of the government in respect of NZDMO's activities (New Zealand Treasury, 2013). In order to minimise exposure to market risk, the NZDMO holds derivative transactions and matches characteristics of its assets to those of its liabilities. Against to credit risk exposure sources mainly from derivative contracts, the NZDMO sets credit exposure limits and counterparty collateral obligations.

The government balance sheet is also used for calculating some useful financial indicators such as "Net Debt" and "Net Worth" in New Zealand.

¹⁰Concerns about the poor quality of the data on the assets, the legitimacy of the assumption used that cash flows or benefit streams were insensitive to interest-rate changes, insufficient information on the extent to which the assets were nominal or real in nature (Wheeler, 1996).

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Increases in these indicators imply a worsening of the net liabilities of government. The “Net Debt” metric is calculated by deducting government cash and other similar liquid assets from the government debt stock. “Net worth”¹¹ is defined as the difference between the value of certain assets and the liabilities on the balance sheet. Figure 4 presents financial position of the New Zealand government for 2012 and 2013. Major assets on the balance sheet include non-financial items such as property, plants and equipment and financial assets including cash reserves, securities and derivatives in gain. On the liability side, borrowings stand as the largest item. Other liabilities are related to offset government future obligations, largely comprise of earthquake related insurance liabilities and retirement plan liabilities for the Government Superannuation Fund.

¹¹ Bradbury et al. (1999) discuss different concepts of net worth and state eligibility criteria of asset and liability items to be considered in net worth calculation. They compare “comprehensive net worth” (CNW) and “reported net worth” measures for their effectiveness as policy targets and argue that CNW is a more satisfactory indicator since it is a forward looking measure which takes into account future cash flows under current policy settings.

FIGURE 4: STATEMENT OF FINANCIAL POSITION OF GOVERNMENT OF NEW ZEALAND

(Millions of Dollars)	30-Jun-12	30-Jun-13
Assets		
Cash and cash equivalents	10,686	14,924
Receivables	20,956	19,883
Securities, deposits and derivatives in gain	48,385	44,000
Share investments	14,385	17,359
Advances	21,766	22,613
Inventory	1,234	1,140
Other assets	2,134	2,295
Property, plant & equipment	108,584	109,833
Equity accounted investments	9,483	9,593
Intangible assets and goodwill	2,705	2,776
Total assets	240,318	244,416
Liabilities		
Issued currency	4,457	4,691
Payables	11,604	11,160
Deferred revenue	1,712	1,714
Borrowings	100,534	100,087
Insurance liabilities	41,186	37,712
Retirement plan liabilities	13,539	11,903
Provisions	7,506	7,138
Total liabilities	180,538	174,405
Total net worth	59,780	70,011
Debt Indicators:		
Net debt	50,671	55,835
Gross Debt	79,635	77,984

Source: The Financial Statements of the Government of New Zealand, 30 September 2013

Compared to 2012, total net worth figure indicates a significant increase in 2013 largely attributable to rise in cash and share investments. In the same period, the net debt figure increased by \$5.2 billion, and amounted

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to 26.3 percent of GDP as of June 2013. As a long term objective, government's strategy is to lower net debt level below 20 per cent of GDP by 2020 in order to rebuild the balance sheet buffer against future risks and adverse events (Fiscal Strategy Report of 2013).

3.2. Government Debt Management at the Nationalbank of Denmark

In Denmark, the Ministry of Finance (MoF) and the Nationalbank of Denmark are together responsible for the management of the government debt. While the overall strategy for the government's borrowing and debt management is determined at quarterly meetings between the MoF and the Nationalbank, management operations are carried out by the Government Debt Management at the Nationalbank on behalf of the MoF. In addition, Debt Management administers re-lending and government guarantees and the assets of the three government funds: the Social Pension Fund, the Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention. Government debt management controls the financial risk of financial assets and liabilities of the government (Denmark's Nationalbank, 2008). While domestic and foreign debts form the liability side, three government funds central government's account and re-lending comprise the asset side.

