What Asset-Liability Management Strategy for Sovereign Wealth Funds?

March 2012
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Foreword

The publication that we are pleased to present here covers the industry reactions to an EDHEC-Risk Institute study entitled “Asset-Liability Management Decisions for Sovereign Wealth Funds,” which was the foundation paper of the eponymous EDHEC-Risk Institute research chair endowed by Deutsche Bank and led by Lionel Martellini, the scientific director of EDHEC-Risk Institute.

That study put forward a model to optimise the investment and risk management practices of sovereign wealth funds, which can be regarded as the extension to sovereign wealth funds of the liability-driven investing paradigm recently developed in the pension fund industry. The model suggested that the investment strategy of a sovereign wealth fund should involve a state-dependent allocation to three main building blocks: a performance-seeking portfolio, an endowment-hedging portfolio, and a liability-hedging portfolio.

The objective of the current publication is to compare these research conclusions with current perceptions by sovereign investment professionals. There is indeed widespread belief in the public that sovereign wealth funds are long-term investors free of liabilities and short-term constraints and as such have nothing to gain from dynamic asset-liability management (ALM) approaches.

The industry reactions that we collected offer a strong rebuttal of these perceptions in that a large majority of the sovereign investment practitioners surveyed manage short-term constraints and implicit liabilities and they believe that the ALM framework provides a better understanding of optimal investment policy and risk management practices. The majority of respondents also recognise the need to hedge endowment fluctuations and endorse the approach put forward by the foundation paper.

This has important potential implications in terms of the emergence of genuinely dedicated ALM and risk management solutions for sovereign wealth funds, the lack of which practitioners lament.

Practitioners’ responses also point to the need for further applied research and education with a view to illustrating how the dynamic ALM approach presented can be tailored to a particular fund and its specific model of corporate governance.

We would like to thank all the respondents who took the time out of their busy executive schedules to react to our study. Without their participation, this publication would not have been possible.

We would also like to express our gratitude to our partners at Deutsche Bank for their commitment to this research chair.

We hope that you will find the results of our call for reactions both interesting and informative.

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Executive Summary
Executive Summary

Sovereign Wealth Funds (SWFs) are long-term investors with a significant impact on international financial markets. According to some estimates, SWF assets under management are nearing USD5 trillion. Broadly speaking there are three kinds of SWFs – natural resources funds (e.g. Abu Dhabi and Kuwait), foreign reserve funds (e.g. China and Singapore), and pension reserve funds (e.g. Australia and New Zealand).

In view of the rapid growth of SWFs, it is important to study their optimal investment policy and risk management practices; this was the objective of the research chair set up by EDHEC-Risk Institute and Deutsche Bank as early as 2009. To date, the research chair publications have adapted the asset-liability management (ALM) framework applied in the pension fund industry to the unique characteristics of SWFs and explored the management of natural resources funds. This report presents the results of the research chair’s foundation paper – a dynamic ALM model developed to guide asset allocation and risk management decisions at the SWF level, and describes the results of a call for reaction on its theoretical and practical appeal for sovereign fund management.

By analysing the optimal investment policy of an SWF in a dynamic ALM framework, the approach formalises the effect of key inputs on the optimal policy, such as the state’s investment and consumption objectives.

The formal dynamic asset allocation model developed captures the most prominent factors such as the stochastic nature of the sovereign fund’s endowment process, the stochastic properties of the sovereign fund’s expected consumption streams and, naturally, the stochastic features of the assets held in the portfolio. In this context, the publication shows that the optimal asset allocation strategy involves three main building blocks: (i) a performance-seeking portfolio (PSP), (ii) an endowment hedging portfolio (EHP), and (iii) a liability hedging portfolio (LHP), as well as hedging demands for risk factors impacting the stochastic opportunity set. The allocation between the building blocks is dynamic and state-dependent because it is a function of the investment horizon and the values of key market parameters such as volatility and equity risk premium.

The EDHEC-Risk Institute foundation paper on ALM for SWFs established that their optimal investment policy should involve three building blocks: a performance seeking portfolio (PSP), an endowment-hedging portfolio (EHP) and a liability-hedging portfolio (LHP) and also hedging demands arising from a stochastic opportunity set.

The PSP building block has a standard structure and is typically invested in asset classes offering risk premia to provide the highest risk-adjusted returns. With a long-term investment horizon, higher margin for error, and absence of regulatory constraints, SWFs are able to seek higher risk investments compared to other public investment funds. Unlike the PSP, EHP and LHP building blocks must be customised to meet the specific needs of each SWF. The EHP needs to be customised to hedge the SWF’s endowment streams. The endowment stream of the SWF can be related to the world economic growth or commodity price fluctuations, depending on the source of funding for the SWF, which has a huge
impact on the composition of the EPH. It is important to recognise that in some cases the fluctuations in the endowment stream cannot be replicated by a traded asset which poses additional challenges unique to the EHP building block. The LHP building block is used to hedge against interest rate risk and/or inflation risk and is typically invested in bonds or assets which exhibit inflation hedging properties.

