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Commodity-based Sovereign Wealth Funds: Managing Financial Flows in the Context of the Sovereign Balance Sheet

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IMF Working Paper
Commodity-based Sovereign Wealth Funds:
Managing Financial Flows in the Context of the Sovereign Balance Sheet

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Abstract

Commodity-based sovereign wealth funds (SWFs) have been at a crossroads following the recent fall in commodity prices. This paper provides a framework for commodity-based SWF management, focusing on stabilization and savings funds, by (i) examining macro-fiscal linkages for SWFs; (ii) presenting an integrated sovereign asset and liability management (SALM) approach to SWF management; and (iii) applying this framework to a scenario where assets are being accumulated and to a scenario where the SWF is drawn on to cover a financing gap due to lower commodity prices.

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I. INTRODUCTION

Commodity-based SWFs have experienced various strains since the pronounced fall in commodity prices over the past few years.² Especially for countries where fiscal revenues are primarily dependent on certain commodity-export proceeds, the ongoing commodity price downturn has led their respective SWFs to become the last resort in financing part of their fiscal gaps. Compounding these challenges, returns on invested assets are expected to be lower than historical averages for quite some time. Thus, current challenges for resource-based SWFs revolve primarily around maintaining their funding bases, and improving their investment activities in the prevailing environment of subdued growth and low interest rates. Other related challenges, involving SWF organizational and institutional structures, investment and risk management mandates as long-term investors, and transparency and accountability requirements as global investors, have also played a pivotal role in SWFs' well-functioning and integration in the global financial system.

SWFs are established with specific policy objectives, which largely determine their financial management, including investment and risk management decisions (Al-Hassan et al. 2013). According to the Santiago Principles (IWG 2008), SWFs are categorized as: (i) stabilization funds, set up to insulate the budget and economy from commodity price volatility and external shocks. Their investment horizons and liquidity objectives resemble central banks' reserve managers, in view of their role in countercyclical fiscal policies to smooth boom/bust cycles; (ii) savings funds, set up to share wealth across generations by transforming non-renewable assets into diversified financial assets. Their investment mandates typically reflect a higher tolerance for volatility and a focus on long-term returns; (iii) development funds, set up to allocate resources to priority socioeconomic projects, usually infrastructure; (iv) pension reserve funds, set up to meet identified outflows in the future with respect to pension-related contingent-type liabilities on the government's balance sheet. They usually hold high shares in equities; and (v) reserve investment corporations, set up to reduce the negative carry costs of holding reserves or to earn higher return on ample reserves, while the assets in the funds are still counted as reserves. They often maintain high allocations in equities and alternative investments. The discussion in this paper focuses on stabilization and savings funds.

The management of SWF assets has implications for the owner country's macroeconomic and financial policies. For example, the stance of fiscal policy will be to some extent affected by changes in SWF inflow and outflow rules. While a well-designed SWF can help support the successful implementation of fiscal policy, it cannot serve as a substitute for a fiscal policy framework. In this connection, having an SWF does not in itself guarantee a sound and efficient fiscal policy framework. Further, optimal SWF management is closely linked to the broader issue of sovereign assets and liabilities management (SALM). In a period of low

² The International Working Group of SWFs defined them as: “*Special purpose investment funds or arrangements that are owned by the general government. Created by general government for macroeconomic purpose, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies that include investing in foreign financial assets.*”

commodity prices, SWFs are faced with critical decisions on asset accumulation/liquidation in the presence of sovereign debt and fiscal deficits.

This paper sets out a simple framework of commodity-based SWF management, by analyzing asset accumulation and liquidation decisions in the broader context of the owner's sovereign balance sheet. In particular, it (i) examines some relevant macro-fiscal linkages for SWFs, (ii) presents an integrated SALM approach to SWF management, and (iii) applies this framework to scenarios where assets are accumulated in an SWF and where the SWF is drawn on to cover a financing gap due to lower commodity prices. At times of persistent movements in commodity prices, there may be a need to align the management of the SWF to the fiscal framework through inflow and outflow rules for financing needs to be met. In this context, resilience of the sovereign balance sheet will be maximized if the management of sovereign assets and liabilities will be integrated and the liquidity risk on both the asset and liquidity sides of the sovereign balance sheet will be appropriately assessed.

The remaining of the paper is organized as follows: Section II discusses some important macroeconomic and financial linkages of SWF management. Section III sets out a general SALM framework, with particular emphasis on management of liquidity risk at the sovereign balance sheet level and its relevance to SWF strategy. Section IV presents an application of such a framework in the context of a growing SWF, while Section V addresses asset and debt management when lower commodity prices lead to a financing gap. Section VI provides some concluding remarks and policy considerations.

II. MACROECONOMIC AND FINANCIAL LINKAGES

Any fiscal framework ought to be guided by an assessment of fiscal sustainability and take appropriate account of external risk factors. Typically, a fiscal policy framework reflects country-specific factors that may change over time; promotes the sustainability of fiscal policy; is sufficiently flexible to enable scaling up growth-enhancing expenditure; considers absorption capacity constraints and the quality of public financial management systems; and provides adequate precautionary buffers to counter vulnerabilities to high volatility and uncertainty of resource revenue (see Baunsgaard et al., 2012). As a result, countries have adopted different inflow/outflow rules for their SWFs that are tailor made to reflect the appropriate fiscal policy strategies of each individual country (Appendix II).³ For example:

- **Chile:** The country has a structural balance rule. To meet this rule, the authorities forecast the structural revenue where copper revenue is estimated using a long-term (10-year average), forward-looking reference price from an independent panel of experts; and other revenue is based on potential output that is estimated by a panel of experts. The expenditure is the residual, after subtracting the structural balance target from the estimated structural revenue.

³ Others do not have formal rules (e.g., Qatar, Saudi Arabia, and UAE).

- **Norway:** According to the so-called “spending rule” (first established in 2001), the non-oil budget deficit should be on average 3 percent of the Norwegian SWF over time, which corresponds to the estimated real return on the fund.⁴
- **Russia:** A special mechanism was developed for the use of oil and gas revenues within the federal budget with a view to reducing the budget’s dependence on oil and gas revenues, as well as to accumulating reserves in the event when oil prices retreat. These revenues are accumulated in the Reserve and the National Wealth Funds. After the 2009 crisis and until January 2015, the mechanism for oil and gas revenues was suspended and funds were used directly to finance the budget deficit.
- **Timor-Leste:** The Petroleum Fund’s only expenditure is a transfer to the budget, payment of operational management fees, and refunds of overpaid taxation. The mechanism for integrating the Petroleum Fund and the budget is the estimated sustainable income, calculated as 3 percent of total petroleum wealth (estimated as the sum of the value of the Petroleum Fund and remaining oil resources). The transfer to the budget requires an explicit decision of Parliament.

In addition, the appropriate rules for inflows and outflows should be seen in the context of necessary general improvements to the fiscal framework. The framework needs to explicitly take into account off-budget spending and government-guaranteed debt. Ideally, a fiscal framework would target a sustainable longer-term trajectory for the non-commodity budget deficit. Changes in this deficit is an important indicator of the fiscal stance, so a commitment to a smooth and sustainable trajectory for it would imply significantly reduced risk of pro-cyclical and unsustainable fiscal policy in the future. In such a setup, the inflow and outflow rules for an SWF would reflect the accumulation of assets associated with the chosen long-term trajectory of non-resource deficits and act as a buffer for changing commodity revenues.⁵

The inflow and outflow rules for an SWF should be aligned closely with the actual net fiscal position of the government (IMF, 2015). It is critical to establish a firm link between asset accumulation/liquidation in SWFs and changes in actual balances in the form of budget surpluses/deficits.⁶ Such rules would ensure that the accumulation/liquidation of assets in SWFs reflects changes in the actual financial position of the sovereign balance sheet. This approach seems even more urgent for countries with an increasing stock of debt and a high cost of servicing it. While building up a portfolio of liquid assets provides some benefits in

⁴ This is similar to U.S. endowment funds that often have spending rules based loosely on 4–5 percent of a 5-year moving average of fund value. The Norwegian government recently changed the rule by lowering the non-oil budget deficit from 4 to 3 percent of the fund, reflecting lower expected returns.

⁵ So rather than targeting a specific size of the SWF or a specific share of commodity revenues to flow to the fund and treating the resulting room for fiscal spending as a residual, one would target the long-term trajectory for spending of commodity revenues through the financing of the non-resource deficit, and let accumulation in the SWF follow from that.

⁶ Appendix I provides an overview of SWF asset accumulation and revenue projection models.

the form of lower risk of financing constraints in tight global liquidity conditions, the opportunity cost of holding such assets is high in the current financial environment.

When a fund is set up to manage revenue from exports of natural resources, it is essential that its assets be largely invested abroad for the fund to meet its stated objectives. Investing the fund's assets domestically will have a procyclical bias and not be compatible with the stabilization objective of the fund. Upward swings in commodity prices tend to result in a boom in aggregate domestic demand, inflationary pressures, and thus an appreciation of the real exchange rate vis-à-vis trading partners in resource-based economies. Investing the fund outside the domestic economy would help mitigate that risk. For a resource-based fund, investing assets in the domestic economy implies that more money will be flowing into domestic assets when resource revenues are high, pushing up asset prices. Conversely, assets may have to be withdrawn from the fund to support the budget if resource revenues fall. In this case, sale of assets from the fund will contribute to lowering prices of domestic assets exactly at a time when they will already tend to be depressed due to external factors. Further, in the case of fund purchases of domestic government debt instruments, the fund would essentially be functioning as an extension of the fiscal budget and create an unwanted loophole in the fiscal framework.

