The Theoretical Logic of Sovereign Wealth Funds*[1]

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Abstract: Sovereign wealth funds (SWFs) form a new class of institutional investors with significant influence on the global financial market. Assets under management (AUM) of global SWFs totaled around US$3.0 trillion at the end of 2007, and are still rising. Three developments are behind the current cause of SWFs: First, reform of international monetary system is the core reason for the rise in SWFs; Secondly, the phenomenal raise of energy price is an important reason contributing in the expansion of SWFs; finally, the economic globalization facilitates SWFs' operation. According to the model of "National Economic Man" model, the foreign reserve of a nation will increase sharply and gradually this nation will invest surplus wealth during the economic stage of early expansion or fast-growing stage. Whereas, with the decreasing of the production factors, accumulated wealth of a nation will gradually attain to peak. When the economy enters into wealth-oriented stage or the stage of sustainable low growth, the nation will increasingly rely on wealth accumulated by consumption, and incline to invest in risk-free assets. At present, the aims of SWFs are mainly focused on the following five aspects, including stabilization the national balance sheet for different periods, diversification of the central bank's reserves, smoothening inter-generation revenue of country, prevention of national socio-economic crisis and assistance of the government's overall development strategy.

Keywords: Sovereign Wealth Funds; Foreign Exchange Reserve; Investment

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Chapter I. Introduction

The history of Sovereign Wealth Funds, as commonly acknowledged, can be traced backed to the 1950s. The Kuwait Investment Board created in 1953 from oil revenue surplus and to reduce Kuwait's dependence on depleting oil resources, was regarded as the first SWF. In 1965, the Kuwait Investment Authority was officially set up to manage 10% of Kuwait's annual oil revenue and to make long-term global investment across asset classes and across regions. In 1956, the then British colony Gilbert Islands (later becoming independent in 1979 as the Republic of Kiribati) established Revenue Equalization Reserve Fund (RERF) originated from its phosphates revenue. The fund has since grown to 600 million Australian dollars, approximately 9 times of the Kiribati GDP and with the investment return contributing 33% of the GDP. The fund has become a major income source of the country and has managed to diversify the portfolio. Following the two funds, the world has witnessed two waves of SWF formation: first in the 1970s with noticeable examples like the Singapore Tamasek Holdings established in 1974 and the Abu Dhabi Investment Authority (ADIA) in 1976; second in the 1990s, represented by the Iran Oil Stabilizing Fund and the Foreign Exchange Reserve Fund in 1999 and the Qatar investment Authority in 2000. In 2007, China created its own SWF- China Investment Corporation.

The academic community, however, has not yet agreed on the definition of SWF all along. The term "Sovereign Wealth Fund" was first used by the U.S. State Street Bank economist Andrew Rozanov (2005). He noted that with a country's macro economy, trade terms and fiscal balance improving and a long-term budget plan and fiscal spending restriction policies enforced, the country's budgetary surpluses and foreign exchange reserve surplus accumulated and therefore some dedicated investment institution was established to manage these excesses and such institution could be named "Sovereign Wealth Fund". The rapid growth of SWF gave birth to various definitions made by different institutions. The IMF (2008) indicated that SWFs were government-owned, special purpose investment funds or arrangements; they were, usually set up by the general government to hold or manage assets to achieve financial objectives and they employ investment strategies which include investing in foreign financial assets; SWFs might adopt different legal, organizational and managerial structure and five types of SWFs could be distinguished based on their main objectives: (i) stabilization funds, (ii) savings funds, (iii) reserve investment corporations, (iv) development funds, and (v) contingent pension reserve funds, which provide for contingent unspecified pension liabilities. The OECD (2008) recognized that SWFs were the medium through which the governments made investments and were mainly financed by foreign exchange reserves. The U.S. Treasury (2007) referred to the term as a government investment vehicle which was made of foreign exchange assets, and

should be managed separately from the FX reserves controlled by the monetary authorities. McKinsey & Company (2007) believed that SWFs, funded by the Central Bank's reserves, aimed to maximize the returns within manageable risk bands. Deutsche Bank (2008) stated that sovereign wealth funds – or state investment funds – were financial vehicles owned, managed, and run by states, which were mainly derived from excess liquidity including those from government fiscal surpluses or from FX reserves at central banks. Morgan Stanley (2007) believed that a SWF needed to have five ingredients: (i) sovereign -- totally owned by the government; (ii) high foreign currency exposure – mostly in foreign currency; (iii) no explicit liabilities – different from pension funds that are bound by specific liabilities; (iv) high risk tolerance – able to withstand significant fluctuations in short term; and (v) long investment horizon – usually longer than five years.

The above different versions lead us to believe that the key elements of an SWF are:

1. Ownership. An SWF must be entirely owned by the country's government. Some institutes may include state government-owned funds, the Alaska Permanent Fund established in 1976 for example, in the SWF category. Though bearing no difference from SWFs in their purposes and sources of funding, these "state" wealth funds cannot be called "sovereign" wealth funds in our opinion. An SWF must be under the complete control of the central government—the one and only shareholder. An SWF runs the wealth of a nation, aiming to benefit the citizens of the nation, and therefore has a nation-wide impact that cannot be restricted within a certain locality.