Over time, the composition of the portfolio has changed in favour of assets, and the net debt has decreased. Hence, debt management in Denmark has been operating in a low debt environment for the last two decades. As of the end of 2012, nominal value of government funds reached to DKK 110.3 billion, and 64 per cent of the total value invested in government bonds. On

the other hand, the gross debt amounted to 45 percent of GDP while net debt was only 4 percent of GDP¹² (Denmark's Nationalbank, 2012). In the light of a falling borrowing requirement environment, debt managers have continued to issue bonds to avoid a re-entry cost¹³ to financial markets and to support the market-making role of government securities. In this regard, Denmark is an example of a changing role of government debt management over time.

During the global financial crisis, the Danish government introduced two rescue packages for banks and mortgage credit institutions totalling up to DKK 135 billion. The packages were financed through a central government's account rather than via an increased amount of government bond issuances (Denmark's Nationalbank, 2012). Accumulation of financial assets during the pre-crisis period helped the government to finance crisis related expenses. In the same vein, Denmark avoids issuing extra securities and putting market liquidity under pressure during stress periods.

The interest-rate risk of the government debt is managed on a consolidated basis. As most of the assets of the government funds consist of government bonds, they are a natural perfect hedge against the liabilities. Each year a duration target of the consolidated portfolio is decided based on a CaR model. While the issuance strategy is focused on 10-year domestic government bonds, the target for interest rate risk management is to

¹²The Social Pension Fund can invest in listed domestic bonds, but the majority of its assets must be invested in government bonds. The Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention funds may only invest in government bonds (Denmark's Nationalbank, 2012).

¹³Re-entry cost occurs when DMOs re-start issuing government securities in financial markets after stopping issuances for a while due to disappearance of funding needs or adverse market conditions.

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maintain long duration (an average duration of 10 years in 2013). The duration of the portfolio is managed via interest-rate swaps.

The exchange rate risk on government debt and foreign reserves has been managed jointly since 1992. Since the debt managers only issue domestic debt, the Denmark's Nationalbank enters currency swaps for foreign reserve management. It should be noted that, since Denmark has well-developed financial markets and access to international financial markets, interest rates swaps and currency swaps can be easily applied and incorporated into debt management strategies. The Nationalbank of Denmark also hedges exchange rate risk on military procurements, which are in US dollars via forward contracts in dollars.

A significant element in the assessment of the central government's overall refinancing risk is its portfolio of short-term assets. In order to mitigate the refinancing risk, a level of cash reserves sufficient to service one year of debt repayments is maintained. This strategy can be considered as a natural hedge against balance sheet exposure to refinancing risk.

The Government Debt Management at the Nationalbank formulates the general guidelines for borrowing by the government-owned companies that have access to government guarantees and re-lending facilities. The general guidelines set principles for activities ensuring that they do not take on risks that the central government normally would avoid. Against this backdrop, Government Debt Management at the Nationalbank holds annual meetings with those companies.

3.3. Undersecretariat of Turkish Treasury

The Turkish economy suffered from a debt sustainability problem for many years in the past¹⁴. The heavy debt burden had been the source of some economic crises while being the result of some others. Following the financial crisis in 2001 public fiscal management has gone through a remarkable change with extensive reforms for Treasury management carried out in 2002. Enactment of the Law No. 4749 on Regulating Public Finance and Debt Management in 2002 was an important step in that creates sound foundations for more efficient asset and liability management. Centralization of the management of the main financial assets and liabilities together with the public debt stock within the Treasury played as a catalyst factor creating further incentives to adopt the ALM approach in public debt management. Also, the “Risk Management Unit –Mid Office–” and a “Debt and Risk Management Committee” were created within the Treasury. The committee serves as a high level decision making platform that sets and monitors strategic benchmarks. Also, the regular and ad-hoc meetings of the committee help to enhance coordination and communication among its members. The Mid-office comprises of the departments of market risk management, credit risk management and budget monitoring and analysis. This unit has broad functions in terms of fiscal risk management together with preparing Medium Term Debt Strategies (Undersecretariat of Turkish Treasury, 2010).

¹⁴ The Turkish economy in the 1990s can be characterized by structural problems including chronically high inflation, high public sector deficits, and a fragile banking sector along with unsteady growth rates. As of 2002, the government debt was 74 percent of GDP (net debt level of 66.4 per cent). Following the crisis, the government adopted tight fiscal and monetary policies. A significant reduction in gross and net debt level is achieved due to fiscal surpluses and privatization revenues over a number of years. The debt to GDP ratio decreased to 39 per cent of GDP (net debt level of 17 per cent) in 2012.