Even when a fund is invested abroad, there may be unintended elements of procyclicality stemming from the design of fiscal rules. When the fiscal rule is linked to the size of a fund, cyclical swings in asset prices can translate into cyclicity in spending.⁷ For countries with spending rules based fully or partly on estimates of future prices of resources (e.g., Chile, Timor-Leste), projections of future prices may also be influenced by the current price environment, which may introduce an element of procyclicality in spending. In addition to the government-budget linkages, other links between the investment strategies of commodity-based SWFs and the macroeconomic framework of the owner country relate to monetary policy and exchange rate movements (see Brown et al., 2010).

III. SOVEREIGN WEALTH FUND STRATEGY AND SOVEREIGN ASSET AND LIABILITY MANAGEMENT

The SALM approach, as analyzed by Das et al. (2012), represents an analytical framework for asset and liability management policies based on the sovereign balance sheet. The main objective of sovereign liability management is to ensure financing of the budget at the lowest possible cost subject to an acceptable level of risk over the medium to long term. In contrast, the objectives of the sovereign asset management are to ensure that cash balances meet commitments and maximize the purchasing power of any long-term capital given an acceptable level of risk. The SALM approach aims at a holistic approach to these issues, by assessing both sustainability and vulnerability of government finances in the face of potential shocks.

⁷ The Norwegian spending rule is deliberately set as a medium-term guideline for the non-oil budget deficit rather than a strict rule to be followed every year. This avoids a direct link between variable asset prices and government spending.

A sovereign balance sheet should be based on economic rather than fixed accounting principles (Merton, 2007), considering the underlying intertemporal objective of the sovereign and including future income and expenditures (Table 1).⁸ This, of course, does not preclude audits of the SWF balance sheet or assessments of the SWF performance in accordance with recognized international or national standards.

Table 1. Stylized Sovereign Balance Sheet

Assets	Liabilities
Present Value of Incomes:	Present Value of Nondiscretionary Expenses:
Taxes	Social and economic development
Fees	Government administration
Seigniorage	
Balances:	Balances:
Cash	Monetary base
Currency Reserves	Government debt
Investments (pension funds and SWFs)	In domestic currency
	In foreign currency
Government-owned enterprises	Pension Liabilities
Infrastructure	
Real Estate	
Other assets	
	Contingent claims (explicit and implicit)
	Guarantees to banks and nonbanks
	Guarantees on retirement income
	Guarantees on social welfare
	Net worth
	Net financial worth

Source: Merton (2007).

There are, however, challenges in defining the sovereign balance sheet. The first relates to the choice of relevant accounting practices, where the value of assets and liabilities depends much on which accounting measure is used: mark-to-market valuation or historical price. For example, large movement in interest rates and exchange rates will have significant impact on bond valuation and external debt if marked-to-market. The second challenge is to determine the items of assets and liabilities that should be included in the SALM.

A narrow definition of the SALM, used in many developing and emerging market economies, includes coordination between international reserves and foreign currency debt. Broader definitions include all sovereign financial assets and liabilities, with the present value of nonfinancial assets excluded given the difficulty in measuring them. In this paper, the focus will be on financial assets.

⁸ The IMF's Government Finance Statistics Manuals is an accounting approaching for the valuation of government's assets and liabilities.

The accumulation and drawdowns of assets in an SWF and its investment strategy ought to be seen in the broader context of SALM. One aspect thereof for indebted resource-rich countries is striking the right balance between debt repayments and the building up of SWF assets. On the one hand, liquid assets in an SWF can give more flexibility in the implementation of fiscal policies and make it easier to absorb short-term fluctuations in resource revenues within an appropriate long-term framework.⁹ On the other hand, the cost of servicing debt would usually be higher than expected returns on a low-risk portfolio of assets in a fund set up to meet stabilization objectives. Holding liquid reserves in a fund would thus imply an opportunity cost (carry cost) for the government. In addition, while the costs associated with government liabilities are near certain (i.e. based largely upon the issuance-weighted coupon on current debt outstanding), there is a wide range of possible return outcomes for prospective investments over different time horizons.

Reducing the stock of government debt may also reduce the risk premium on government bonds, which all else equal, should help to ease financial conditions and thus support economic growth. Recent research suggests that the net, and not the gross, debt level is the main determinant of the government's financing cost (Hadzi-Vaskov and Ricci (2016) and Bianchi et al. (2016)).¹⁰ The implication is that countries cannot reduce the risk premium by drawing on liquid assets to repay debt, since this deleveraging of the sovereign balance sheet does not change the net asset position of the government. However, in a more dynamic framework, reduced opportunity cost of holding liquid assets could translate into lower spreads over time as the benefits of a more optimal SALM feeds into fiscal balances and thus into the trajectory of net debt.

A Unified Approach to Liquidity Risk Management

In practice, one of the most significant risk factors for the sovereign balance sheet is the risk of sudden shortages of liquidity in international financial markets. While the sovereign balance sheet may be healthy from a solvency perspective, many of the most valuable assets—for instance the net present value of future tax receipts—will be illiquid. At the same time, there may be a significant exposure to adverse international liquidity events on the liability side of the sovereign balance sheet; a foreign high debt burden with short maturity will increase the risk of having to roll over debt in periods of constrained liquidity. A large banking sector dependent on access to external funding may be vulnerable if global liquidity dries up and represent a significant contingent liability for the sovereign balance sheet.

From an asset allocation perspective, risk factors, including liquidity, credit, or the equity premium, can be seen as the building blocks of expected returns. Some risk factors, such as

⁹ The value of this option is obviously higher when the resource sector is a dominant part of the overall economy.

¹⁰ For example, in the case of a commodity-producing country with a SWF, net debt will be lower due to the accumulation of assets. This results in lower bond risk premia and, in turn, lower coupons.

liquidity, may have particularly skewed return distributions.¹¹ Exposure to these factors will generally give investors modest, positive returns in most years, but a few, shorter periods of significant losses—and these losses would often occur just when investors can least tolerate them.¹² The pay-off structure for exposure to such factors is similar to the pay-off investors would receive if they sold insurance against the events that trigger losses connected to exposure to them.

By definition, the average investor must hold the market-weighted average of all available assets in the financial markets. Any investor who holds more than his or her “fair” share of exposure to systematic risk factors would therefore in most years earn higher returns than the average market return. However, s/he will have significant losses compared to the average investor in periods when there is a credit or liquidity event or some other event that triggers a drawdown in value connected to exposure to factors with skewed return distributions.

We can then restate the investment problem in an insurance framework. The issue of choosing whether to take more or less risk than the risk in the market portfolio can be equivalently formulated as a question of whether one would want to buy or sell insurance against, for instance, a credit or liquidity event. Those who are selling insurance would expect higher returns over time, but would have to cope with periods of potentially significant losses. The buyers of insurance would have to live with below-average returns over time, but would be protected against large losses in “bad” years.

This can be a useful starting point for a discussion of the capacity to take liquidity risk on the asset side of the sovereign balance sheet, for instance, in currency reserves, government pension funds, or sovereign wealth funds. It can also be a useful perspective on risk on the liability side of the sovereign balance sheet. For instance, borrowing with long duration may imply a higher expected cost of financing due to positive term premium, but also lower risk of having to roll over debt under tight liquidity conditions. In general, lower liquidity risk comes at a cost of lower expected returns on assets and/or higher costs of servicing liabilities. An optimal level of insurance against this risk requires both an understanding of the nature of this risk and an understanding of the costs of taking out insurance against it (see also Bianchi et al., 2016). In general, the liabilities of the sovereign balance sheet will be more exposed to liquidity risk in circumstances such as:

- The government debt/GDP ratio is high
- The share of illiquid assets to total assets is high
- The average maturity of government debt is low and/or the investor base is concentrated
- The government cannot borrow in its own currency and/or cannot create liquidity in the currency it borrows in

¹¹ More precisely, they tend to be negatively skewed, leptokurtic and co-vary with the price of risk.

¹² In general, investors’ risk-return profiles differ depending on different factors, including liquidity needs and the investment horizon. These profiles shape the investment policy, with the investment horizon determining the impact of investors’ exposures to liquidity risks. In this context, a SWF with a long-term investment horizon could sell insurance against liquidity risks to cover associated exposures.

- The assets of the banking sector are large relative to GDP
- The banks are thinly capitalized and have low reserves of liquidity
- The banks rely on funding in foreign markets
- The private sector has a high level of external short term debt
- The depth and liquidity of the domestic currency and bond market is low

On the other hand, risks will be mitigated if the government has ample access to liquidity through, for instance, high international reserves of liquid assets. One can thus usefully distinguish between four different combinations of access to liquid assets and liquidity exposure of liabilities as illustrated in Figure 1.