2. Source of funding. Consensus is that the funding of SWFs is mainly from foreign exchange reserves or export revenues. Firstly, source of funding is primarily connected with future SWF size estimation. Global economic forecast analysis can indicate the trend of reserve surplus, which leads to the estimation of future size of SWFs and other size-related issues such as their market impact. Secondly it may also exert influence over investment direction as funding stability and sustainability determine whether the SWF will be prone to long-term and active investment.

3. Purpose and style of investment. It should be noted that SWFs are mainly created to yield investment returns. The returns can reduce the volatility of national income across different time periods and provide funding guarantee for future generations. Hence, SWFs seek maximized returns within an acceptable risk range and thus have higher risk tolerance and invest in a professional and market-oriented way. Therefore government bodies such as the reserve management functions of the monetary authorities, which simply use reserves as a currency stabilizer, should not be regarded as SWFs. The "sovereign" nature

however sets SWFs apart from the rest pure profit-seeking financial institutions as SWFs do play a certain role in assisting the country's economic strategic development and currency stabilization. The Temasek Holdings of Singapore, for example, has controlling stakes in more than 50% of Singapore's domestic companies and through effective supervision and commercial and strategic investment, has cultivated a number of world class companies for Singapore and bolstered the country's strategic development.

The above analysis leads us to conclude that an SWF is a market-oriented and professional investment body owned and managed by a state's central government, which uses mainly foreign exchange reserves and export revenues to make overseas investment and seeks to maximize long term return. The management of such a body should be independent from the passive forex reserve management as exercised by monetary authorities to stabilize the currency.

Though studies on SWFs have accompanied the growth of SWFs and have attracted close attention of both academicians and practitioners home and abroad, they—be it concept introduction, nature scoping, history tracking, case study or generalization—all tend to be methodologies of qualitative analysis rather than frameworks for systematic analysis.

When it comes to the subjective drivers behind the rapid growth of SWFs, most scholars tend to think that with current account surplus consistently exceeding their contingency needs, some governments started to create sovereign funds to generate higher returns (Rozanov, 2005; IMF, 2007). Meanwhile, others think there are two reasons for setting up SWFs: (i) to peg exchange rate when the current account is in surplus or foreign investments flush in; and (ii) to build up wealth for future generations and facilitate intergenerational wealth transfers (Jen, 2007). Of course there are quite a few other theories stating that SWFs may be established to diversify national wealth and optimize return, or as an income substitution mechanism, or as a result of commodity price surge and world trade imbalances (Lowery, 2007).

Limited transparency of SWFs makes it very hard to determine exactly the size of a single fund and SWFs as a whole. Estimations based on different information sources make their scientific integrity constrained. For instance, Deutsche Bank (Kern, 2007) estimated the current size of SWFs to be around $3.4 trillion while Morgan Stanley (Jen, 2007) figure was around $2.5 trillion. IMF (2007) believed that the assets managed by SWFs valued between $2.1 trillion and $3 trillion by February 2008 and would grow to $6-10 trillion by 2013. Despite the significant difference in their forecasts, scholars mostly tend to agree that the overall size of SWFs will expand very quickly.

Scholars also categorize SWFs from different perspectives; the most representative categorizations are as follows: Chen Chao (2006) based on why the

fund was created in the first place, organizes SWFs into five categories: (i) stabilizing SWF – to stabilize national income across different periods and reduce the impact of accidental income fluctuations over economy and fiscal budget; (ii) offsetting SWF – to assist the central bank to channel forex reserves, intervene in the forex market and absorb excessive liquidity; (iii) saving SWF—to stabilize national wealth across generations and save up for future generations; (iv) preventative SWF – to prevent national social or economic crisis and promote the smooth socioeconomic development; (iv) strategic SWF – to support national development strategy, optimize asset allocation globally, nurture world-class businesses and better serve national interest in international economic activities. Clay Lowery (2007) states that SWFs generally fall into two categories based on the source of the foreign exchange assets – Commodity Funds and Non-commodity Funds. IMF (2007) distinguishes SWFs into five categories based on their main objective: (i) stabilization funds, usually set up by countries rich in natural resources, where the primary objective is to insulate the budget and the economy against commodity (usually oil) price swings; capital is injected into the funds during good years with significant fiscal surplus to prepare for the needs of difficult years; (ii) savings funds for future generations, which for countries rich in natural resources, aim to convert nonrenewable assets into a more diversified portfolio of assets for the benefit of future generations or for other long term goals; (iii) reserve investment corporations, individual fund entities whose assets are often still counted as reserve assets, and are established to reduce reserves holding cost or to increase the return on reserves; (iv) development funds, which typically shifts capital to help fund socio-economic projects (e.g. infrastructure projects); and (v) contingent pension reserve funds, which provide for pension and contingent liabilities on the government's balance sheet.

As for the purposes of setting up SWFs, Owen Humpage (2007) and others believe that SWFs invest across classes to diversify national wealth portfolio and be less dependent on U.S. treasury bonds while Stephen Jen (2007) finds SWFs showing a clear investment preference tendency for strategic sectors like high-tech companies, overseas banks and resource businesses in resource abundant countries and etc.

Chapter II. Institutional characteristics and size estimations

1. Sovereign Wealth Funds vs. Other Institutions

Owned by the government, SWFs are often confused with traditional government pension funds (GPF), monetary authorities and state-owned enterprises (SOE). Here is a comparison of the four.