Apart from the general structure of the optimal investment policy, there is another important aspect. Even though SWFs are regarded as long-term investors, they could face a variety of short-term constraints of different types. Examples include a limit on the maximum drawdown over a given period or minimum performance requirement due to peer comparison, loss aversion or sponsor risk. As a consequence, SWFs could also benefit by implementing a dynamic risk-controlled allocation strategy designed to meet short-term goals and constraints.

Following the publication of its foundation paper, EDHEC-Risk Institute issued a call for practitioners’ reactions to the application of ALM in sovereign wealth funds. Reactions show that most practitioners find that applying an ALM framework to SWFs allows for a better understanding of optimal investment policy and risk management practices. However, there is concern that the three building blocks suggested could be too simple to match the strategic objectives of the SWF.

A large majority of the sovereign investment practitioners surveyed manage short-term constraints and implicit liabilities and they believe that the ALM framework provides a better understanding of optimal investment policy and risk management practices. The majority of respondents recognise the need to hedge endowment fluctuations and endorse the approach put forward by EDHEC-Risk Institute. Sovereign investment practitioners lament a lack of dedicated ALM and risk management solutions.

It is a common misconception that SWFs do not have explicit liabilities and, as a result, an ALM framework would not be appropriate for SWFs’ investment and risk management. Respondents to this survey confirm that applying a dynamic ALM framework offers important insights to SWFs’ optimal investment and risk management. A brief summary of the results follows below.

89% of the sovereign investment practitioners surveyed think that SWFs are subject to implicit short-term constraints;

89% of the respondents recognise that they have to manage implicit liabilities either frequently or occasionally;

92% of the respondents think that implicit liabilities should be taken into account;

70% of the respondents agree that the ALM framework provides SWFs with better understanding of optimal investment policy and risk management practices;

63% agree that there is a need to hedge endowment stream risk;

A majority of the respondents agree that the dynamic ALM model proposed by EDHEC-Risk Institute is appropriate;
A majority of the respondents report a lack of dedicated solutions for ALM and risk management by SWFs.

While the majority of respondents find the fund separation approach appropriate for SWFs, some express concerns that using the three main building blocks for decision making would oversimplify the investment decisions. However, the framework is fully customisable and in reality, the structure of the building blocks, as well as the dynamic allocation between them, would reflect the objectives and the constraints of each particular SWF. The expressed concerns indicate that more applied research and education are needed to illustrate how the approach can be tailored to a particular fund.

Another obstacle mentioned by some respondents is that ALM is generally viewed as a country-level approach while SWFs may be managed separately from the rest of the state’s asset and liabilities. While the follow-up publication to the foundation paper showed how to extend the framework to account for the sovereign sponsor’s economic balance sheet in the optimal policy, doing so is usually not expected of SWF managers. This indicates the need to engage multiple stakeholders managing state assets and liabilities and for further research into solutions tailored to particular models of corporate governance. In fact, integrated ALM does not require giving a single entity control of all assets and liabilities. Management of the sovereign assets and liabilities can continue along the existing administrative lines provided the SWF is given information about the state assets and liabilities beyond its control and its mandate is updated so that these assets and liabilities can be taken into account when defining investment policy.
Introduction
Sovereign wealth funds (SWFs) have become a significant force on international financial markets. Current assets under management by SWFs are estimated to be nearing USD5 trillion.¹ There are three main groups of SWFs – natural resources funds, foreign reserve funds and pension reserve funds. The first group of SWFs are owned by resource rich countries and their mandates are typically to maintain economic stability against commodity price fluctuations and to invest for future generations. The second group of SWFs are set up by countries with current account surpluses; their objectives are to earn a higher return on their foreign reserves and to hedge the risk factors impacting the surpluses. The last group of SWFs includes pension reserve funds, which are managed separately from the state pension funds to meet the needs of an ageing population.

In contrast to the traditional management of foreign exchange reserves by central banks, SWFs are managed as investment funds and are, thus, allowed to invest in a variety of asset classes with different risks. The rapid growth and size of SWFs have posed a series of challenges for financial markets and sovereign states. The unique features of this relatively new group of investors and their potential economic impact at home and abroad call for the development of dedicated techniques and solutions for optimal risk and investment management.

In a recent publication of the research chair established with Deutsche Bank at EDHEC-Risk Institute, Martellini and Milhau (2010) examined the specific investment needs of SWFs and proposed applying the asset-liability management (ALM) approach to SWFs. The study proposes a quantitative dynamic asset allocation framework to analyse the optimal investment policy of SWFs modelled as long-term investors managing fluctuating assets, state contributions and liabilities. The results suggest that the investment strategy for an SWF should primarily involve an allocation to three building blocks: (i) a performance-seeking portfolio (PSP), (ii) an endowment-hedging portfolio (EHP), and (iii) a liability-hedging portfolio (LHP). The allocation between the building blocks depends on the investment horizon and the values of key market parameters such as volatility and risk premia, which implies that the allocation is dynamic and state-dependent as it is a function of market conditions.