For the different combinations of liquidity exposure and liquidity access, the following general policy implications may be drawn:

- I. **Monitor liquidity risk.** While low exposure to liquidity risk gives little risk of adverse shocks in the short term, low access to liquid reserves makes it important to monitor risk and take measure to mitigate it if it increases. This could happen, for instance, if there is a strong growth in the domestic banking sector or budget deficits financed by short-term borrowing.
- II. **Reduce liquidity risk.** The combination of low liquid reserves and high vulnerability on the liability side of the balance sheet calls makes liquidity risk reduction an urgent priority. Relevant measures could include extending the maturity profile of government borrowing, taking steps to curb lending growth in the banking sector and increasing its capital adequacy, taking steps to increase official reserves and to increase liquidity of existing reserves. This can be thought of as moving from II to I in the diagram.
- III. **Consider the liquidity risk capacity of reserves.** A typical example of a country in this group would be a resource rich economy with a relatively large SWF, and with low gross debt and/or a robust banking sector. Such countries may consider enhancing expected returns of their assets by shifting into less liquid assets. One example of this is how Norway is gradually moving into less liquid assets in the Government Pension Fund through for instance real estate investments, thus moving from III to I in the diagram.
- IV. **Consider deleveraging the sovereign balance sheet.** While the availability of liquid assets makes adverse liquidity-related shocks less likely in the short term, there may be a significant cost of carry in holding liquid assets to match the liquidity risk on the liability side. Using excess reserves to repay external debt is one way of reducing this cost. Mexico, for instance, used excess currency reserves to repay government debt through an arrangement between the Central Bank and the Ministry of Finance in the 1990s, moving from IV to I.

Figure 1. Combinations of Liquidity Access and Liquidity Exposure

		Liquidity Exposure of Liabilities	
		Low	High
Access to Liquid Assets	Low	I	II
	High	III	IV

IV. ASSET AND DEBT MANAGEMENT WITH A GROWING SWF

Applications of SALM

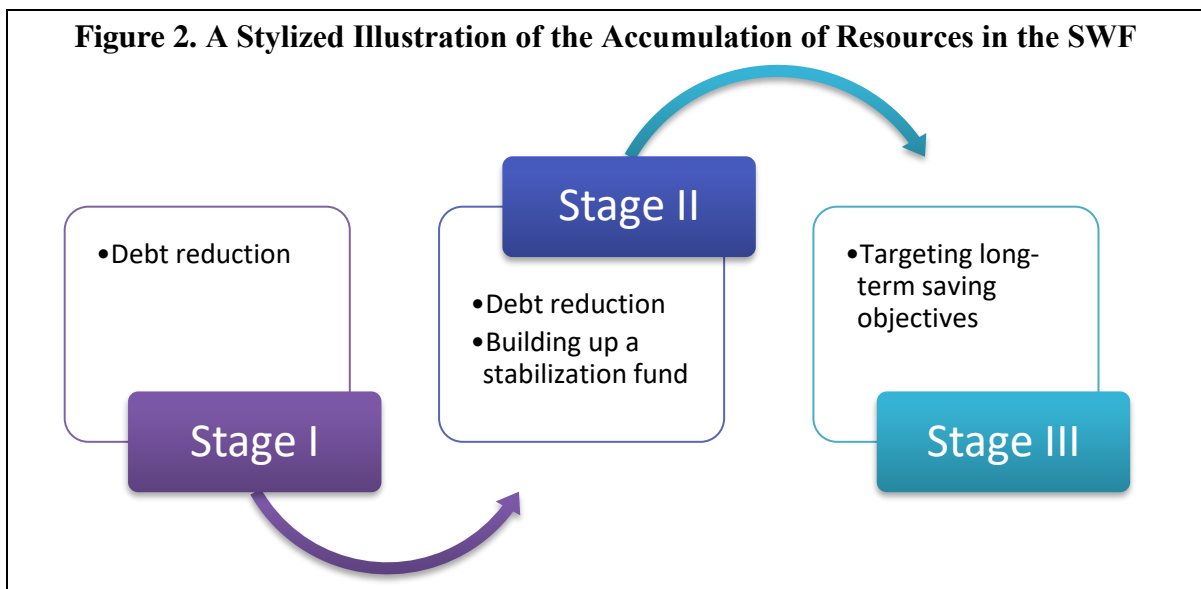
A practical application of the SALM considerations in the case of indebted commodity exporters with growing commodity revenues would suggest a three-stage approach (Figure 2):¹³

- The key priorities during *stage one and two* are to allow for debt reduction as set out in the fiscal framework and building up a fund to act as a stabilizer to cushion the budget and the economy against volatile commodity prices. It is critical to strike the right balance between debt repayments and asset accumulation for stabilization purpose.¹⁴ Therefore, the appropriate level of the stabilization fund should be evaluated in a SALM framework, taking account of interest rate levels and the size of public debt. The pros and cons of various targets for asset accumulation should be carefully evaluated as part of the overall fiscal framework.

¹³ The establishment of a SWF presupposes that the SWF owner country has (i) adequate international reserves and (ii) not excessive debt. These considerations are critical for the country's financial stability and should be satisfied before it proceeds with the establishment of for example a savings fund. In this context, we propose the three-fold "tranching" of the SWF's resources. It should be noted that this is not a symmetric process when the fund has to liquidate its assets to finance budget deficits. Also, the approach will depend on the magnitude of the commodity price fall, fiscal shortfalls, and availability of financial buffers.

¹⁴ It may not be optimal to reduce gross government debt to zero, for example, because having a stock of debt outstanding helps keep the market alive (and thus facilitate government liquidity management) and develop capital markets. Further, a country's Debt Sustainability Analysis will determine its suitable level of debt under plausible assumptions on its key fiscal and macroeconomic variables that drive debt dynamics.

- i. *Stabilization*: to allow the SWF to play a role as a stabilization fund by letting automatic stabilizers work through the economic cycle.¹⁵
 - ii. *Debt reduction*: the priority should be to use annual “commodity revenues” to reduce the stock of government foreign debt to sustainable levels.¹⁶ The exact target for debt reduction would have to be set as part of an overall fiscal policy strategy. The SWF would still contribute to stabilizing the economy and insulating it from the effects of commodity price volatility in two ways: (i) the use of annual commodity revenues for debt reduction in itself implies that commodity revenue volatility will be absorbed by changes in the rate of debt reduction rather than in changes in government spending; (ii) to allow for letting automatic budget stabilizers work within an appropriate long-term fiscal policy framework, and letting the resulting changes in the budget stance be absorbed by the SWF.
- The *third stage* would start once the target debt level and optimal size of the stabilization objective were reached. At that point, the focus should be turned to long-term savings objectives.



As part of the work on drawing up the fiscal strategy and SALM framework that will guide the milestones for the three-stage approach, a “financing fund” model can be considered for the SWF (Box 1 and 2). In this model, transfers from the fund would cover non-commodity deficits. The actual outflows would then be contingent on the trajectory of non-commodity deficits, which in turn should be determined by an appropriate long-term fiscal policy

¹⁵ The term “automatic stabilizers” refers to the dampening effect on volatility in the economy from changes in taxes, transfers, etc., through the business cycle. They will manifest themselves through larger variations in actual budget deficits than in structural budget deficits over time, where the “structural” part of the deficit is the deficit one would have when the economy is operating at normal capacity.

¹⁶ The level of debt should be guided by a debt sustainability analysis.

strategy. The appropriate fiscal rule would be contingent on several factors, including the size of the non-commodity deficit at the time of transition to a financing fund model. For the first stage, where the focus is on debt reduction, fiscal targets must be coordinated with appropriate debt-reduction targets.

The effects of asset accumulation on debt servicing costs should also be considered. As reserves and other pools of sovereign assets grow, the resilience of the economy in the event of adverse shocks increases. This may have a positive effect on credit ratings and the costs of servicing debt, making the “insurance premium” for building financial assets lower. For instance, in August 2012 Moody’s indicated the possibility of upgrading the sovereign rating of Angola on the basis of reduced vulnerability to shocks after the establishment of a fiscal stabilization fund to cushion the impact of external shocks on the government finances.

The investment strategy of SWF assets should be reconsidered in a macro-fiscal framework. If some SWF assets are invested in the domestic financial system, it may contribute to procyclical macro-policies, as the fund will have a tendency to acquire domestic currency-denominated assets when there is a commodity boom and disposing of them when commodity prices fall. Deposit of SWF funds in domestic commercial banks risks amplifying these effects through effects on these banks’ balance sheets and lending capacity. Any plan to shift SWF assets to international financial markets should recognize that this shift may have shorter-term consequences for financial stability and the exchange rate. Finally, there needs to be close coordination among the institutions involved in the management of sovereign assets and liabilities. This is typically achieved through appropriate legislation that establishes policy guidelines (to avoid substantial mismatches) and the sharing of information.

Investment and Risk Management under the Three-stage Approach¹⁷

Determining the investment and risk management framework for a SWF has to begin with the purpose or objective of the SWF. The three-stage approach essentially puts a ring around funds that are serving different purposes: repaying debt, smoothing fiscal revenues, and building a portfolio of assets as part of a long-term savings strategy.¹⁸ While the financing model we have discussed will allow two or even three of these purposes to exist within a single SWF, the clarity and calibration of the tranches is key to establishing an appropriate investment strategy overall.¹⁹

For the debt repayment tranche, the funds will be applied directly to retiring the debt in most instances. Where there are delays in being able to repay the debt, the objective of any pool of

¹⁷ Appendix III provides further considerations on investment and risk management.

¹⁸ IMF (2012) and IMF (2014a) provide a fuller discussion of how to derive an optimal strategy for asset accumulation in the context of resource rich economies.