SWF vs. GPF: A SWF is fully owned by the central government; composed mainly of forex reserves and export revenues; the government has a complete holding stake; the investment serves various purposes and is more of an aggressive nature; information disclosure is usually poor with a few exceptions like the Norway and New Zealand ones which have been known for transparency all along. In contrast, a traditional GPF could be owned by a local government; composed of social security tax revenues, which features contribution from community members; the government has a less say; the investment is made to secure pension for aged citizens and more of a conservative nature; information is more open to the public. A typical GPF is the California Public Employees' Retirement System (CalPERS).

SWF vs. monetary authorities: A SWF is "value enhancing" oriented with a diversified investment portfolio which usually includes bonds, stocks and other high-risk assets (hedge funds and private equities) whereas monetary authorities are more "value preserving" oriented with foreign bonds (U.S. dollar bonds in particular) heavily weighted in their monotonous investment portfolios. Most SWFs have employed the external management model. According to a Standard Chartered report (Lyons, 2007), 60% of the SWFs have hired external managers and 70% of the total SWF assets are mandated to external professional investment institutions. Monetary authorities, however, are generally using the traditional model of central bank direct administration as they are more of a currency stabilizer and macro economy regulator.

SWF vs. SOE: the former is held by the central government and is funded by forex reserves and export revenues; the latter is held by the central or local government and is funded by the government grants and corporate profits. In terms of legal structures, SOEs are corporations regulated by the general company law while SWFs may take three forms: a pool of assets, a legal entity under a specific public law, or a legal entity under the general company law. Most SWFs take the third form and act strictly as a business entity.

Table 1 summarizes the differences of the four:

	SWF	**Traditional GPF**	**Monetary Authorities**	**SOE**
Owner	Central government	Members of the pension scheme	Central government	Central/local government
Source of fund	Forex reserves/ export	Contribution from	Forex reserves	Government grants/corporate

	revenues/investment returns	community members		profits
Investment purposes	Value enhancement (primary) or strategic goals (secondary)	Alleviate future pension funding pressure	Value preservation/currency stabilization	Value enhancement/ profit making/strategy
Investment portfolio	Diverse	Diverse	Monotonous	Industrial sector prone
Investment horizon	Long	Long	Possibly short	long
Government holding stake	Complete	Not obvious	Complete	Significant but not complete
Information disclosure	Varied (mostly non transparent)	Highly transparent	Non transparent	Varied (listed companies need to meet disclosure requirements

Table 1 Sovereign Wealth Funds vs. Other Institutions

2. Estimation of SWF Sizes and Structures

Poor information disclosure and lack of statistic conformity make it difficult to date to have a precise estimation of AUM for global SWFs. We estimate that current global sovereign wealth funds manage assets valued over $3 trillion and the volume will continue to rise. The main drivers behind the growth momentum are: 1) Oil and other commodity prices keep rising. Oil dollar and commodity dollar are key to SWF growth. 14 of the 20 largest SWFs have their funding sources in oil and other commodities revenues. 2) Forex reserves increase. IMF (2008) statisitcs showed that global forex reserves increased to $6.9 trillion as of the end of the third quarter of 2008 with developing economies taking up $5.4 trillion, or 78% of the total. Forex reserves are one of main sources of funding for SWFs and therefore as long as global saving-investment balance is not restored in the short term, the forex reserves will continue to grow and so will SWFs. 3) investment returns and other factors. Other than forex reserves and coomodity dollars, there are additional sources of funding like bond issuance which is to be

determined by way and scale of asset injection by the government. In addition, investment returns will also add up the exsiting assests.

Strcutally speaking, Gobal SWF is highly concentrated as reflected in AUM, geography, creation time and sources of funding.

1. Size of AUM. In absolute terms, assets managed by the top 10 SWFs ($2.775 trillion) account for 85% of the global total ($3 trillion) with the largest one, ADIA alone managing about $875 billion, 27% of the total.

2. Geography. Countries that have established SWFs are concentrated in Middle East, Northern Europe and Asia. The size of an SWF does not present an envident corelation to the country's economic strength. Except for China and Russia, the two economies of some global influence, owners of the top SWFs are all small economies. The value of the largest SWF, ADIA, equaled to 29.5% of the country's 2007 GNP while some large economies, like Japan, do not even have SWFs of their own.

3. Creation time. Though the first SWF was created in Kuwait as early as in 1953, SWFs took off in the past decade, which witnessed the creation of 33 funds. And the noticeable size expansion of the funds also took place in the past decade.

4. Source of fund. The main sources are commodity exports and fiscal/trade surplus while commodity is chiefly represented by energy products like oil and gas. In terms of size, oil and gas revenues account for 72% of the total as contributed mainly by oil and natrual gas exporting countries, which acquired significant amount of income during the commodity price surge over the past ten years; trade and fiscal surplus takes up 27% and is mainly contributed by Asian countries with trade surplus and high saving rate.