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Today, SALM has become an important approach to decision-making in public debt and risk management at the Treasury. Main financial items on the balance sheet including the Treasury cash reserve, undertaken guarantees and collections from these guarantees, on-lent credits, collections from the Treasury receivables¹⁵ and the risk account¹⁶ are used as inputs for debt and risk management. Both amount and composition of those items play an important role in designing medium-term benchmark policies. Therefore, it has a wide range of implications, which can be summarized as follows:

- The mid-office built a simulation model based on CaR methodology to develop strategic benchmarks for borrowing. Treasury's debt simulation model presents cost and risk indicators for each debt funding strategy, as well as maturity and composition profiles for different borrowing amount scenarios. Also, the model enables debt managers to test impact of different financing requirement amounts which vary based on different primary surplus and privatization revenue targets, Treasury receivables and undertaken guarantees projections and liquidity buffer target on cost and risk indicators. With this information set, the Debt and Risk Management Committee better appraises the different plans of action for specific scenarios.

¹⁵ The Treasury manages the stock of both projected and unpaid Treasury receivables arising from the on-lent loans, undertaken amounts of the Treasury guarantees and on-lent non-cash domestic debt securities. Collections from the Treasury receivables are the principal, interest and expense payments made by several counterparties including local governments, SOEs, public banks and investment and development banks.

¹⁶ In order to cover expected loss of the Treasury guarantees, the Risk Account was established in 2003 at the Central Bank of the Republic of Turkey. The revenues of the account consist of guarantee/on-lent fees, interest income and repayments by beneficiary institutions related to undertaken loans.

- The Treasury has adopted strategic benchmarks to reduce the weight of floating interest-rate securities and to increase the share of fixed-rate and inflation-linked securities. Moreover, given the limited amount of FX denominated assets on the balance sheet, reducing the share of FX denominated debt has been the main priority to minimize exchange rate risk in the context of strategic benchmarks. One of the implications of this strategy is that the Treasury has no longer issued FX denominated or linked debt in domestic markets since 2008, and that domestic debt is entirely composed of local currency securities since 2010. As a result, the share of FX denominated net debt declined to 0.6 per cent of GDP in 2011 from its peak of 35.4 per cent reached in 2002 (Undersecretariat of Turkish Treasury, 2013).

- A liquidity buffer policy has been implemented to act as a cushion against short term demand side volatility since the year 2004. The amount and composition of the buffer are determined so as to reflect those of the debt service and the primary surplus.

- The Treasury applied “Public Net Debt Stock” and “Net External Debt Stock of Turkey” definitions so as to provide a better understanding of indebtedness.

- Medium-term and long-term debt sustainability analysis is held and reported on monthly basis. Moving from conventional sustainability analysis to risk based analysis¹⁷; fiscal impact of economic decisions (such as enacted and draft regulations on tax regime) is also estimated via stress testing and scenarios analysis on an ad-hoc basis.

¹⁷ The conventional DSA examines debt level projections under different macroeconomic scenarios; while the risk-based DSA takes a broader approach in which several indicators such as level of cash reserves, non-residents share and maturity profile of the portfolio are also considered.

Occasionally, the Treasury implements buy-back operations in the domestic market in order to lengthen the maturity profile of the public debt. It should be noted that the Turkish Treasury has not been involved in derivative instruments to change its debt profile. However, during the period 2011-2012, the Treasury has made a number of arrangements in its legal and technical infrastructure to meet the requirements for such operations. Also, the capacity of the Risk Management Unit has increased through training courses and interactions with IFIs. Recently being upgraded to investment grade levels by credit rating agencies, the Treasury may consider issuing derivative instruments in the future.

4. Implications for Developing Countries

4.1. Importance of the ALM Approach for Developing Countries

Besides the benefits discussed in the Section 2, developing countries may find extra incentives to adopt SALM framework for various reasons. First of all, the adverse implications of mismatches on the sovereign balance sheet are arguably more severe in developing countries due to weaker fundamentals. Empirical studies suggest that developing economies are generally more prone to external shocks than developed countries due to their weak economic fundamentals and weak institutions. Indeed, one of the important factors behind the crises in developing countries including Mexico, Turkey and Brazil in 1990s was government balance sheet vulnerabilities. These factors highlight the need to identify and address the risks on government balance sheets in developing countries. Currie and Velandia (2002) argue that the more vulnerable the sovereign is to shocks and the weaker its risk-management capacity, the more stringent central government

guidelines and monitoring should be. The level of technical capacity and risk awareness in the government institutions necessitates a more centralized financial risk management of the sovereign balance sheet.