¹⁹ Of course, there could be a more formal separation of the investment tranches into separate funds, and in principle different managers for the different funds (for instance the Central Bank for the most liquid fund and a separate manager for longer term savings). But this will not affect the general principles outlined here.

assets will be to match the domicile, currency, duration and credit of the liability, i.e. the debt that it is intended to repay. The investment management framework for this tranche will focus on the appropriate level of mismatch, given the available investments.

For the stabilization tranche, the objective could be stated as “maximize returns while ensuring sufficient funds are available to smooth fiscal revenues during foreseeable downturns.” The focus here will be on liquidity risk management and the definition of “foreseeable.” If the pool is well funded relative to fiscal revenues, then a greater degree of risk could be borne and higher returns anticipated. If stakeholders need “foreseeable” to mean “any” downturn then less risk can be taken, and less return can be anticipated. In all instances, the favored assets will be foreign investments with good liquidity and a tendency to go up in price, or at least not do go down, during the sorts of crises that would lead to fiscal deficits. These characteristics favor foreign fixed interest assets although a business case might be made for other foreign assets that have prices that are lowly correlated with crises. The investment management frameworks would focus on the assets that are approved for investment, credit and currency management, and the likelihood of sufficient liquidity to meet foreseeable fiscal shortfalls, which would include modeling of price movements during stress tests.

For the long-term savings tranche, a reasonable objective is to “maximize long-term returns subject to not incurring undue risk.” Where the stabilization tranche is considered effective and the likelihood of needing to draw on the savings tranche is remote, higher risk and less liquid investments such as equities and private assets can be added, with the anticipation of a commensurately higher return. These higher-return investments are compatible with an objective to maximize long-term returns, and the key discussion for the stakeholders is to agree what level of risk would be considered “undue.” The investment management frameworks would focus on how to size the allocations of capital to the different types of investment in order to maximize return for a given level of risk (often referred to as asset allocation), which in turn requires a clear set of investment beliefs held by the stakeholders. Frameworks for appointing aligned managers, currency management and liquidity management are also investment management priorities.

Risk appetite discussions amongst the stakeholders around the definition of “foreseeable” and “undue” are essential, as is transparency and communication. In the current low-yield environment, focusing on costs has never been more important. The costs of unwinding one investment to establish another, after a change of heart or other knee-jerk reaction, is likely to be one of the most expensive avoidable costs; to avoid this cost, trust and transparency must be established.

Box 1. Saving and Investment Decision in the Context of Natural Resource Wealth

A nation can save either in financial assets (by accumulating claims on other countries) or in domestic assets that increase consumption possibilities in the future. These domestic assets could be either physical assets, such as infrastructure, or increased human capital in the form of better health care or education. When a country transforms wealth in the form of natural resources into savings for future generations, it is thus, in principle, faced with a choice between accumulating financial assets and/or accumulating other forms of wealth.

In general, many poorer, resource-rich countries have been constrained in their access to credit, so many profitable investments in, for example, education, healthcare, or infrastructure have not been undertaken. When income and consumption are already at low levels, reducing consumption to finance investments to foster growth is often not an option. In this way, a combination of constrained credit and low income can lead to a poverty trap.

In principle, increased revenues from natural resources can be a way of breaking out of this trap by channeling some of the extra revenues into domestic investments to promote growth. To the extent that such investments have been constrained in the past, these domestic investment opportunities will often yield higher returns than alternative investments in foreign financial assets. However, there are several factors that will constrain the optimal level of such domestic investments:

First, it should be noted that—by definition—one dollar of increased exports from the resource sector in a country has to be matched by a combination of

- Reduced exports from other sectors of the economy (x); and/or
- Increased imports (y); and/or
- Increased claims on other countries in the form of an accumulation of financial assets (z),

where $x+y+z=1$.

Thus, if the government decides not to accumulate assets in a fund ($z=0$), the result must be either increased net imports or increased net accumulation of financial assets by the private sector. These effects will be brought about by changes in prices, wages, and equilibrium exchange and interest rates. Increased net imports will have to come about through real exchange rate appreciation which will have to be reversed when resource income falls, leading to risk of Dutch disease problems. Accumulation of financial assets in a fund helps reduce this risk.

Second, it should be noted that even if many domestic investments may seem profitable on an individual basis, the sum of all projects might be considerably less profitable. This is because of the effect of the investments on equilibrium prices, wages, and exchange and interest rates as described above.

Third, while projects may be profitable for society as a whole, they may erode government finances over time. This is because the costs of these investments typically are borne by the government, while the benefits accrue to the private sector. If mechanisms for sharing the returns from such investments with the government in the form of taxes and user tariffs are weak, the optimal level of such investments may be lower. All of these issues should be addressed in a unified framework that assesses optimal domestic investment levels within a broader macroeconomic context, including longer-term growth and fiscal sustainability issues.

Source: IMF (2014a).

Box 2. Financing Funds

Stabilization funds are generally set up to reduce the impact of volatile revenues, such as Chile (Economic and Social Stabilization Fund) and Russia (Oil Stabilization Fund). Typically, the inflows and outflows are contingent on whether revenues are “high/low.”

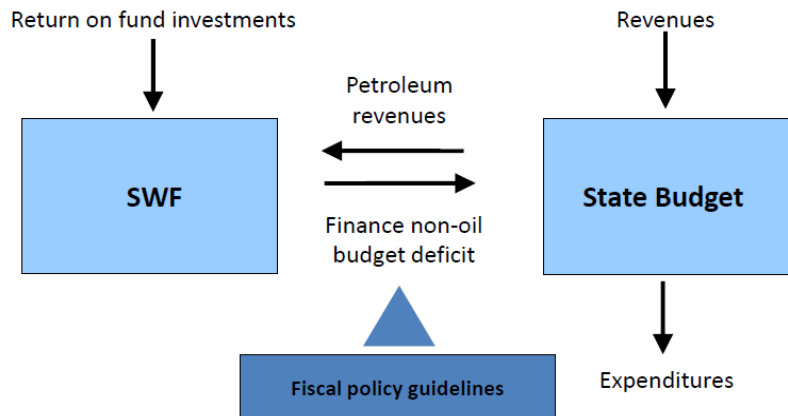
The primary objective of *savings funds* is to build wealth for future generations, such as Abu Dhabi Investment Authority, Libya, Norway, and Russia (National Welfare Fund). These funds typically have fixed inflows and discretionary outflows, and are set up when a government can set aside funds for the future and be reasonably confident that it will not be necessary to liquidate the assets in the fund in the short and medium run.

A *financing fund* model is an SWF that combines the characteristics of a savings fund and a stabilization fund, such as Norway and Timor-Leste. It is a model that is fully integrated with the government budget process. Typically, the inflows to the fund will be the resource revenues of the government in addition to the returns on the fund’s investments. The outflow from the fund will be a transfer to cover the non-resource budget deficit (that is, the deficit that arises when the resource revenues of the government are excluded).

In this way, the fund will receive positive net transfers if, and only if, there is a government budget surplus when resource revenues are included. This implies that the accumulation of assets in the fund will correspond to an improvement in the government’s net asset position. For stabilization funds and savings funds, this is not necessarily the case (for example, New Zealand), since they are not linked to the budget deficits/surpluses of the government.

A central feature of this model is the fiscal policy guideline (rule). This guideline sets out the desired trajectory of the non-resource budget deficit to be covered by transfers from the fund.

Financing Fund Mechanism



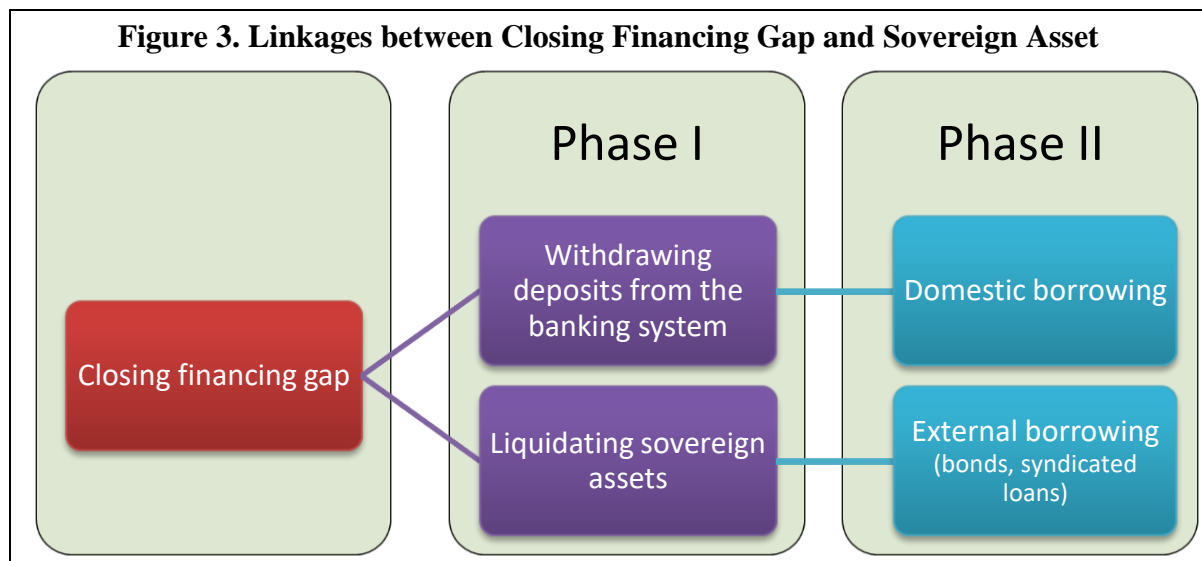
V. ASSET AND DEBT MANAGEMENT WITH A FINANCING GAP

The plunge in commodity prices since mid-2014 (especially for oil) has had considerable impact on the size and rate of accumulation of sovereign assets, and has created fiscal shortfalls in many oil-producing countries. In attempting to close financing gaps (fiscal deficits plus servicing of debt), commodity-exporting countries have utilized a mix of asset drawdowns and debt issuance. Sharing the burden between the fiscal adjustment and

drawdown of SWF will depend on the cyclical and permanent nature of price decline and duration of fiscal adjustment.