The structure of the PSP building block is standard; its goal is to deliver the highest risk-adjusted returns. The EHP and the LHP building blocks, however, have to be customised depending on the nature of the SWF. The EHP is customised to hedge the exposure of the SWF to the endowment stream, and the LHP to hedge the risks to which liabilities are exposed – typically the interest rate risk and the inflation risk. It should be noted that although SWFs do not have explicit future liabilities, they do have contingent liabilities to meet future needs depending on the nature of the SWF (e.g. pension or government budget needs). ALM techniques have already been adopted by pension funds and insurance companies for portfolio management in the presence of future liabilities; the liability-driven investing (LDI) paradigm has been very popular in recent years. The approach suggested for SWFs can be

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¹ - These figures are from TheCityUK, whose February 2012 report puts assets under management at other sovereign investment vehicles, such as pension reserve funds, development funds and state-owned corporations’ funds, at USD7.2 trillion, and records official foreign exchange reserves, usually held by central banks, at USD8.1 trillion.
viewed as an extension of LDI that has been tailored to SWFs.

To compare current industry perceptions and practices with the conclusions drawn by the EDHEC-Risk Institute foundation paper on the application of ALM to SWFs, we surveyed SWF investment officers for their viewpoint on the potential application of ALM in the portfolio management process. In addition to describing the reactions of SWF investment officers, this report briefly reviews the fundamental idea of analysing the optimal investment policy of an SWF in the ALM framework.

The report proceeds as follows: we present the basic ideas on the application/suitability of ALM to SWFs; we then proceed to analyse the industry views of using ALM in SWFs; finally, we present the detailed survey results.
Introduction
1. ALM Decisions in Sovereign Wealth Funds
1. ALM Decisions in Sovereign Wealth Funds

Sovereign wealth funds have become a significant factor on financial markets. Current assets under management by SWFs are estimated to be nearing USD5 trillion and their impact is expected to increase substantially.

Generally, SWFs can be divided into three main groups. The first, and the biggest, group is made of the natural resources funds. It is estimated to manage about 70% of the total sovereign wealth fund asset holdings. The three biggest oil-based SWFs recently accounted over 50% of the assets held by SWFs. Examples of natural resources SWFs include Abu Dhabi Investment Authority (ADIA), Kuwait Investment Authority (KIA) and Norway’s Government Pension Fund – Global (GPFG). The endowment stream of these funds comes from extraction revenues and the exportation of natural resources (oil in most cases). Their goal is to maintain economic stability against commodity price fluctuations and to engage in inter-generational planning by ensuring that future generations also benefit from the depletion of natural resources by the current generations.

The second group of SWFs is the foreign reserve funds. The group includes the SWFs of a number of Asian countries, such as the China Investment Corporation (CIC), the Korea Investment Corporation (KIC) and the Government of Singapore Investment Corporation (GIC). The endowment stream of these SWFs is linked to the current account surplus of the corresponding economies, and their objective is to hedge away the factors behind the commercial surpluses. Another goal may be to generate higher returns than local sterilisation bond costs related to the issuance of sovereign debt aimed at reducing the monetary base expansion caused by capital inflows.

The last, and much smaller, group of funds is made of the pension reserve funds; examples include the Australian Government Future Fund, the New Zealand Superannuation Fund and Ireland’s National Pensions Reserve Fund. The objective of these funds is to meet the government’s future cost of funding pension liabilities, which are expected to balloon with an ageing population.

The fast growth of SWFs emphasises the importance of better understanding their optimal investment policies and risk management practices. In spite of the size of the SWF ‘industry’ and maybe because of its diversity, there is no consensus on an investment management approach. There are also significant challenges for the sovereign states because, unlike other types of investment vehicles, an SWF is owned by the government. One way to gain a better understanding of the optimal investment policies is to view SWFs as long-term investors and pose the investment management problem in a formal dynamic asset-liability management (ALM) framework. The approach is flexible and can be extended in various directions.

In this section, we briefly describe the implications of the optimal solution resulting from solving the investment management problem for SWFs. We then discuss possible extensions that can account for features identified as important by the survey participants.

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2 - See Martellini and Millhau (2010).
3 - See Scherer (2009a) and Scherer (2009b) for additional details.
4 - The purpose of the Australian Government Future Fund is to meet the government’s future liabilities for the payment of superannuation to retired public employees. The New Zealand Superannuation Fund was created to partially provide for the future cost of funding New Zealand’s superannuation payments. Ireland’s National Pensions Reserve Fund is supposed to partially fund future pension liabilities. Its objective is to meet as much as possible the costs of social welfare and public service pensions from 2025 onwards when these costs are projected to increase dramatically due to the ageing of the population.
Application of a Dynamic Asset-Liability Management Framework to SWFs

Asset liability management is a common framework applied to long-term investors and one that could therefore be insightful for SWFs. In the pension fund industry, liability-driven investing (LDI) has become a popular approach. Applying a dynamic ALM framework to SWFs could be viewed as an extension of LDI that has been tailored to SWFs. The approach is appealing because, despite the highly stylised nature of the framework, it leads to a tractable solution allowing one to fully understand the structure of the optimal allocation strategy.