A number of developing economies have rich natural resources. In those countries, formulating a medium and long term fiscal framework is a very sensitive issue due to the depleting nature of resources. Empirical studies (Hausmann and Rigobon, 2003) revealed that when revenues from natural resources are treated as a regular part of the budget, this has adverse impacts on macroeconomic conditions and reduces the incentives for necessary structural reforms. In periods of high commodity prices increased revenues tempt governments to spend more. Furthermore, when prices fall, this may lead to an excessive borrowing for financing large expenses. In order to avoid this phenomenon which is called “natural-resource curse”, many developed countries established good governance principles and strong public institutions for managing their sovereign wealth effectively. Following developed country experiences, some developing countries including Azerbaijan (1999) and Timor-Leste (2005) have also established sovereign wealth funds¹⁸ (SWFs) to collect revenues from natural sources to sustain fiscal policies in the long run. From a SALM perspective, governance policy and investment strategy of a SWF can play an important role to reduce overall balance sheet risks (Blommestein and Koc, 2008). Long term investment strategy of a SWF should be set up in a way to consider main characteristics of sovereign liabilities and other assets. For instance, if a SWF

¹⁸ With respect to revenue sources, SWFs fall into three categories as natural resource-based funds, foreign exchange-based funds and fiscal funds. Natural resource-based or commodity funds are financed via commodity export revenues (in case of natural resources owned by the government) or via taxation and their purposes include stabilization of fiscal revenues, inter-generational savings, and sterilization of international inflows.

in an oil-rich country invests in securities that are inversely correlated with oil prices, this strategy would mitigate the impact of oil price volatilities on the net worth of the balance sheet.

Usually, there is a differential between interests paid on sovereign debt and interest received on sovereign financial assets. This creates incentives for countries with unfavourable debt dynamics to pay off some of the debts with those financial assets to eliminate debt related vulnerabilities on the balance sheet. For example, Russia used a Stabilization Fund to make early debt payments to the IMF and the Paris Club in 2005. Also, Leigh and Olters (2006) suggest that oil rich countries with high debt burden should follow this kind of risk averse of policy.

In highly indebted countries, interest payments on the debt stock make up a large share in budget expenses. Therefore, if significant shocks to the economy can be identified, budget smoothing is possible by pursuing a specific debt structure. For instance, inflation linked bonds can be used to stabilize the overall budget if an economy is exposed to demand side shocks by exploiting the positive correlation between inflation and the primary balance.

4.2. Difficulties of the ALM Approach for Developing Countries

As discussed in Section 2, the key challenges of implementing the SALM approach are related to data availability, technical capacity and centralization of the risk management. Some of these difficulties are particularly important with regards to developing countries and complicate widespread adoption of this approach in developing countries.

Recording and reporting of government's assets and liabilities are in early stages of development in many emerging countries. Indeed, homogenous, timely and consistent dataset for all of the government's assets and liabilities is available in only a few developing countries (e.g. South Africa and Brazil). In most cases, there is a lack of specialist staff and strong technical capacity for executing risk-based analyses in government agencies of developing countries. Furthermore, due to limited resources available and weak institutions, they may not be able to cope with these obstacles in a short period of time. However, as it was previously noted, most of these challenges are encountered in implementing a model-based balance sheet approach which requires the valuation and technical analysis of assets and liabilities.

Degree of financial market development could be another source of constraint in developing countries mainly due to low level of domestic savings in these economies. Local financial markets are often not deep and developed enough for issuing long term fixed bonds and using derivatives. Furthermore, using derivative instruments entails specific legal and IT system arrangements which do not exist in many developing countries. DMOs of those countries may find it difficult to employ such instruments to achieve a preferred and optimal portfolio.

When responsibility for managing the central government's debt and its financial assets is spread across several government agencies, implementing the SALM approach becomes more complex. In some of the developing countries, management of external debt, domestic debt and cash management are assigned to different government agencies. This fragmented structure in debt management may cause inefficiencies not only in strategy

formulation and implementation process of risk management, but also in coordination with fiscal and monetary authorities.