Chapter III Reasons Behind the Rise of SWF

1. Changes in the international monetary system are the fundamental reason

1) Evolvement of the international monetary system after WWII

After World War II, the Bretton Woods system introduced adjustable fixed exchange rate regime in which all currencies were defined in relation to the dollar, itself convertible into gold. The Bretton Woods system did put an end to the monetary and financial chaos prior to the war, but failed to address the inherent contradiction. In a nutshell, other countries had to hold significant dollar reserves as the dollar was providing liquidity for the international economy and inevitably the United States was running a balance of payment deficit. However, huge

deficit over a long period of time led the international market to lose confidence in the dollar and propelled countries to run on gold with dollar reserves. Eventually the gold reserves drained and the gold exchange system could no longer sustain – the Triffin Dilemma. Shrinking gold reserves, continued deficits of international payments deficits and growing inflation in the U.S. together resulted in the dollar crisis and American economic crisis. With the convertibility of dollar to gold terminated in 1971 and the fixed change rate aborted in 1973, the Bretton Woods system finally dissolved.

The collapse of the Bretton Woods system was followed again by financial turmoil worldwide and many reform ideas were proposed, including restoration of the gold standard, restoration of the dollar standard, establishment of a multi-currency standard and establishment of optimum currency areas, but no substantial progress was made until members of the IMF reached the "Jamaica Accord" in Kingston, Jamaica in January, 1976. The Accord legitimized floating rates, downgraded the monetary role of gold, designated Special Drawing Right (SDR) as the principal reserve asset, decided to expand financing support to developing countries and amended articles concerning gold, SDR and exchange rates. The Accord allowed members to choose their own exchange rate arrangements and allowed the coexistence of fixed rates and floating rates, but IMF would exercise surveillance over the exchange rate policies to reduce exchange rate volatility and to make sure that the arrangement was in accordance with the specific country's economic situation, not allowing members to manipulate exchange rates to prevent balance of payments adjustment or to gain unfair advantages over other countries. That was the birth of a new international monetary system – the Jamaica System.

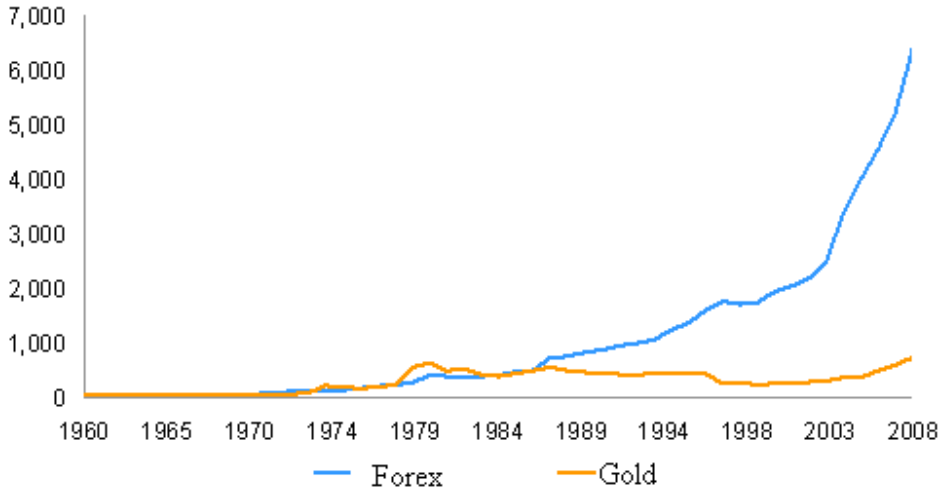
It is fair to say that the Jamaica System did free countries from the downside of the previous interdependence between the anchor currency country and the pegger countries under the Bretton Woods system. A floating dominated hybrid exchange rate regime could quickly respond to international economic changes and monetary supply and demand shifts and thus enabled countries to adopt more independent and effective macroeconomic policies. But the system also had its flaws: multiple reserves and the lack of a universal currency standard introduced new uncertainties and flexibility increased exchange rate volatility, system instability and exchange risk.

2) The Jamaica monetary system resulted in global imbalance and forex reserve surge

Although multiple reserve currencies were adopted under the Jamaica system and countries may choose a pegged or floating rate policy or something hybrid to facilitate balance of payments, with the incomparable economic strength of the United States, most countries still preferred the dollar to be the major trade and reserve currency. However the diminishing pivotal role of the dollar as the

international currency resulted in a lack of reserve currency standard. The currency mix and volatile exchange rates brought about negative impact on international trade, loan and credit and even encouraged forex speculation and exacerbated financial unrest and turmoil. On the other hand, against the design of multiple balance of payments adjustment arrangements, the IMF did not have full access to the balance information and therefore did not have any power to discipline the surplus countries and deficit countries. Imbalance of payments as a result of the poor functioning of the Jamaica system actually increased.

To cope with exchange fluctuations and imbalance of payment, the non reserve currency countries needed to maintain a certain amount of foreign exchange assets, usually government bonds or quality bonds of reserve currency counties against transaction and preventative risks. These are low-risk, liquid assets but with low returns and opportunity costs were incurred. Reserve currency countries should maintain the currency value but at the same time they enjoyed great benefits as the currency issuer. Before the Jamaica system was founded, international forex reserves were kept at a low level with slow growth. But with the system in place, exponential growth of forex reserves was witnessed (see chart 1), particularly in developing and emerging economies.



Source: Bloomberg

Chart 1 international forex reserve change after the establishment of the Jamaica system

3) Inherent risk of large forex reserves

What are the implications if a country has large reserves of foreign currency? The economy's defense against exchange rate risk surely improves. In the 1998 Southeast Asia financial crisis, for example, Hong Kong shielded itself from the attacks of global financial speculators with sufficient reserves and maintained the stability of the Hong Kong dollar. But the huge costs in maintaining huge currency reserves cannot be ignored.