In fact, there is widespread belief that SWFs have no liabilities. Although this may be true from a bottom-up viewpoint, it is not true from a top-down view of a sovereign manager. There is a clear case to be made that SWFs face implicit liabilities and, therefore, an integrated framework allowing for modelling asset and liabilities makes sense.

The approach formalised in the EDHEC-Risk Institute publication includes the most prominent factors in SWF management. In particular, it takes into account the stochastic features of the SWF endowment process, the stochastic features of the SWF consumption stream (which takes the form of an inflation-linked investment benchmark), and the stochastic properties of the assets held in the portfolio. As a consequence, the liabilities are not modelled as an explicit well-defined schedule of expenses. Rather, they are implicitly present because of the inflation-linked benchmark; that is, the preferences of the representative SWF are expressed over real as opposed to nominal wealth.

The optimal allocation policy consists of several building blocks. In finance, results of this kind are known as fund separation theorems. One of the building blocks is a portfolio dedicated to performance generation, also known as the performance-seeking portfolio (PSP). The PSP building block has a standard structure and its objective is to deliver the highest possible risk-adjusted returns. It is typically invested into equities although any asset class with risk premia is a natural candidate.

Another building block is the liability-hedging portfolio (LHP). Since we consider an inflation-linked benchmark, this building block is in fact an inflation-hedging portfolio. It is invested in assets exhibiting attractive inflation-hedging properties (e.g. inflation-linked bonds) or real assets exhibiting inflation tracking properties.

A third building block is the endowment-hedging portfolio (EHP). The goal of the EHP is to hedge the risk exposure of the fund endowment stream and it exists because the endowment stream depends on stochastic variables. In the case of resource-based SWFs, this is the price of the resource (e.g. oil) and in the case of foreign reserve funds, it is more complicated and depends on the macroeconomic factors that influence the commercial surplus. Generally, the EHP consists of assets that are negatively correlated with the stochastic variables influencing the endowment stream. For instance, in the case of an oil-based SWF,
1. ALM Decisions in Sovereign Wealth Funds

this building block could involve short position in oil commodity futures or long positions in companies such as airlines benefiting from a decrease in the price of oil. In the case of the Chinese SWF, a big risk factor is a slowdown of US consumer demand and, therefore, the EHP building block may involve short positions in stocks of US retailers. At any rate, the structure of this building block is highly dependent on the particular SWF.

Finally, there are other building blocks called hedging demands for risk factors that have an impact on the investment opportunity set, most notably interest rates and equity risk premia.

Possible Extension to the Dynamic ALM Framework for SWFs

The model can be extended in different directions. The structure of the EHP building block needs to be better understood because, very often, the endowment stream cannot be replicated by a traded asset. This is especially true for the foreign reserve funds where the endowment stream is generally influenced by worldwide economic growth.

Another direction for improvement is incorporation of short-term constraints. Even though SWFs are regarded as long-term investors who are not subject to strict regulation (unlike pension funds), they could face a variety of short-term constraints. One of them involves shortfall constraints over a given horizon linked to a benchmark. Another type of constraint could be a requirement to draw back from investments abroad in order to increase investments in the home country.

Minimum performance requirements may also arise because of peer comparison or loss aversion. These considerations suggest that dynamic risk-controlled strategies could be beneficial for SWFs. In fact, strategies of this type are specifically designed to meet short-term goals and constraints and have been suggested for the pension fund industry. There has been a fierce debate on advantages and disadvantages of introducing short-term constraints through tighter regulation and the related welfare loss impacting the long-term objectives of pension funds. Analysis in a formal dynamic asset allocation framework by Martellini and Milhau (2009) suggests that long-term objectives and short-term constraints can be reconciled.

Finally, looking at the SWF’s assets and (implicit) liabilities in isolation from the State presents another limitation since, unlike other types of investment vehicles, an SWF is owned by the state. This holds especially for funds financed through foreign exchange reserves. This is because reserve accumulation in managed exchange rate regimes is usually accompanied by sterilisation through issuance of local currency debt. In fact, we can think of these types of SWFs as being financed through borrowed funds in local currency because of the sterilisation. As a consequence, it is not clear that the assets under management represent net sovereign wealth because both the assets of the fund and the liabilities in terms of local debt on the side of the state grow. Disregarding the size of the debt in local currency relative to the value of the assets of the fund (also known as economic leverage) could lead to relatively more
aggressive allocation policies. These arguments call for inclusion of other sovereign liabilities in the framework. This avenue was explored by Scherer (2011) in a follow-up EDHEC-Risk Institute publication that integrated the economic balance sheet of the sponsor in the optimal asset allocation problem of the SWF. The example below draws on this work to provide additional support for the idea of applying the ALM framework to SWF management.