4.3. Lessons Learned from Other Countries' Experiences

One can argue that developing countries can enhance their debt management framework by learning lessons from other countries' experiences so that they do not need to follow the same phases to set up an effective model. Based on the country experiences examined in this paper, suggestions for developing countries in implementing of the SALM approach will be elaborated in the following sub-sections.

4.3.1. Institutional Arrangements

The SALM approach requires the debt management office or another government agency to consider and assess financial features of assets and liabilities. Also, adoption of this approach in debt management simply implies incorporating financial characteristics of assets and other liabilities into the government debt management strategies. Therefore, successful implementation of the SALM approach has implications on institutional arrangements.

As much of the central government's risk management expertise lies with the debt managers who often act as the capital market advisor for the government, DMOs are considered well-placed in assessing and managing the risk profile of the overall sovereign balance sheet. In some countries such as New Zealand, Canada and South Africa, the DMOs are being organized so that they can focus more on the government's balance sheet risk. In South Africa, the Asset and Liability Management Division is a unit within the

National Treasury. The unit is primarily responsible for managing government's funding programme in a manner that ensures prudent cash management and an optimal portfolio of debt. It also promotes and enforces prudent financial management of SOEs through financial analysis and oversight.

Establishing a formal "Asset Liability Management Office/Division" can be a challenging task for governments, since it involves making legal arrangements and overcoming strong resistance to organizational changes. Alternatively, the role of the DMO can be extended to cover key financial assets, taking advantage of the expertise that debt management offices have in financial portfolio management. Already, DMOs in some of developing countries (e.g. South Africa, Turkey and Colombia) play an important role in managing cash reserves and other financial assets.

Although there is no straight forward answer with regards to the "best institutional arrangement" for an efficient management of SALM, mainly due different governance cultures across the countries, country experiences favour an ALM unit responsible for strategic decisions and coordination across government agencies. Hence, a specialized unit would serve to create a consistent risk management framework and take advantage of economies of scale. However, such an arrangement does not need to be structured from the start. Refinements to the institutional framework can be done in successive phases.

Finally, in order to adopt the SALM approach successfully, developing countries need to strengthen their institutional capacity in debt management. Countries are using various measures to address staff and

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information technology systems capacity. Providing training program opportunities and organizing study visits for the staff are some of the ways of building technical capacity of debt management. It should be noted that IFIs play a crucial role in accumulating and disseminating lessons learned from country experiences, including the developing countries themselves. In this framework, developing countries can benefit from technical assistance programs provided by international institutions including the WB, the IMF, UNCTAD, COMSEC and OECD through advisory programs, shared resources, conferences, workshops and other outreach events. As the technical capacity of a DMO develops, the level of analysis can grow when/if needed over time.

4.3.2. A Gradual Approach to the implementation of SALM

Since, there are a host of practical obstacles in implementing a model-based balance sheet approach in those economies due to weak technical and institutional capacity, developing countries can benefit from a stepwise approach to the implementing of SALM. Hence, the IMF (2011) underlines that for developing countries the SALM framework can be modified to accommodate data limitations and lack of strong analytical capacity.

The adoption of SALM in developed countries start with the construction of a comprehensive sovereign balance sheet. There are certain standards such as IMF's Government Financial Statistics, UN and/or IPSAS, ESA'95 which guide governments to produce balance sheets based on comparable reports. In Australia, where SALM is evolving, it started by the consolidation of a full sovereign balance sheet. Then, potential benefits and analytical methods have been elaborated upon further. It can be argued that this is a logical order of necessary steps. However, one of the main challenges

related to a model-based SALM is collecting a homogenous, timely and consistent dataset for all items in the balance sheet, which is a key problem for many developing countries. The SALM framework can be adjusted to the circumstances and be applied without having a full set of data for all asset and liabilities. In an early stage, SALM can be pursued to the extent that data and technical capacity requirements are met. Debt managers of developing countries can benefit from employing the SALM framework based on a conceptual balance sheet which provides significant information about major characteristics of assets and liabilities, and thus enables to detect major mismatches.

Wheeler (2004) suggests that borrowing policies should be set up by considering the risk characteristics of a government's main asset and liability portfolios with a view to helping to reduce the government's overall risk. In practice, nature of the cash flows generated by the government's assets can be examined without actually measuring their values. This exercise enables debt managers to gain valuable insights into sensitivity of the cash flows to economic shocks.