First of all, the Triffin Dilemma under the Bretton Woods system is not solved. Even the reserve currency country would employ a fiscal and monetary policy to assume its responsibility and stabilize the currency, the country still faces the dilemma between the stable currency and the imbalance of payments; the reserve holder increases reserves while the currency issuer keeps running a bigger deficit, which in turn leads to the depreciation of the currency and loss of wealth for the holder. This is a strange cycle. The more reserves one holds, the bigger depreciation risk you assume. The hard efforts made by people of the holding country actually fund the temporary consumption expansion of the issuer and are rewarded by shrinking asset value. To make things worse, the central government, when deciding fiscal and monetary policies surely places domestic stability and policy preferences ahead of international responsibilities, and that could incur additional opportunity costs for reserve holders. In 2002-2004, the American Treasury bond yield declined and inflicted huge losses for international reserves. Similar cases can also be found in the 1970s, 1980s and 1990s.

Secondly, the surge in forex reserve may also result in excess liquidity and asset bubble in the reserve holder. To stabilize the exchange rate, the central bank must increase reserves through open market operations – to inject base money into the financial sector, causing excess liquidity, which could end up nowhere but in capital market and the property market, creating asset bubble. Once the bubble busts, the real economy and the financial sector will suffer greatly.

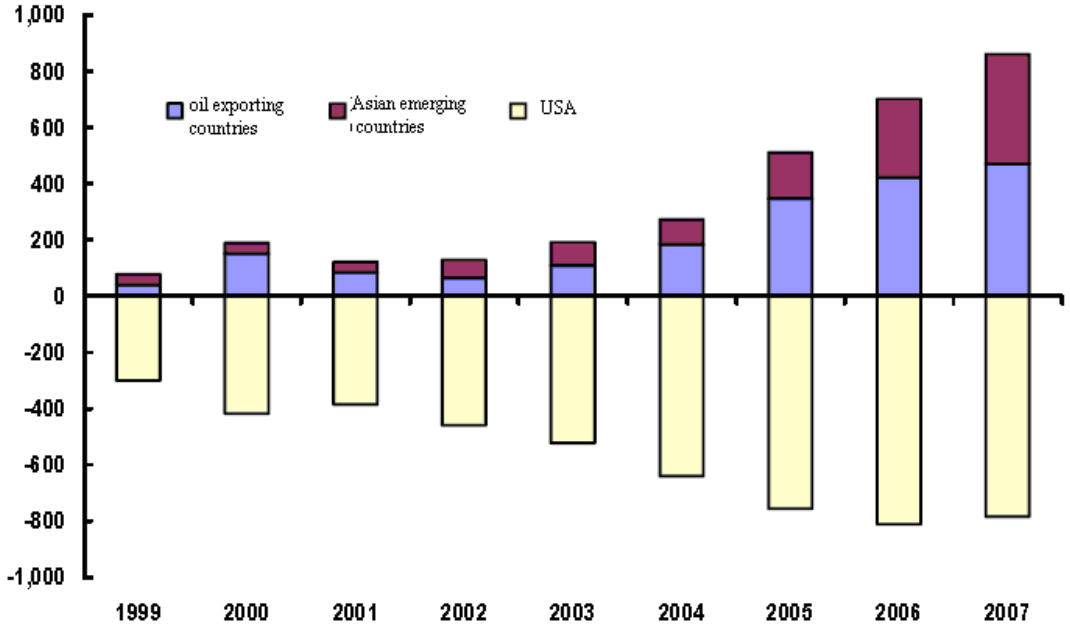


Chart 2 large forex reserves of emerging economies and US fiscal deficit ($billion)

Source: Bloomberg

4) Sovereign Wealth Fund—effective management of excess reserves

For the vast number of the non reserve currency countries, how can they, under the current monetary system, regulate exchange rate risks on one hand and prevent the large reserves from losing their purchasing power, on the other hand?

One solution is currency bloc—the Euro zone is a living example. Within the block, countries don't need excessive reserves to offset exchange rate risk and thus the opportunity risk is minimized. But the formation of a currency block requires the coordination of interests of different parties and is deemed a long process and that leaves the SWF a more practical choice. Reserves above the level needed and other long-term money are pooled together for investment in assets other than the reserve currency bonds by a dedicated institution. This feasible solution conforms to the current monetary system and address both liquidity and return needs. The logic behind the creation of SWFs tells us that the behavior of a government in nature is the same as that of an individual. Keynes noted in *The General Theory of Employment, Interest, and Money* that there are three motives for people to hold cash: precautionary motives, transactions motive and speculative motive. An individual holds cash primarily to meet daily life needs (liquidity) and then seeks

asset appreciation -- the transactions motive. Similarly, a country holds forex reserves primarily to prevent exchange rate volatility with sufficient liquidity and when the reserves are enough to meet this need, the country, just like an individual, can go on to invest the reserve in excess into other asset classes and seek higher returns. This is when the sovereign wealth fund comes into play.

2. Energy price surge being the major contributor to SWF size expansion

1) Phenomenon: energy price surge brought about giant funds

Oil and gas export revenues and forex reserves are the two major sources of funding for SWFs. Energy price rise is the other important contributor to the rapid growth of SWFs besides the monetary system that induced reserve increases. From 1998-2008, oil price skyrocketed from $15/barrel to near $150/barrel and natural gas price from $15/MMBTU to $80/MMBTU. During the same period, 33 countries and regions set up their sovereign funds with most of the savings originated from energy export revenues. This proves the correlation between oil price and SWF size.