Many governments initially drew on their deposits in the domestic banking system and liquidated assets in SWFs and/or international reserves, as drawing on liquid financial assets is the fastest and easiest way of bridging financing gaps during the early stages of shocks, especially when a government has not been issuing any debt prior to the commodity shock. Subsequently, after being absent for many years, they borrowed from domestic banks and tapped international debt markets, as shrinking commodity revenues eroded their budgets. In some cases, syndicated loans from international lenders have been utilized (Figure 3).

In general, the choices between borrowing and drawing down financial assets will depend on borrowing costs, market access and sentiment, the objectives and size of SWFs, liquidity of financial assets, and risk management trade-offs for the whole sovereign balance sheet.²⁰ For example, Saudi Arabia faced the sharp decline in the oil prices during 2014–2016 from a strong asset-liability position, it has utilized a number of options for financing—reducing its deposits with the central bank, and borrowing domestically and internationally (Box 3). Each of these has its own costs and benefits, which are likely to vary depending on market circumstances. Similarly, there has been a gradual increase in the non-oil deficit in recent years, exacerbated by weaker growth in the wake of lower oil prices.



While stabilization funds may not provide full protection for the falling oil prices after 2014, this does not necessarily mean that the stabilization funds were too small. As discussed in Section III above, there is a high cost to insure for such a large shock. The relative size of the stabilization and savings portions of a financing fund should be calibrated to take account of this.

²⁰ IMF (2016) provides detailed examples on financing fiscal deficits.

A shock of the magnitude experienced after 2014 has in many cases led to very different perspectives for the accumulation of financial assets in a savings fund. This may warrant revisiting the stated objectives for the savings fund, and the agreed risk appetite and investment beliefs, as they are now generally applied to a smaller fund with—possibly—a shorter remaining investment horizon.

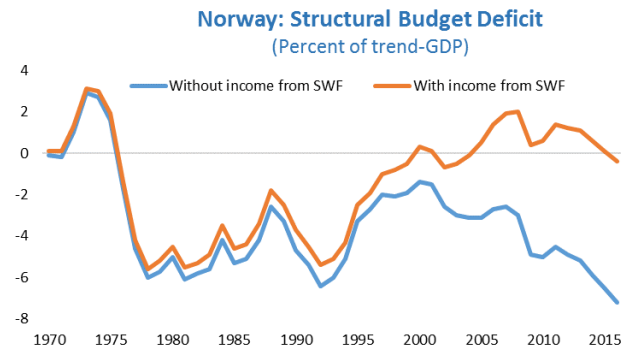
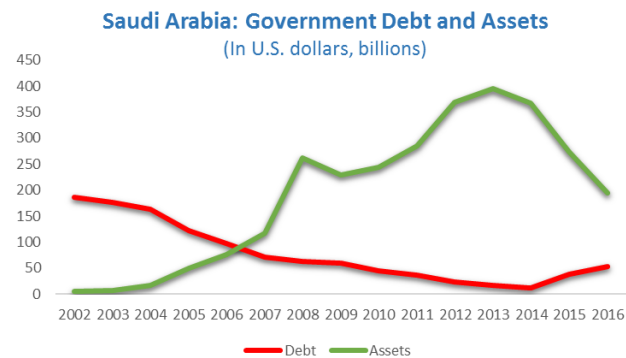
Box 3. The Role of SWFs in Closing Financing Gaps

Saudi Arabia has faced the recent collapse in oil prices from a strong sovereign balance sheet. Government debt was less than 2 percent of GDP and its deposits at SAMA (considered as a SWF) stood at around 50 percent of GDP as of end-June 2014.²¹ Due to the collapse of international oil prices, the country incurred fiscal deficits after accumulating fiscal surpluses for several years. The fiscal deficit reached 16 and 17 percent of GDP as of end-2015 and 2016, respectively.

Though the government has been accustomed to managing large sovereign assets, with the bulk of assets managed by SAMA, the increasing issuance of debt to finance fiscal deficits has posed a challenge to manage the sovereign balance sheet

(e.g., minimizing interest rate and exchange rate risks). Therefore, to limit the pressures on drawing down financial assets, the government has been optimizing its asset-liability management to close financing gaps through a mixture of using assets and/or issuing debt. Fiscal deficits have been financed through drawdown of government deposits at SAMA, domestic borrowing from the banking system and institutional investors, and external borrowing (both through syndicated loans and Eurobonds).

In Norway, there has been a gradual increase in the structural non-oil deficit in recent years, exacerbated by weaker growth in the wake of lower oil prices. However, a growing SWF has at the same time implied a gradual increase in the structural level of cash returns from financial assets (dividends, interest coupons, and rental income from properties—excluding any revaluations). This has broadly offset the effect of a widening non-oil deficit.



²¹ It covers central government gross debt, deposits and reserves at SAMA. It does not cover other central government assets, e.g., the Public Investment Fund, another SWF, government's stakes in some companies.

VI. CONCLUSION

As commodity prices may stay low for longer, it is critical for the SWF owner country to assess the relationship between bridging financing gaps and asset accumulation/liquidation of SWFs within a broad SALM framework. In this context, there is a need to align the management of the SWF to the fiscal framework through inflow and outflow rules, the balance between debt repayment and asset accumulation, and appropriate investment strategies that can meet fiscal financing needs on a timely basis.

While many resource-based economies faced the recent decline in commodity prices from a position of financial strength, it is essential for those economies without an asset-liability framework to develop such a framework, especially in view of potential financing needs over the short to medium-term. Accordingly, it will be highly desirable to integrate the management of sovereign assets and liabilities in a manner that maximizes the resilience of the sovereign balance sheet. In this context, appropriate assessments of liquidity risk on both the asset and liability sides of the sovereign balance sheet will play a central part.

Clear and consistent objectives, risk appetite and investment beliefs for each pool of sovereign wealth are key for ensuring consistency and transparency in investment decisions and the overall functioning of SWFs. Where assets from long-term savings have been used for stabilization, the allocation of the remaining portfolio may need to be reevaluated to ensure continued consistency with long term objectives.

BIBLIOGRAPHY

Al-Hassan, Abdullah, Michael Papaioannou, Martin Skancke, and Cheng Chih Sung (2013). “Sovereign Wealth Funds: Aspects of Governance Structures and Investment Management,” IMF Working Paper 13/231(Washington: International Monetary Fund).

Alhumadih, Fahad, Ryadh Alkhareif, Khalid Alsaeed, Nabil Ben Ltaifa, Ken Miyajima, and Guilherme Pedras, 2016, “Financing the Fiscal Deficit: Possible Options and their Potential Implications”, Selected Issues for Saudi Arabia ((Washington: International Monetary Fund). Available at: <http://www.imf.org/external/pubs/ft/scr/2016/cr16327.pdf>

Ang, Andrew, William Goetzmann, and Stephen Schaefer (2009), “Evaluation of Active Management of the Norwegian Government Pension Fund—Global.” Available at: <https://www.regjeringen.no/globalassets/upload/fin/statens-pensjonsfond/eksterne-rapporter-og-brev/ags-report.pdf>

Arezki, Rabah, Adnan Mazarei, and Prasad Ananthakrishnan (2015). “Sovereign Wealth Funds in the New Era of Oil,” iMFDirect (Washington: International Monetary Fund).

Baungsaard, Thomas, Mauricio Villafuerte, Marcos Poplawski-Ribeiro, and Christine Richmond (2012), “Fiscal Frameworks for Resource Rich Developing Countries.” IMF SDN/12/04 (Washington: International Monetary Fund).

Bianchi, Javier, Juan Carlos Hatchondo, and Lenonardo Martinez (2016). “International Reserves and Rollover Risk”. Federal Reserve Bank of Minneapolis.

Brinson, Gary, Brian Singer, and Gilbert Beebower (1986), “Determinants of Portfolio Performance,” *Financial Analysts Journal*, Vol. 42, No. 4, pp. 39–44.

Brown, Aaron, Michael Papaioannou, and Iva Petrova (2010), “Macrofinancial Linkages of the Strategic Asset Allocation of Commodity-Based Sovereign Wealth Funds,” IMF Working Paper 10/9 (Washington: International Monetary Fund).

Das, Udaibir, Yinqiu Lu, Michael Papaioannou, and Iva Petrova, 2012, “Sovereign Risk and Asset and Liability Management—Conceptual Issues,” International Monetary Fund, WP/12/241 (Washington: International Monetary Fund).

Frédéric Ducoulombier, Lixia Loh, and Stoyan Stoyanov (2012). “What Asset-Liability Management Strategy for Sovereign Wealth Funds,” An EDHEC-Risk Institute Publication

Hadzi-Vaskov, Metodij, Luca Antonio Ricci (2016). “Does Gross or Net Debt Matter More for Emerging Market Spreads?” IMF Working Paper 16/246 (Washington: International Monetary Fund).