The left side of the balance sheet contains the sovereign assets and the right side shows how the economy is financed. When the foreign reserves increase due to exports, and a part of the reserves are transferred to the SWF, the left side of the balance sheet increases. The increase in assets would normally lead to currency appreciation under a flexible exchange rate regime. However, under a managed exchange rate regime, the central bank creates domestic currency and, to avoid expansion in the monetary base (a rise in liquidity) during exchange rate interventions, the central bank sells debt in local currency. In this case, both the size of the SWF and the local currency debt increase and we can think of the SWF as being financed by issuing local currency debt. In effect, looking at the increase of assets alone is misleading because sovereign liabilities accumulate as well. In other words, there is an increase in economic leverage.

1. ALM Decisions in Sovereign Wealth Funds

The example: Foreign reserves-based SWFs

To illustrate the application of the ALM framework in SWF investment and risk management, we consider the case of an Asian SWF financed by foreign reserves. Many Asian countries are net exporters and have accumulated huge foreign reserves. They usually manage their currencies under a managed exchange rate regime under which the central bank has to purchase foreign currencies, such as the US dollar, in order to keep its currency from appreciating. In a straightforward implementation, domestic currency would be created to purchase foreign currency which would create excess liquidity in the domestic market, and eventually lead to inflation. To avoid the problem of excess liquidity in the domestic market, the central bank carries out a sterilisation operation to eliminate the excess liquidity that involves the issuance of local currency denominated debt. As a consequence, the SWF could be deemed to be financed by the funds borrowed through bond issuance.

The SWF is created via foreign reserves accumulation which, when combined with the sterilisation operation, leads to an expansion of the balance sheet both on the asset and liability sides. See Exhibit 1 for a simplified version of a sovereign balance sheet.

An EDHEC-Risk Institute Publication
Scherer (2011) shows that economic leverage leaves hedging demands unchanged but high economic leverage strongly reduced speculative demand. The increases in economic leverage should lead to a more conservative asset allocation policy; that is, the allocation to the PSP component should be smaller than it would be without considering the liability side. On the other hand, there would be pressure on the PSP component to deliver more than the interest paid on the local debt, which is a liability of the State. Finally, an inflation-linked target would determine the composition of the LHP building block. Such a target would be an implicit liability for the SWF, in contrast to the explicit liabilities on the sovereign balance sheet.

As far as the EHP is concerned, the SWF would find it desirable to invest in assets that have negative correlation with the factors impacting their exports. In the case of China, the main risk factor for its primary budget is a slowdown in US consumer demand. Thus, to hedge against a fall in the flow of funds into China’s SWF due to a fall in consumer goods exported to the US and due to currency appreciation, China’s SWF would not hold stocks of US retailers and may consider shorting this sector.

For an example of risk management for oil-based SWFs, see Scherer (2009a) and Scherer (2009b).
2. The Practitioners’ View on Introducing ALM Techniques into Sovereign Wealth Funds: Key Findings
2. The Practitioners’ View on Introducing ALM Techniques into Sovereign Wealth Funds: Key Findings

We provide a summary of the call for reaction and group the survey results into 3 main points.

92% of survey respondents think that implicit liabilities should be taken into account
The majority of the respondents think that SWFs are subject to short term constraints due to peer comparison, loss aversion and sponsor risk. Even though SWFs are long-term investors without explicit liabilities, they have to manage implicit liabilities related to the objectives of the fund, the source of its revenues and the future uses of its wealth. Most of the SWFs manage implicit liabilities and 92% of the respondents feel that implicit liabilities should be taken into account when making investment decisions. Some respondents specifically state the importance of sponsor risk contributing to implicit short-term constraints.

70% of the respondents think that ALM provides better understanding of optimal investment policy and risk management practices but the majority of respondents lament the lack of dedicated ALM solutions for SWFs
More than half of the respondents (56%) agree that there is a lack of dedicated ALM and risk management solutions for SWFs. In particular, respondents think that such issues have not been given much practical consideration or priority. In addition, the respondents agree that extending the liability-driven investing (LDI) paradigm developed in the pension fund industry to SWFs provides a better understanding of the optimal investment policy and risk management practices.

A majority of respondents agree that the dynamic ALM model introduced by EDHEC-Risk Institute is appropriate; however further educational efforts are required to underline how it is customised to an individual SWF’s circumstances
Although a majority of the respondents feel that there is a need to manage implicit liabilities (92%) and hedge risk emanating from endowment fluctuations (63%), slightly more than half of the respondents (55%) agree that an investment strategy for an SWF should involve the three building blocks: PSP, EHP and LHP. The respondents who do not agree that the building-block investment approach is appropriate for them feel that it may oversimplify asset allocation decisions. They claim that the investment strategy should be specific to the SWF’s strategic investment objectives. This concern, however, is addressed by properly customising the structure of the building blocks to meet the objectives of specific SWFs. The fund separation property is a general characteristic of the optimal investment policy, but the structure of the building blocks would in practice be driven by the particular constraints and objectives of each SWF. This result suggests that further educational efforts are required to underline how the approach is customised to fit the characteristics and objectives of individual SWFs.