But a closer look prompts us to think. In theory, national income as acquired from energy export should be utilized in three areas: (i) sufficient reserves to hedge against exchange rate risks; (ii) domestic consumption, government budget and domestic investment; (iii) excess reserves to be invested overseas for returns. But the study on the respective percentage of savings, investment, and current account surplus to GDP shows that major oil exporting countries maintain a constant level of investment while their savings surge (chart 3).

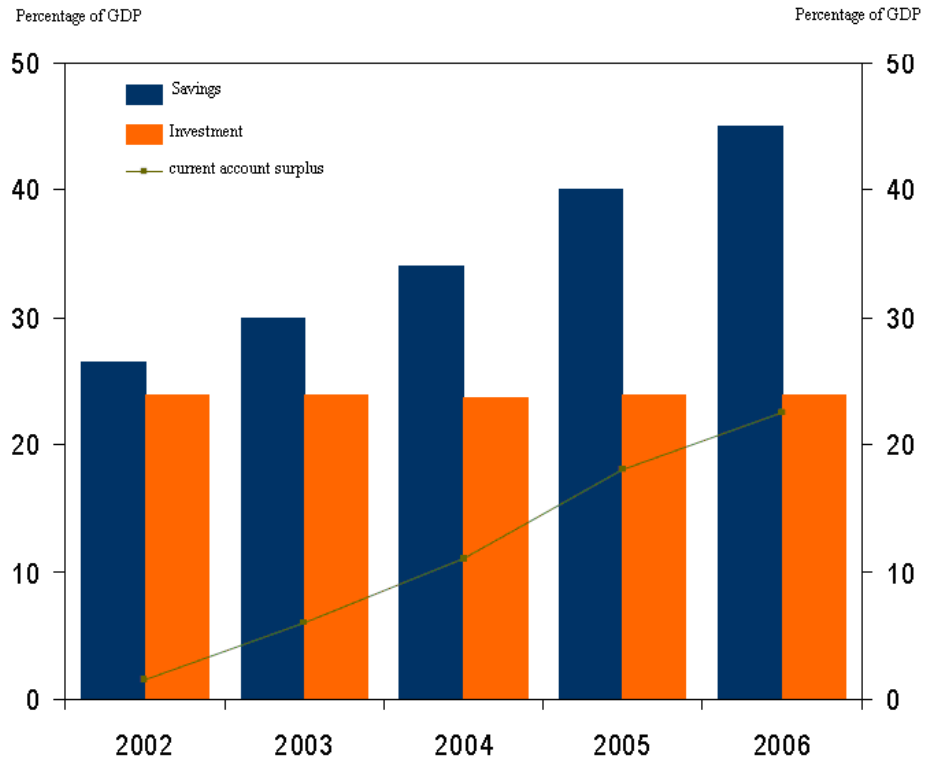


Chart 3 savings/investment/current account surplus as a percentage of GDP of major exporting countries

Note: IMF definition of Middle East is employed here, which includes Bahrain, Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, UAE and Yemen.

Source: IMF (2007)

Most oil exporting countries do not have a complete industrial system yet. Why do these countries invest their increasing national wealth in overseas market, resulting in such significant growth of SWFs instead of allocating it to their own countries to boost industrial structure upgrade and refine industrial system? Behind this phenomenon, there implies a famous paradox in economics – "resource curse".

2. “Resource curse” and inflation of SWFs

What is "resource curse"? Empirical study by quite a few economists have found, countries and regions with an abundance of natural resources tend to have less economic growth and worse development outcomes than countries with fewer natural resources. The higher ratio of revenues from resource export in GDP, the slower its economy grows. This perplexing phenomenon is referred to as "resource curse". For example, empirical study by Canadian scholar J. Jay Park (2007) has

found, during 1960-1992, share of revenues from resource export in sample countries has high negative correlation to GDP growth of that country.

In practice, "resource curse" is not rare: In early 1970s, GDP per capita of resource-abundant Malaysia was twice of that in resource-poor South Korea. However, only after two decades, the affluence of the latter is much greater than the former. In the example of large oil exporter Saudi Arabia, GDP per capita during 1965-1997 dropped by 3% in average annually. In the meantime, output per capita in Iran dropped by 2% annually and that for Venezuela dropped by 1% annually, while income per capita for Nigeria remained unchanged since its independence in 1960. In comparison, those countries or regions that lack natural resources, e.g. Singapore and Hong Kong etc., their economic growth remained at higher level. This phenomenon has been perplexing. It is generally believed the more abundant resources a country has, the less constraint it faces in development, and the more it is able to refine industrial system and upgrade industrial structure. However, why it is exactly the opposite in reality?

Currently, "resource curse" can be attributed to the following phenomena: (1) the Dutch disease. On one hand, rise of price for export of natural resources has caused labor and capital flow to resource export sector. On the other hand, the appreciation of domestic currency caused by increase in foreign exchange income will further weaken competitiveness of manufacturing, and finally lead to decline of manufacturing. (2) Excessive reliance on export of natural resources. As export of natural resources can generate much national income in short time, the state will be inclined to prioritize development of resource-related industries. Slow pace of industry diversification, especially for countries with extremely incomplete industrial system at outset, imbalance of industrial system will be further aggregated with the elapse of time. (3) High volatility of energy price. From 1986-2007, oil price moved significantly in the range of US$12-70. When price moves significantly, revenues from countries that rely on resource export will face risks of decline; even it is likely to erase income growth during price rise. In addition, corruption, power rent-seeking and taxation will directly or indirectly cause phenomenon of "resource curse".