Ibbotson, Roger, and Paul Kaplan (2000), “Does Asset Allocation Policy Explain 40, 90, or 100 Percent of Performance?” *Financial Analysts Journal*, Vol. 56, No. 1, pp. 26–33.

International Monetary Fund (2016), “Regional Economic Outlook for the Middle East and Central Asia,” October (Washington: International Monetary Fund).

--- (2015), “The Commodities Roller Coaster” Fiscal Monitor (Washington: International Monetary Fund). Available at:
<http://www.imf.org/external/pubs/ft/fm/2015/02/pdf/fm1502.pdf>

--- (2014b), “Revised Guidelines for Public Debt Management.” (Washington: International Monetary Fund and World Bank). Available at:
<https://www.imf.org/external/np/pp/eng/2014/040114.pdf>

--- (2014a), “Sovereign Asset-Liability Management—Guidance for Resource Rich Economies.” (Washington: International Monetary Fund). Available at:
<https://www.imf.org/external/np/pp/eng/2014/061014.pdf>

--- (2013), “Revised Guidelines for Foreign Exchange Reserve Management.” (Washington: International Monetary Fund). Available at:
<https://www.imf.org/external/np/pp/eng/2013/020113.pdf>

--- (2012), “Macroeconomic Policy Frameworks for Resource-Rich Developing Countries,” IMF Policy Paper (Washington: International Monetary Fund).

International Working Group of Sovereign Wealth Funds (IWG) (2008), “Generally Accepted Principles and Practices—Santiago Principles.” Available at: <http://www.iwg-swf.org/pubs/gapplist.htm>.

Jones, Bradley (2016), “Institutionalizing Countercyclical Investment: A Framework for Long-term Asset Owners,” IMF Working Paper 16/38 (Washington: International Monetary Fund).

Jones, Bradley (2013), “Leaning Against the Wind: Reflections on Institutionalizing Counter-Cyclical Investment Behavior,” *Journal of Wealth Management*, Spring, Vol. 16, No. 1, pp. 85–89.

Jones, Bradley (2012), “Navigating the Long Run: A Strategic Asset Allocation Framework for Sovereign Wealth Funds, Pension Funds and Endowments,” Global Macro Issues (London: Deutsche Bank).

Koc, Fatos (2014), “Sovereign Asset and Liability Management Framework for DMOs: What Do Country Experiences Suggest?” Available at:
http://blog-pfm.imf.org/files/fatos-salm_final-edited.pdf

Lagos, Gustavo C.C. (2014), “Proyección de Producción de Cobre de Chile 2014:2020,” Universidad Católica de Chile, Julio. Available at: www.gustavolagos.cl/publicaciones.html

Merton, Robert C. (2007), "Observations on Sovereign Wealth Fund, Reserve, and Debt Management: A Country Risk Management Perspective," Luncheon Address at the First IMF Annual Roundtable of Sovereign Asset and Reserve Managers, November (Washington: International Monetary Fund).

Papaioannou, Michael G., Joonkyu Park, Jukka Pihlman, and Han van der Hoorn (2013), "Procyclical Behavior of Institutional Investors During the Recent Financial Crisis: Causes, Impacts, and Challenges," IMF Working Paper 13/193 (Washington: International Monetary Fund).

Rawdanowicz, L., E. Wurzel and P. Ollivaud (2011), "Current Issues in Managing Government Debt and Assets", OECD Economics Department Working Papers, No. 923 (Paris: OECD Publishing). Available at: <http://dx.doi.org/10.1787/5kg0kp6s6c0s-en>

Appendix I. SWF Asset Accumulation and Revenue Projection Models

Among the challenges faced by resource-rich countries is the high uncertainty of commodity prices and their impact on resource revenue. Forecasts of future income from natural resources are a central part of the budget process and macroeconomic modeling in most resource-rich countries. In general, the commodity sector is treated as an exogenous source of income, both for the economy as a whole and for the government (in the form of royalties, taxes, and dividends). That is the case, for example, in New Zealand, Norway, Alaska, and Chile. For countries with SWFs where flows are linked to exports of commodities, these forecasts feed into projections of asset growth. This can in turn inform decisions on investment strategy.²²

In order to make the assumptions that feed such models, most countries use a plethora of sources. In general, forecasts on quantities are obtained from the main companies in the sector and consider the production plans of both operating projects and projects under construction. Information is also provided by specialized institutions, such as the relevant ministries, the tax revenue service, and producers associations. In the case of Chile, for instance, both the central bank and the MoF collect information from the main companies, the Ministry of Mining, and the tax revenue service. In the case of Norway, the starting point for the analysis is a forecast of expected future petroleum production on the Norwegian continental shelf provided by Norwegian Petroleum (a public agency) and available on its website.

Information on expected quantities provided by companies is in many cases treated as a “best case scenario.” An adjustment is done to account for underperformance bias, based on historical information. For Chile, between 2004–14, future production was overestimated on average by 20 percent.²³ Four causes for the overestimation for mines in operation were dominant: (1) overestimation of average mineral proportion per ton of cinder (this is a small source of bias, because companies use models that can determine this variable with accuracy); (2) unpredictable natural events such as landslides, earthquakes, and rock explosions; (3) accidents with life casualties that force mines to cease operations temporarily; and (4) equipment failure. In addition, there are regular delays in the construction of new mines.

With respect to price forecasts, there is a distinction between the short and the long run. A combination of external and internal forecasts is used to project prices in the short run. For the long run, the common assumption is that prices in U.S. dollars increase at a rate that is similar to global inflation. In other words, the real dollar prices of commodities are projected

²² Equities were introduced in the Norwegian SWF in 1998 based on projections of strong future growth in assets, although actual assets at the time were limited.

²³ See Lagos (2014).

to remain constant. This forecast implicitly assumes that the real price follows a random walk without drift. This is the practice at the World Bank and the IMF.

For countries that calculate structural prices for their main commodity exports, the calculation is usually forward looking. In Chile, the SWFs accumulate assets according to a rule that is based on a “structural surplus.”²⁴ In order to calculate the structural revenues, the government uses, among other variables, a structural price for copper, which is an important export. For the calculation, once a year the government asks a committee of experts to provide their forecast for the average price of copper for the next 10 years. The structural price is the simple average of each expert’s forecast (excluding the highest and the lowest estimate). In Timor-Leste, forward-looking estimates of prices are used to calculate a net present value of petroleum resources, which in turn feeds into the fiscal framework through a spending rule linked to sustainable income.

It is worth noting that technological and other structural risks affect various aspects of the policy challenge. First, the total amount of extractable natural resources depends on evolving extraction technology (e.g., the technology of oil sands extraction and renewables is advancing quickly). Second, the cost of extraction may fall over time due to technological progress. Third, earnings projections may be affected by the evolution of technology available to rival producers, and technological progress (and regulatory actions) may affect ultimate demand. These possible shifts need to be incorporated into price projections, volume projections, and the modelling of how commodity price movements correlate with other variables of interest, such as global interest rates. Further, the technology risk implicitly refers to risks related to climate change.

Transparency should be a guiding principle for the use of forecasting models. The main methodology for forecasting should be publicly available, as should model inputs. This ensures that forecasting results are replicable, that forecasting prevents the manipulation of data and modeling results, and that it enhances confidence in the execution of fiscal policy.

²⁴ The Chilean Pension Reserve Fund receives a minimum contribution of 0.2 percent of previous year GDP, not only when there are fiscal surpluses.

Appendix II. Inflow and Outflow Rules of Selected Sovereign Wealth Funds

	Inflows Rule	Outflows Rule
<u>Australia:</u> Pension Reserve Fund	<p>Contributions to the Future Fund and Nation-building Funds come from the Australian government's budget surpluses. The Future Fund has also received contributions resulting from the proceeds of the sale of the government's stake in Telstra in late 2006 and approximately 2 billion shares in Telstra remaining after this sale process. Also, it received contributions from a combination of budget surpluses, proceeds from the sale of the government's holding of Telstra and the transfer of remaining Telstra shares. The Finance Minister may have certain discretionary transfers from time to time.</p>	<p>Withdrawals from the Fund occur only once the superannuation liability is fully offset or from July 1, 2020, whichever is the earlier, except for the purpose of meeting operating costs or unless the Future Fund's balance exceeds the target asset level as defined by the Future Fund Act. They are determined by the government, subject to the advice of the relevant Advisory Board and oversight of the maximum spending from the funds by Parliament.</p> <p>The Board must take all reasonable steps to ensure that, during a financial year, the amount of money standing to the credit of the Fund Account is sufficient to cover the purpose.</p> <p>The Fund Account is a Special Account for the purposes of the Financial Management and Accountability Act 1997.</p>
<u>Canada (Alberta):</u> Savings Fund	<p>Initially: annual transfers of 30 percent of non-renewable resources. Until 1982, it retained all investment income. In 1984, it was reduced to 15 percent and to 0 percent in 1987.</p> <p>Since 1987: automatic annual payments apart from inflation-proofing to the Fund were stopped. From time to time, ad hoc capital was transferred to the fund primarily based on budget surpluses. The Fund has a legislated provision for retaining a portion of its income as protection against inflation. The annual amount forecast to be retained from investment income in the Fund for inflation-proofing is \$304 million.</p> <p>ALM approach: Assets and income of the Heritage Fund are fully consolidated with the assets and revenue of the province.</p>	<p>Initially all income was retained.</p> <p>Since 1982, the investment income earned by the Heritage Fund, less the amount retained in the fund for inflation proofing, is transferred to the province's main operating fund, the General Revenue Fund, to help pay for priority programs (essential to programs like health care and education) and keep taxes low.</p> <p>The Minister of Finance may charge a cost, expense, or other payment to the Heritage Fund if in the opinion of the Minister the cost, expense, or other payment was incurred or paid in respect of the Heritage Fund.</p>
<u>Chile (ESSF):</u> Stabilization Fund	<p>Effective fiscal surpluses above 0.5 percent of GDP.</p>	<p>To support counter-cyclical fiscal policies to complement fiscal revenue as needed and in order to finance authorized public expenditures in the case of a fiscal deficit, for the regular or extraordinary amortization of public debt, and for financing the annual contribution to the Pension Fund PRF.</p>