After this broad overview of the survey findings, we turn to the detailed results.
3. Detailed Survey Results
3. Detailed Survey Results

**Methodology and Survey Participants**

Our call for reactions contained a questionnaire consisting of seven multiple choice questions, with the possibility of adding further comments related to the questions. The questionnaire was sent to sovereign wealth funds and public bodies who are responsible for managing sovereign investments. Most of our 27 respondents are SWFs from Asia-Pacific and Middle Eastern countries. The survey period is from 23 February 2011 to 2 December 2011.

The breakdown of the domicile of the respondents is shown in Exhibit 2. Some 33% of respondents (9) are from Asia-Pacific, 30% (8) are from Europe while 11% (3) are from Africa and 7% (2) are from other regions. The majority of the respondents come from Asia-Pacific and the Middle East, which is not surprising because most of the SWFs are set up by foreign reserve surplus countries in Asia and resource rich countries in the Middle East.

The breakdown by type of fund is shown in Exhibit 3. Sovereign wealth funds make up 45% of the respondents, central banks make up 37%, while 11% of respondents work in state reserve funds and 7% represent sovereign development funds.

The breakdown of the respondents’ job positions is shown in Exhibit 4. The majority of respondents have direct responsibility in managing the funds. 8% of the respondents are Chief Executive Officers (CEO), 37% are Chief Financial Officers (CFO) or Chief Investment Officers (CIO) or Chief Risk Officers (CRO), 15% of the respondents are Heads of Unit, 33% are investment or risk officers and 7% have other titles.

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8 - Some countries do not set up a SWF but manage all foreign reserves through the country’s central bank.
9 - Although a strict definition does not exist, State Reserve Funds are usually set up by governments to manage explicit foreseeable liabilities. Examples include FRR in France and NTMA in Ireland.
10 - Sovereign development funds are funds set up by governments for development purposes such as agriculture investment and development.
3. Detailed Survey Results

In the first two questions, the survey participants were asked about their views on the implicit liabilities of sovereign wealth funds.

89% of the respondents agree that SWFs have to manage implicit liabilities
Survey respondents were asked if they feel that SWFs have to manage implicit liabilities. As shown in Exhibit 6, 48% of the respondents feel that SWFs have to manage implicit liabilities frequently while 41% of the respondents feel that SWFs have to manage implicit liabilities occasionally. Only 7% of the respondents feel that SWFs never have to manage implicit liabilities while 4% of the respondents have no opinion.

Exhibit 5: Are SWFs subject to implicit short-term constraints?
In spite of the fact that sovereign wealth funds often do not have explicit short-term constraints or objectives, do you consider them to be subject to implicit short-term constraints (max drawdown, minimal performance, etc) due to peer comparison, loss aversion or sponsor risk?

Exhibit 6: Do SWFs have to manage implicit liabilities?
Even though SWFs are mostly presented as accumulation funds without explicit liabilities, do you feel that they have to manage implicit liabilities such as the objectives assigned to the funds, the source of their revenues, or the future use of the wealth?
92% of respondents think implicit liabilities should be taken into account

Next, the respondents were asked if these liabilities should be taken into account. Exhibit 7 shows that 92% of the respondents think that the implicit liabilities should be accounted for. This highlights the importance of implicit liabilities such as the future use of the wealth.11

Exhibit 7: Should these liabilities be taken into account?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>48%</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

The next set of questions turns to the central issue studied by the research chair: the potential application of ALM techniques to SWFs, including the need to hedge the risk of endowment streams and also fund separation in general.

56% of the respondents agree that there is a lack of genuinely dedicated asset-liability management solutions for SWFs

A majority of the respondents think that there is lack of appropriate solution for asset-liability management and risk management for SWFs. As shown in Exhibit 8, 8% of the respondents strongly agree and 48% of the respondents agree that there is a lack of appropriate solutions for asset-liability management and risk management. 22% of the respondents neither agree nor disagree while 22% disagree that there is a lack of appropriate solutions.

Exhibit 8: Is there a lack of dedicated solutions for SWFs?

EDHEC-Risk Institute’s research is a response to a perceived lack of genuinely dedicated asset-liability management and risk management solutions for sovereign wealth funds. Do you believe that there is indeed a lack of appropriate solutions?

<table>
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<th>Strongly agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly disagree</th>
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<tr>
<td>Respondents</td>
<td>8%</td>
<td>48%</td>
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70% of the respondents agree that the ALM framework provides a better understanding of optimal investment policy and risk management

When asked if the insights from applying an ALM framework help in understanding optimal investment policy and risk management practices for SWFs, a majority of the respondents react positively. As shown in Exhibit 9, 15% of the respondents strongly agree and 55% of the respondents agree that extending the liability-driven investing (LDI) paradigm provides a better understanding of optimal investment policy and risk management practices. The remaining 30% of the respondents neither agree nor
3. Detailed Survey Results

disagree on the helpfulness of the approach. One of the respondents, who neither agrees nor disagrees, thinks that the framework is only suitable for pension fund modelling. This indicates that some SWFs are not aware of the usefulness and flexibility of the ALM approach and that it can be tailored to meet the specific objectives of SWFs.