The paradox of "resource curse" has received attention in early times. In order to avoid falling into vicious circle of "resource curse", academicians have put forward many solutions, including leaving natural resources underneath, achieving diversification of industrial system, freezing income, stabilization and resource fund, as well as political change etc. Among these solutions, freezing resources obviously removes revenue stream of many countries that mostly rely on exchange of energy for income. Improvement of industrial system and political change requires long-term exploration are subject to greater uncertainty. Establishment of SWFs and overseas investment is the least costly approach. In addition, SWFs that have been established early, e.g. Abu Dhabi Investment Authority and Norway Oil

Reserve Fund etc. have achieved better earnings, and are role models to development of SWFs.

3 Economic globalization provides a favorable environment for SWFs

Globalization is a prominent feature of the current world economy. National economies have been woven into a coherent whole through international trade, capital flow, technology transfer and service provision. In essence, economic globalization is the result of highly developed productivity and division of labor on a global scale. Ever since the 1980's, trade and financial barriers have waned, and cross-border flow of assets and goods have waxed. Rather than remaining stand-alone, domestic markets—including capital markets—have been integrated, interrelated and become organic component of the global market. This integrated market lays out the foundation for global asset allocation of SWF.

First, with increasing globalization, the growing number of investment vehicles provides opportunities for SWF to hedge between different investment categories. This is manifest in two aspects. For one thing, a direct benefit of economic globalization is that cross-border investment barriers have been removed with investment areas and vehicles that historically rejected foreign investors due to national security concerns have gradually opened up. Ease of relations between old-time archrivals, driven by economic benefits, has also made such two-way investment possible. For instance, back in the 1960's and 1970's, it would have been unimaginable for SWF from China, the Middle East or Russia to invest in the US financial sector or any other sector that was considered critical to national strategic interests. In contrast, such funds are now not only seating on the boards of heavyweight Wall Street companies, but also regarded as "saviors" of the recent subprime crisis. The other aspect is that globalization has also ushered in more investment categories. Previously, US treasuries were the only choice for gargantuan foreign reserves. But now, fund managers have come to recognize financial products that they've never tried before and portfolios have shifted from traditional equity and bonds to alternatives such as real estate, hedge funds and PE. Increasing investment choices enable SWFs to improve profitability, diversify risks and hedge between different categories.

Secondly, deepening globalization make investment choices more geographically diversified and thus facilitating cross-market arbitrage. Returns on different markets vary widely. At the time when the level of globalization was low, SWFs could only invest in certain limited geographies. Their returns were severely affected when those regions suffered from economic distress because they could not share the boom of other regions. For instance, many Asian countries used to

preserve 60-70% of their foreign reserve as US treasury bonds and suffered from dramatic losses when the dollar depreciated. With globalization, SWFs can now invest in economies with long-term growth potential and truly capitalize on global economic growth. In addition, they can also use the interactions between different markets to seek arbitrage and thus realize even higher return.

Lastly, globalization of technology provides technical support for SWFs to allocate their assets globally. With IT as its core, globalization of technology is also an important part of economic globalization. The use of IT has constantly updated infrastructure of the financial industry, promoted invention and application of new investment/financial service technologies and derivatives and significantly improved transaction efficiency. Massive use of microelectronic technologies in the financial sector shortens the time and distance of transactions and reduces information cost by 15-25% on an annual basis. Low-cost, fast telecommunication is an important enabler of 7/24 financial services. The global information network and adoption of “computerized transactions” have also enabled bank to engage in innovative businesses—such as “interest rate swap” and “currency swap”—that require fast transmission and processing. The development of IT makes the financial sector more “engineering-like.” Notable improvements in computer software/hardware, long-distance data transmission technologies and storage devices have made large-scale technological application in financial services possible. With more and more IT applications, the financial sector has entered the “real-time data transmission era”. All in all, from the market perspective, the formation of the global market have paved the way for SWFs to allocate assets globally while technological globalization provides technical solutions to it.

CHAPTER IV

Theoretical Hypothesis: The “National Economic Man” Investment Behavior Model

So far two theories on the development stages of a national economy have emerged. The first is the stage theory of economic development proposed by American economist Rostow in his book *The Stages of Economic Growth* published in 1960. According to various economic dimensions, i.e. the level of science, technology, and industrial development, and the evolution of industrial structure including the shift of the leading industries, the theory divides the history

of economic development of a region, a country or even the world into five stages of economic growth: traditional society, preconditions for take-off, take-off, drive to maturity, age of high mass-consumption, and age of pursuing high life quality. The second theory involves a four-stage model proposed by strategist Michael Potter in his book *The Competitive Advantage of Nations*. Potter believes that the economic development of a country occurs in four stages: a factor-driven stage, an investment-driven stage, an innovation-driven stage and a wealth-driven stage. The first three stages are where lie the main driving forces of the national competitive advantages which usually lead to economic booms while the fourth stage is the economic turning point when the economy of a country could possibly decline.