	Inflows Rule	Outflows Rule
<u>New Zealand:</u> Pension Reserve Fund	<p>The establishing legislation for the Fund includes a funding formula from which an annual government contribution is derived. Contributions are to be made during the early period of the Fund, while the cost of superannuation is relatively low, and invested by the Guardians to build the Fund. The contributions come from tax revenue.</p> <p>The contributions were suspended in July 2009 as the government prioritized debt reduction in the wake of the Global Financial Crisis. Under the funding formula, the calculated annual contributions in each period incorporate the Fund balance and therefore the expected future contributions reflect the contribution cessation, among other factors. The funding formula is disclosed: http://www.legislation.govt.nz/act/public/2001/0084/latest/DLM114296.html?search=ts_act_New+Zealand+Superannuation+and+Retirement+Income+Act+2001_resele</p>	<p>After 2020, if the required annual capital contribution is less than 0, the Minister may require a capital withdrawal to be made from the Fund up to that amount and paid into a Crown Bank Account.</p> <p>At a certain point—currently from around 2035—the government will begin making withdrawals from the Fund in line with the funding formula to help smooth the cost of superannuation over time.</p> <p>Money may be paid out of the Fund to pay any fee that is payable to an investment manager or custodian in respect of the Fund, meet any other obligations that are directly related to the operation of the Fund, and pay the taxation liabilities arising in respect of the Fund.</p>
<u>Norway:</u> Stabilization and Savings Fund	<p>The inflows to the fund are defined in legislation and include the net cash flow to the government from the petroleum sector in addition to the returns on the fund's investments.</p> <p>The net cash flow includes taxes and duties on petroleum companies as well as net cash flows from the government's direct participation in the petroleum sector and dividends from Statoil.</p>	<p>The outflow from the fund is a transfer to cover the non-oil deficit of the central government budget, defined as the difference between total expenditures and non-oil revenues.</p> <p>According to the so-called “spending rule,” the non-oil budget deficit should be on average 3 percent of the fund over time, which corresponds to the estimated real return on the Fund. The mechanism is detailed in Box 2.</p>
<u>Kuwait (GRF and FGF):</u> Stabilization and Savings Funds	<p>The GRF is the main treasurer for the government and receives all revenues (including all oil revenues) from which all State budgetary expenditures are paid.</p> <p>FGF (established in 1976 with 50 percent of the GRF balance): annual transfer of 10 percent of all State revenues; all investment income is reinvested, including 10 percent of the net income of the GRF.</p>	<p>GFR: transfers to pay the State budgetary expenditures sanctioned by law.</p> <p>FGF: No assets (withdrawals) can be withdrawn from the FGF unless authorized by specific legislation.</p>

	Inflows Rule	Outflows Rule
<u>U.S. (Alaska):</u> Savings Fund	At least 25 percent of all mineral lease rentals, royalties, royalty sales proceeds, federal mineral revenue-sharing payments, and bonuses.	<p>The entire Fund is managed as a single investment pool. However, for accounting purposes it is divided into two parts: principal (the non-spendable funds) and the earnings reserve (assigned funds). The Alaska Constitution says that the principal may not be spent. The earnings in the earnings reserve may be spent by the Legislature for any public purpose, including the Permanent Fund Dividend distribution.</p> <p>The Legislature decides how Fund income is used. To date, the Legislature has:</p> <ul style="list-style-type: none"> • inflation-proofed Fund principal, • paid dividends to qualified applicants, • made special appropriations to the principal, and paid for some Fund-related state expenses <p>Of the spending that has occurred from the Fund, most of it has been for dividends to qualified Alaska residents.</p>
<u>UAE</u> Abu Dhabi Investment Authority	The government of Abu Dhabi provides funds to the Abu Dhabi Investment Authority (ADIA) on periodic basis that are surplus to its budgetary requirements and other funding commitments.	<p>ADIA is required to make available to the government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate. In practice, such withdrawals have occurred infrequently and usually during periods of extreme or prolonged weakness in commodity prices.</p> <p>In anticipating any withdrawals, ADIA manages its fund in such a way as to ensure there is a sufficient level of short-term liquidity to meet any anticipated funding requests from the government.</p> <p>ADIA is not involved with nor has any visibility on matters relating to the spending requirements of the government of the Emirate of Abu Dhabi.</p>
<u>Timor-Leste:</u> Petroleum Fund	Income from upstream (and downstream) petroleum activities enters the Petroleum Fund, mainly from: (1) tax revenues, (2) first tranche petroleum and oil profit, (3) investment returns, and (4) other types of revenues such as pipeline rental.	The Petroleum Fund's only expenditure is a transfer to the central government budget (based on the Estimated Sustainable Income, calculated as 3 percent of total petroleum wealth), payment of operational management fees, and refunds of overpaid taxation. By the Petroleum Fund Law, the transfer to the State budget requires an explicit decision of Parliament.

	Inflows Rule	Outflows Rule
		<p>Outflows are electronic transfers to the credit of a single State Budget account, as approved by Parliament for the Fiscal Year.</p> <p>No transfer from the Petroleum Fund in the Fiscal Year unless the government has first provided Parliament with reports: specifying the Estimated Sustainable Income for the Fiscal Year for which the transfer is made; specifying the Estimated Sustainable Income for the preceding Fiscal Year; and from the Independent Auditor certifying the amount of the Estimated Sustainable Income.</p> <p>Transfers from the Petroleum Fund by the Central Bank in the Fiscal Year take place after publication of the budget law.</p> <p>The Central Bank is entitled to deduct, by direct debit of the Petroleum Fund account, any reasonable management expenses, as provided for in the operational management agreement.</p>

Appendix III. Considerations in Investment and Risk Management

Investment Framework

This section provides practical steps on further strengthening and developing SWFs' investment and risk management, including the formulation of an investment strategy, the importance of explicitly adopting investment objectives and determining risk tolerance, and some guiding principles on risk management.

The formulation of a strategy for investment management can be thought of as a hierarchy of decisions that start with the investment objective and end with the rationale for individual investment and divestment decisions. The basic principles of the chain of decisions, along with the responsible entity, are shown in the table below.

Table 2. Formulation of Investment Strategy

Decision	Rationale	Entity
Investment objective: the objective for investing the SWF funds, which will be derived from the purpose of the SWF.	Establishing a basis for the management of the fund.	Owner
Risk and return expectations and risk tolerances: these will depend on the objective and purpose of the fund and the risk tolerance of the owner, and will take into account the liabilities of the SWF.	Aiding transparency and consistency in investment decisions.	Owner
Investment beliefs: the nature of risk and return and the management of funds	Ensuring transparency and consistency when making both asset allocation and investment/divestment decisions.	Executive Board, or owner
Strategic asset allocation (SAA): the target allocation to classes of assets, where the assets in each class are assumed to have broadly similar financial characteristics and to behave similarly in different market conditions.	Combines the purpose and beliefs into a portfolio of assets that is expected to meet the objective of the fund.	Executive Board, or owner
Numeraire currency: the base currency of the portfolio, which should comprise a basket of currencies that best approximates the procurements that fund assets are expected to finance in the long run.	Sets out the base by which to measure currency risk.	Executive Board, or owner
Investment constraints: some of these will result from the purpose of the fund, whereas others will result from risk tolerances.	Sets out the maximum exposures that are appropriate to the purpose, objective, and risk tolerance.	Executive Board
Asset class performance benchmarks: these will set the return expectations at the asset class level.	When the constituent asset classes of an SAA are assigned investable benchmarks with appropriate numeraire currency, the SAA represents a theoretical portfolio forming the benchmark against which the performance and risk of the fund are measured and managed.	Executive Board
Active risk budget and constraints: active risk is any deviation from benchmark weights, either for asset classes as a percentage of the fund (determined by the SAA) or for individual assets within an asset class as determined by the asset class benchmark.	Sets out clearly where active risk is expected to be used in aggregate and at the investment opportunity level, which will be in line with the investment beliefs and any competitive advantages.	Executive Board
Statement of investment policies: a strategic document housing all of the investment policies of the SWF.	Keeps all the investment policy statements in one place for regular review and high-level attention by the Executive Board.	Executive Board
Investment and divestment decisions: in accordance with the active risk budget and constraints and may involve the services of an external investment manager.	Will include reference to policies regarding, <i>inter alia</i> , active risk and the selection and monitoring of external managers in order to maintain high-level attention on these issues.	Investment managers
Source: Authors.		