Exhibit 9: Does ALM provide better understanding of investment and risk management? Do you agree with EDHEC-Risk Institute that extending the liability-driven investing (LDI) paradigm recently developed in the pension fund industry to sovereign wealth funds provides a better understanding of optimal investment policy and risk management practices?

63% of respondents agree that it is necessary to hedge against fluctuations in the endowment stream

Next, the respondents were asked about the need to hedge the risk from fluctuating revenues to the fund. Most of the respondents see the need to hedge the risk exposure of the stochastic endowment stream. As shown in Exhibit 10, 19% of the respondents strongly agree and 44% of the respondent agree that hedging against fund inflow risk is needed, 15% of the respondents neither agree nor disagree while 22% of the respondents disagree.

Exhibit 10: Is there a need to hedge endowment stream volatility? The work highlights in particular the need for a hedge against the risk emanating from fluctuating revenues to the fund. Do you agree that this need exists?

A majority of the respondents agree that the investment approach consisting of three building blocks (PSP, EHP and LHP) is appropriate

Finally, we turn to the fund separation result describing the structure of the optimal allocation policy. The optimal investment policy consists of three main building blocks: a performance-seeking portfolio, an endowment-hedging portfolio and a liability-hedging portfolio. Respondents were asked whether they find this investment approach appropriate. More than half of the respondents (55%) agree the approach is appropriate – 11% of the respondents strongly agree and 44% agree that the approach is appropriate. Further on, 22% of the respondents neither agree nor disagree, 19% of the respondents disagree and 4%
strongly disagree (see Exhibit 11). Those respondents that neither agree nor disagree fear that the approach may be overly simplistic. In their view, the investment approach should be more specific to the fund strategic goals and objectives. One of the respondents who disagrees finds the approach incompatible with the fund’s objectives as defined by the sponsor and recommends approaching the problem at the state level.

Exhibit 11: Is the fund separation approach appropriate?
The research results suggest that the investment strategy for a sovereign wealth fund should involve a state-dependent allocation to three building blocks: a performance-seeking portfolio, an endowment-hedging portfolio and a liability-hedging portfolio. Does this investment approach seem appropriate to you?
Conclusion
Conclusion

In this call for reaction, we asked sovereign investment practitioners about their views on the use of a dynamic ALM framework for SWF management. This report shows that practitioners appreciate the value of the approach. As far as the inclusion of liabilities is concerned, respondents agree that this is an important aspect as 92% of the practitioners in the survey think that implicit liabilities should be taken into account in an integrated framework. Clearly, practitioners see the need to manage the implicit liabilities and 70% of the survey respondents agree that a dynamic ALM framework provides a better understanding of optimal investment policy and risk management practices.

Some respondents express concerns regarding the implementation of the techniques in practice. In particular, individual SWFs have specific objectives and the investment approach has to be tailored to meet these objectives. Additional research into the application of ALM in the context of specific SWFs and, also, further education of SWFs would increase the adoption rate of the techniques. In fact, while the fund separation property characterises the optimal investment policy, the structure of the building blocks (especially that of the endowment and liability hedging portfolios) would reflect the objectives and the constraints of each particular SWF.

Another obstacle mentioned by some respondents is that the ALM approach is generally viewed as a country level approach while SWFs may be managed separately from the rest of the state’s asset and liabilities. This indicates there is a need to engage multiple stakeholders in the management of state assets and liabilities, as well as a need to conduct further research into solutions tailored to particular models of corporate governance. In fact, integrated ALM does not require giving a single entity control of all assets and liabilities. Management of the sovereign assets and liabilities can continue along the existing administrative lines, whereby an SWF is given information about the state assets and liabilities beyond its control. Such an approach only requires change to the mandate of the SWF so that the sovereign assets and liabilities outside of its control are taken into account when defining the investment policy.

In summary, the general opinion expressed by the respondents is that the dynamic ALM approach has the potential to add value to SWF investment and risk management practices, and it should be explored by investors and their solution providers.
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About EDHEC-Risk Institute
The Choice of Asset Allocation and Risk Management
EDHEC-Risk structures all of its research work around asset allocation and risk management. This issue corresponds to a genuine expectation from the market. On the one hand, the prevailing stock market situation in recent years has shown the limitations of diversification alone as a risk management technique and the usefulness of approaches based on dynamic portfolio allocation. On the other, the appearance of new asset classes (hedge funds, private equity, real assets), with risk profiles that are very different from those of the traditional investment universe, constitutes a new opportunity and challenge for the implementation of allocation in an asset management or asset-liability management context.

This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic “core-satellite” investment management in the framework of absolute return or target-date funds.

Academic Excellence and Industry Relevance
In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:
• Asset allocation and alternative diversification
• Style and performance analysis
• Indices and benchmarking
• Operational risks and performance
• Asset allocation and derivative instruments
• ALM and asset management

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in Singapore, which was established at the invitation of the Monetary Authority of Singapore (MAS), the City of London in the United Kingdom, and Nice, France. In addition, it has a research team located in the United States.

EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:
• Core-Satellite and ETF Investment, in partnership with Amundi ETF
• Regulation and Institutional Investment, in partnership with AXA Investment Managers
About EDHEC-Risk Institute

• Asset-Liability Management and Institutional Investment Management, in partnership with BNP Paribas Investment Partners
• Risk and Regulation in the European Fund Management Industry, in partnership with CACEIS
• Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation, in partnership with CME Group
• Asset-Liability Management Techniques for Sovereign Wealth Fund Management, in partnership with Deutsche Bank
• The Benefits of Volatility Derivatives in Equity Portfolio Management, in partnership with Eurex
• Structured Products and Derivative Instruments, sponsored by the French Banking Federation (FBF)
• Advanced Modelling for Alternative Investments, in partnership with Newedge Prime Brokerage
• Advanced Investment Solutions for Liability Hedging for Inflation Risk, in partnership with Ontario Teachers’ Pension Plan
• The Case for Inflation-Linked Corporate Bonds: Issuers’ and Investors’ Perspectives, in partnership with Rothschild & Cie
• Solvency II Benchmarks, in partnership with Russell Investments
• Structured Equity Investment Strategies for Long-Term Asian Investors, in partnership with Société Générale Corporate & Investment Banking

The philosophy of the Institute is to validate its work by publication in international academic journals, as well as to make it available to the sector through its position papers, published studies, and conferences.

Each year, EDHEC-Risk organises two conferences for professionals in order to present the results of its research, one in London (EDHEC-Risk Days – Europe) and one in Singapore (EDHEC-Risk Days – Asia), attracting more than 2,000 professional delegates.

EDHEC also provides professionals with access to its website, www.edhec-risk.com, which is entirely devoted to international asset management research. The website, which has more than 50,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC’s analysis and expertise in the area of applied portfolio management research. Its monthly newsletter is distributed to more than 1,000,000 readers.

EDHEC-Risk Institute: Key Figures, 2010-2011

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About EDHEC-Risk Institute

The EDHEC-Risk Institute PhD in Finance
The EDHEC-Risk Institute PhD in Finance is designed for professionals who aspire to higher intellectual levels and aim to redefine the investment banking and asset management industries. It is offered in two tracks: a residential track for high-potential graduate students, who hold part-time positions at EDHEC, and an executive track for practitioners who keep their full-time jobs. Drawing its faculty from the world's best universities and enjoying the support of the research centre with the greatest impact on the financial industry, the EDHEC-Risk Institute PhD in Finance creates an extraordinary platform for professional development and industry innovation.

Research for Business
The Institute’s activities have also given rise to executive education and research service offshoots. EDHEC-Risk’s executive education programmes help investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes. In partnership with CFA Institute, it has developed advanced seminars based on its research which are available to CFA charterholders and have been taking place since 2008 in New York, Singapore and London.

While EDHEC-Risk makes important public contributions to the advancement of applied financial research and the improvement of industry practices, the insights drawn from EDHEC-Risk’s “Indices & Benchmarking”, “ALM and Asset Management” and “Derivatives and Asset Management” research programmes over the past several years have led to a series of indices and benchmarks that provide more efficient or more academic-based solutions to investors’ needs than current offers available on the market.
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About Deutsche Bank
About Deutsche Bank

Deutsche Bank is a leading global investment bank with a substantial private clients franchise. Its businesses are mutually reinforcing. A leader in Germany and Europe, the Bank is continuously growing in North America, Asia and key emerging markets.

With more than 100,000 employees in 72 countries, Deutsche Bank offers unparalleled financial services throughout the world. The Bank competes to be the leading global provider of financial solutions, creating lasting value for its clients, shareholders, people and the communities in which it operates.

Despite global uncertainty in financial markets, Deutsche Bank remained well-funded, well-capitalised and armed with top tier status across all of its core businesses. This overall strength provides real competitive advantage for the Bank, particularly in Asia. To this end, the breadth of Deutsche Bank’s footprint, depth of local market penetration, scale in core businesses, and synergies between businesses provide a compelling opportunity to take market share and grow revenues.

Deutsche Bank comprises three Group Divisions: Corporate and Investment Bank (CIB); Private Clients and Asset Management (PCAM) and Corporate Investments (CI). Within Asia Pacific all of the bank’s key business divisions are long and well established with over 18,000 staff located within 17 markets. The region’s success can also be seen in the global contribution to revenue which in the last ten years has increased from 7% to 11%.

In fact, Deutsche Bank’s regional franchise is exceptionally well-positioned in ranking. The Bank is clearly a top three investment bank and top four in global transaction banking, with all divisions recording growth in revenue, market share or both. This significant improvement seen in the ranking of key businesses over the last few years points to the successful implementation of the Bank’s regional strategy.

The Bank will be celebrating 40 years of business in Singapore, where it is one for the key hubs for the bank’s successful regional operations; while in China, one of the priority growth markets, the Bank holds all the operating licenses required to compete in its core global business lines.

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