Initially, priority balance sheet areas should be identified and assessed in a conceptual balance sheet framework, both from a vulnerability and management perspective. In a second stage, simplified risk analysis can be applied to elaborate mismatches and determine appropriate hedging options. Finally, in order to address communication and governance challenges among government institutions, establishing new structures, i.e. certain departments and coordinating committees are recommended.

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A key issue in relation to adopting ALM to sovereigns is the scope of the government balance sheet. The SALM in its broadest sense means that risk management comprises sovereign financial and non-financial assets and liabilities (see Figure 1). As country experiences suggest (e.g. Denmark, Turkey and South Africa) a good starting point in this regard would be considering financial assets such as cash reserves or wealth funds for which DMOs are responsible as well as future assets and liabilities.

Where debt managers are also responsible for the management of sovereign assets, those assets are predominantly, but not exclusively, short-term cash surpluses or deposits, a reflection of the cash management function that several debt managers also perform. Even though model-based ALM analysis cannot be applied, financial assets are taken into account when they fall under the responsibility of the DMO. In most countries, the scope of debt management covers the specific asset management activities or some advisory roles in that they are often regarded as the capital market advisor for the entire government. Frequently, management of government cash balances is assigned to DMOs. Furthermore, in some cases, DMOs manage special purpose funds including pension reserve funds (e.g. Ireland, Denmark).

As discussed in Section 2, the largest asset class in a government balance sheet is the fiscal revenues. Therefore, financial features of the fiscal revenues should be taken into account in a SALM framework. Given the nature of flows of the tax collections, it can be expected that they are incurred in primarily local currencies over a long period of time (Wheeler, 2004). In order to match with the features of the largest asset class in the

balance sheet, government debt portfolio should also be composed of local currency denominated long duration debt.

Considering the operational toolkit of SALM, it can be stated that sophisticated risk management techniques are the standard available. However, these sophisticated models are not indispensable as many countries use simplified risk analyses. In most cases, DMOs in developing countries face technical capacity challenges. Therefore, following a step wise approach is advisable in a sense that simple analyses should be preferred over complicated ones by comparing marginal benefits. This initial framework provides the basis for identifying significant financial vulnerabilities, by providing a basic analytical starting point.

Country experiences examined in Section 3 suggest that, simple metrics can be used for a more accurate valuation of indebtedness. Already by many DMOs of developed and developing countries, net debt¹⁹ –entailing the deduction of cash like liquid assets from gross debt– is included among leading debt indicators (e.g. New Zealand, Canada, Japan, Turkey). International institutions including IMF, WB and OECD also use this definition for providing accurate comparison of countries' indebtedness.

Development of domestic financial markets in many developing countries is not adequate to use active hedging instruments to achieve a preferred and optimal portfolio. However, implementation of natural hedging methods is quite simple and does not require day-to-day operations. In this regard, simple strategies can be used to mitigate currency risk

¹⁹ It should be noted that there are different net debt stock calculations based on different definitions such as central government or public sector definitions.

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exposure of the balance sheet. The available country experiences demonstrate that accumulating the same amount of foreign currency assets as foreign currency debt in form of international reserves proved to be very effective in addressing balance sheet vulnerabilities. Also, when a developing country has to borrow in foreign currency, it may be useful to borrow in currency that has strong correlation with the local currency (Wheeler, 2004). Nevertheless, as local market conditions improve, debt managers should favour borrowing in local currency denominated debt.

Another example of natural hedging strategies is related to refinancing risk. Many DMOs adopt liquidity buffer policy in order to create room for manoeuvre in case of liquidity strain in the local markets. A liquidity buffer can be defined as the level of cash or other highly liquid assets readily available to cover financing needs (i.e. cash deficits or debt service obligations) for certain periods (e.g. for 30 days). In this respect, liquidity buffer has become a widespread practice amongst OECD countries, especially in the wake of the global crisis, as a useful tool in providing flexibility to debt and cash managers and relieving the effects of the stress periods.