The investment objective of an SWF is to maximize risk-adjusted returns subject to an appropriate level of risk for the investment horizon of the SWF. Stabilization funds, which are created to partially cover cyclical reductions in fiscal revenues, will have a relatively low risk-bearing capacity and an investment objective to maximize risk-adjusted returns, subject to maintaining overall low levels of risk and high levels of liquidity.²⁵ On the other hand, savings funds have an ability to maintain investment exposures through market downturns and will typically have a greater portion of the fund in more volatile assets, such as equities, seeking to add return for this higher risk-bearing capacity.

A statement of investment beliefs and principles helps to guide deliberations on strategic issues for the SWF. These statements are a means of (1) ensuring that investment decisions are consistent throughout an organization and its external managers and (2) facilitating comparisons of the attractiveness of various investment opportunities by allowing a comparison of the beliefs that need to be held in order to invest.

An SAA is usually established early in the formulation of the investment strategy, and takes into account the liabilities of the SWF. Use of an SAA-based approach to investment strategy formulation rests on the belief that asset allocation is the key investment decision, a belief held by many institutional investors.²⁶ According to this belief, the fund's aggregate risk and return characteristics are driven mainly by its targeted mix of asset classes. In this approach, the SAA is chosen before selecting individual investments from within those asset classes. The SAA can be set by the fund owner or delegated to an operational manager, and it will reflect return and associated risk expectations. For instance, in Norway, the MoF determines and reviews the SAA and mandates the central bank to implement it. In other countries, such as Australia, Canada, New Zealand, and Singapore, the minister's mandate is more generic, essentially delegating to the Board of the SWF the decision as to the appropriate SAA.

The starting point could be a simpler, liquid, and passive equivalent of the typical SAA, called a reference portfolio. A typical SAA contains a target allocation to listed asset classes, such as bonds and equities, as well as to a number of unlisted investments, such as hedge funds and infrastructure. An alternative to the SAA-approach, used by the Canada Pension Plan Investment Board, NZ Super Fund, and GIC of Singapore, is a reference portfolio approach. Under this approach, the SWF owner sets a benchmark (the reference portfolio), which is comprised only of liquid and listed asset classes and an appropriate numeraire currency. The reference portfolio forms an implementable guide to the owner's risk preference, while at the same time granting more discretion to the SWF manager to determine the appropriate mix of unlisted, less liquid assets.

²⁵ Ideally, investment returns will be negatively correlated to fiscal revenues.

²⁶ Brinson et al. (1986), and Ibboston et al. (2000).

Explicit statements on risk tolerance aid consistency, transparency, and accountability.²⁷ A risk appetite statement sets out more explicitly the tolerance for risk embodied in the choice of an SAA or reference portfolio. It includes both expectations that are on average through time, and tolerance through the shorter-term cycles. The expression of risk tolerance might be in terms of a stress loss or a drawdown limit, such as “the prospective losses from the fund shall not exceed x percent over a period of y years.” Risk appetite statements can also relate to non-investment risks (e.g., reputational risk). It also aids in consistency by making obvious any procyclical change in risk appetite as markets go through crises (where some investors tend to reduce their risk tolerance) and bubbles (where they tend to increase it).²⁸

The fund’s objective and the owner’s risk tolerance help determine what investment constraints are appropriate. For example, a stabilization fund might not be able to invest in domestic assets, or in any investment that is likely to go down in value at the same time that a withdrawal from the fund is required. Constraints can also include a limit to any single manager, asset, or opportunity in order to avoid any undue concentration.

The choice of the numeraire currency is SWF specific. Various countries have arrived at different numeraire decisions based on the characteristics of their funds. The relevant yardstick for investments is the *international* purchasing power of the fund. Therefore, returns are usually measured in foreign currency terms. Some countries use one currency, often the United States dollar (Chile, Timor-Leste). Other countries (Norway, Singapore (GIC)) use a weighted basket of foreign currencies.²⁹

Benchmarks for each constituent asset class of the SAA should represent the full universe of assets that an investor could hold on a passive basis. The index should also, to the extent possible, be one that is constructed with objective selection criteria, and is complete, replicable, investable, and accepted by investors.

Active risk budgets establish on average *ex ante* expectations of the amount of active risk that will be taken in a fund. A formal active risk budget seeks to optimize the expected extra return for the SWF by allocating more active risk discretion to managers (who are considered to be better at generating risk-adjusted returns), while controlling for the fund’s total deviation from the SAA. In most actively managed SWFs, the SAA risk (that is, the risk inherent in the benchmark) remains the majority of the total risk, with active risk contributing

²⁷ Some SWFs, such as those in New Zealand and Singapore, specify the risk tolerance. The Chilean Social and Economic Stabilization Fund does not define a quantifiable risk tolerance level.

²⁸ Papaioannou et al. (2013), and Jones (2013, 2016).

²⁹ In the case of Norway, for instance, the real return on the fund is calculated as nominal return in foreign currency, adjusted for a weighted average of inflation in the countries that constitute the benchmark of the fund. Even if returns are measured in foreign currency, the accounts of SWFs are usually presented in local currency.

a much smaller amount.³⁰ A clearly stated transition strategy should be used whenever there is a decision to adjust the SAA or the active risk budget.³¹

A Statement of Investment Policies gives the appropriate strategic focus to the investment management of SWFs:

- the classes of investment assets in which the fund is to be invested and the selection criteria for investment assets within those classes;
- the determination of benchmarks or standards against which the performance of the fund as a whole and the classes of, and individual, investment assets will be assessed, including numeraire currency;
- the balance between risk and return in the fund;
- the constraints on investment of the fund, including the concentration risk limits;
- the organizational structure for the investment and management of the fund, including the policies for the appointment and oversight of the external investment managers;
- policies on voting rights on behalf of the owner;
- the use of derivative financial instruments and leverage, including principles covering implicit leverage achieved through the use of derivatives and reinvestment of cash collateral provided in connection with securities lending or repurchase agreements; and
- the management of credit, liquidity, operational, currency, market, and other risks.

Risk Management

It is difficult for an SWF to separate risk management from investment management, as risk is typically on the other side of the coin than return. Investment policies set out the SWF's thinking about its investment strategy and management of investment risk, whereas the investment strategy sets out in which assets the portfolio is to be invested. Policy statements may be prescriptive (for example, "The fund will only use derivatives to hedge market risk") or principles based (for example, "Executive Management will maintain a schedule setting out how derivatives are used in establishing active risk positions for each active risk strategy.") Principles-based policy statements establish guidelines rather than prescribe the policy itself.

A rebalancing policy should be designed to minimize rebalancing costs while controlling for deviation from the SAA. For simple portfolios, calendar-based rebalancing (for example, rebalancing at the end of every month) would be sufficient, but for more complex portfolios, risk-based rebalancing (for example, rebalancing when the risk of the portfolio exceeds a

³⁰ Ang et al. (2009).

³¹ There are many examples of a staged transition to riskier assets, including the Norwegian SWF, which moved from a bond portfolio into 40 percent equities after two years, but then took a further 20 years to move into real estate. The New Zealand SWF moved immediately into the desired portfolio of effectively 80 percent equities, but took a number of years to increase in stages its exposure to active risk strategies including illiquidity.

specified limit) would allow for the movements in the various asset classes to offset each other in risk terms.

In its broadest sense, risk for an SWF is the potential to not achieve the fund's objectives. Risks include financial risks (e.g., market risk, currency risk, credit risk, and liquidity risk), and also operational risk (error, fraud), strategic risk (governance risk, agency risk, the risk of poor organizational design), and regulatory risk.

There are some risks that are not compensated with return, and these risks should be managed with a view to balancing risk against risk mitigation cost. Elimination of risk is not always possible, because many risks (for example, operational and agency risks) are unavoidable in the implementation of the investment strategy. In some instances, elimination or mitigation is not desirable due to a judgment that the risk mitigation cost is too high when compared to the implications of the risk that is to be mitigated.

A risk analytics team or external providers can help SWFs to ensure a full understanding of the fund's market risk(s). Estimates of the risks inherent in the fund's SAA and active management program lead to a better understanding of the fund's potential vulnerabilities. Examples of risks typically analyzed include asset volatility, correlation across asset classes and sub-asset classes, sensitivity to macroeconomic variables, contribution from non-numeraire currency exposures, susceptibility to liquidity events, and downside risk due to diverse market distress scenarios.

Risk policies should clearly set out both the approach to risk management and the risk parameters, as well as the timetable for review of both the approach and the parameters. A fund with a stable investment horizon and a dynamic asset allocation program, that allows them to react to changed market conditions in real time, might review the SAA every three years. A review period of one year is more appropriate for a fund that is less mature or that does not engage in dynamic asset allocation. Events that trigger a review include a change in investment objective or a change in investment horizon.

The use of derivatives is an integral part of investment management. Derivatives are often used to reduce risk by hedging components of an investment (e.g., credit risk) that do not suit the mix of other assets in a portfolio, the fund purpose, or the risk appetite of the owner. Derivatives can also be used to obtain exposure to global equities or bonds in a cost-efficient manner and they can be used to implement active risk taking. The use of derivatives can be complex and can create unintended credit, currency, liquidity, and leverage exposures, in turn creating reputational risk and the risk of significant financial losses. These characteristics call for much higher controls, than for other investments, on derivative use and monitoring of any associated leverage, credit, liquidity, currency, and market risk implications.