Credit risks source from derivative agreements and Treasury guarantees can be another area of centralised risk management. Some DMOs (e.g. Denmark and South Africa) provide financial risk management guidance to government owned companies. In those practices, DMOs set general principles on the financial activities of those companies. Currie and Velandia (2002) underlines that policy guidelines regarding contingent liability management can be useful to promote good governance and the sovereign's risk tolerance. Also, introducing a standard contract for PPPs would be an effective way to mitigate credit risk exposure of the sovereign balance sheet

(e.g. U.K., New Zealand, South Africa and Canada). Recently, the use of PPPs in financing big infrastructure assets such as highways and bridges has become more common by the developing countries, since it offers the government an approach for alleviating fiscal constraints. In a PPP model, risk allocation between private and public sector agencies is set in a contract which is generally considered as a complex legal document which defines the project's service obligations and pricing structure. From the SALM perspective, underlying risks sources from PPP projects should be carefully assessed through a centralized risk management.

5. Conclusions

The ALM framework has proven to be useful to identify and manage the risks of the sovereign balance sheet. Comprising large and complex sub-portfolio items, the management of sovereign balance sheets can have enormous effects in both the financial and real sectors of an economy. Therefore, capturing potential risks and opportunities on balance sheet would contribute to any country's sovereign wealth. Particularly, SALM analysis offers valuable insights on how the budgetary impact of debt servicing volatility might be reduced. The literature on SALM suggests that a comprehensive risk management approach would be useful to capture overall vulnerabilities and prospects of a sovereign balance sheet. In practice, however, implementation of SALM by DMOs can be a complicated issue due to various operational and governance difficulties, including compilation of financial statistics and risk analyses of sovereign balance sheet.

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The magnitude of challenges in adopting a model-based SALM framework increases in developing countries, given their weaker fundamentals, scarcer resources and data. In particular, institutional capacity and data problems may significantly complicate SALM implementation. On the other hand, and considering that developing countries are more vulnerable to macroeconomic shocks (because of high level of debt, political instability, lack of strong institutions), and a weaker financial management capacity in government institutions, it can be argued that their balance sheets need a more careful attention. Centralization and integration of financial risk management of sovereign balance sheet in DMOs can offer significant benefits to those economies so as to achieve their medium and long term targets.

An in-depth examination of selected country practices of SALM revealed that there are various degrees of complexity. Countries which newly consider SALM do not necessarily start with the most complicated ones. In this regard, this paper suggests a stepwise approach to adopting a SALM framework in developing countries. First of all, in terms of the scope of the balance sheet priority areas should be selected considering available data and governance challenges. A practical starting point for a limited scope SALM can be the management of liquid financial assets (e.g. cash reserves and state funds) that fall under DMO responsibility. Since major characteristics of fiscal revenues and expenditures are also known, this information can also be incorporated in borrowing policies.

Against this backdrop, this paper argues that debt managers can greatly benefit from adopting the SALM framework based on a conceptual balance sheet which provides significant information about major

characteristics of assets and liabilities, and enables policy makers to detect major mismatches. As discussed, taking available information about current and future financial assets and liabilities would lead to important changes in the debt management strategies.

At the initial stage, simple analyses should be preferred over an overly complex one. Financial assets like cash reserves can be incorporated into the analytical tools of debt management. If or when DMOs have decided to adopt a modelling approach such as CaR methodology, the model can be expanded so as to assess the impact of various strategies –entailing different instrument sets– on the balance sheet. Also, debt sustainability analysis can be enhanced so as to entail contingent liability shock scenarios. Moreover, a net debt stock can be calculated to evaluate the sovereign net financial value.

The same perspective of preferring simple over complex alternatives should be applied to choose appropriate and accurate risk mitigation techniques. In this respect, passive hedging options are considered more suitable for developing countries. In this category, issuing inflation indexed bonds against budget risk, creating natural hedges for currency risk, and establishing liquidity buffers for re-financing risk, would be relatively easily applicable and effective risk management policies that DMOs can adopt. Such actions could be particularly beneficial to developing countries seeking to minimize financial risks on the balance sheet. On the other hand, active hedging instruments such as interest and currency swaps would be complicated both from operational and technical perspectives. Moreover, if technical capacity in a DMO is not well developed, using these instruments may introduce an additional risk factor.

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Finally, given the scarcity of studies in SALM practices in developing countries, further work is necessary. This would provide valuable insights to analysts and policy makers. Especially, modelling studies on how to incorporate liquid financial assets into debt management strategies would be a valuable contribution to practitioners of SALM.

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