What we can learn from the above two streams of theories is that, the process of development of a national economy is similar to an industrial life cycle consisting of four inevitable stages of pioneering development, accelerated growth, maturity, and stabilization and deceleration of growth. The investment and saving behaviors of a nation vary from stage to stage. Our hypothesis is: in the pioneering development and accelerated growth stages, foreign exchange reserves of the country grow rapidly, generating a surplus of wealth, which is gradually put into investment. However, with continued consumption of production factors, the wealth accumulation will reach its limit. As the economy gradually enters the wealth-driven stage or the stable, low-growth stage, the accumulated wealth will need to be consumed and the investment will be shifted toward risk-free assets.

I.Basic Model

Cocco et al. (1998) built a life cycle model of consumption and portfolio choice. Assuming a person's typical life cycle can be broken down into the low-income stage, the high-income stage and the retirement stage, the model tries to work out the optimal asset portfolio for individuals. The conclusion thus reached is an individual's strategic assets allocation varies across different life stages. At young age when a person's income is on the rising trajectory, he tends to invest in risky assets. At middle age when a person's income stabilizes, he then tends to invest in risk-free assets. After retirement when a person stops earning income, he is likely to shift back to risky assets.

In the above model, although the life cycle hypothesis of portfolio selection corresponds to the stages of national economic development, the model's focus

remains to be on individual consumption and investment behavior, with some hypotheses relevant only to individuals, e.g. the inevitable aging and mortality of an individual, consumption maximization as an individual's sole motive (therefore an individual will smooth his consumptions over the life cycle). By contrast, as seen from above, SWFs can be developed out of many different motivations, e.g. to support the central banks or to avoid economic crises. The goal however, is the same: to maintain the normal operation of a nation. Unlike an individual, a nation builds wealth to keep itself running more smoothly, and not for its own consumption. Therefore we do not think these hypotheses can best explain the investment behaviors of a nation.

It is in this background that we have made a few modifications to the work of Cocco et al's (1998) and have built the "national economic man" investment behavior model. In our model, as assumed by Cocco et al., the country also experiences such income dynamics from low to high income and eventually back to no income. The major source of a nation's income is excess reserve. For SWF holding countries, the income comes mainly from earnings from exporting natural resources and trade surplus. When the country has depleted all its natural resources or no longer earns a surplus, it should make sense to assume that the country will have no more income afterwards. Moreover, we assume a probability exists in each time period of the occurrence of a liquidity shock (e.g., financial crisis). Countries with a large enough wealth base can safely weather the storm, while those without shall collapse. Avoiding such a collapse and maintaining normal operation is what drives a nation to build up wealth.

Under such a model, a nation's wealth goes through a cycle from high growth to stabilization, and its investment behaviors also change from stage to stage. Over-investing in risky assets can increase potential returns but will also expose the country to bigger liquidity risks. In other words, the choice of a nation depends upon the level of its income. The modeling details are set out as follows:

1 **Model setup**

(1) Time and utility equation assumptions

Let t denote time and assume a country has an infinite duration, in which the country generates income only in the first K periods and after which the income

reduces to 0[2]. We further assume K has an epigenetically given value. The value of utility acquired by the country at the end of each period is c. The probability of a liquidity shock occurring in the country in each period is p and the size of the shock is S, multiplied by the wealth of the country from the previous period. Let W_t denote the total wealth of a country in each period. So when a liquidity shock does not happen, the country will survive the period and receive a value of utility of c. When a liquidity shock happens but $W_t \geq SW_{t-1}$, the country will survive the period and receive a utility of *c*. If not, the country will collapse and all its future utility becomes 0. For simplicity, we assume a country's wealth stays unchanged after successfully weathering through a liquidity shock. In other words, the CRRA unity function of a country in period t can be denoted as follows:

$$U_t = c + \sum_{i=1}^{\infty} \delta^i p_i c \qquad (1)$$

where p_t is the survival probability in period t, and $\delta < 1$ is the discount factor.

Here we assume the country has no motivation for consumption and we set the cost to maintain normal operation in each period is 0. This is also the fundamental difference between a national economic man and an individual consumer.

(2) National income assumption

As stated above, a country earns income only within the first K periods. After which, its income becomes 0. Therefore, in a period with a positive income ($t \leq K$), the amount of income is epigenetically given as:

$$L_t = f(t) + \varepsilon_t$$

Where $f(t)$ is a time-driven epigenetic function and $\varepsilon_t \sim N(0, \delta_\varepsilon^2)$ is an endogenetic temporary shock.

(3) Financial asset assumption

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[2] This is a simplified hypothesis. In reality, national income will decrease but will not become zero. Here we uniformly make its value "0".

We assume there are two classes of assets to invest: one is a risk-free asset with a real single-interest yield rate R_f, and the other, a risky asset with a real single-interest yield rate R_t. The return of the risky asset therefore can be denoted as:

$$R_t \sim N\left(\mu_R, \sigma_R^2\right)$$

The risk-free asset in the assumption refers to government bonds and the like, which usually produce low yields but are highly liquid and low on risk. On the other hand, the risky asset refers to riskier investments, including stocks, real estate and alternative assets.[3]

Moreover, we assume the country is confined by borrowing and short selling constraints. This is to say, if the percentage of national wealth invested in risky assets is α_t, then we assume:

$$0 \le \alpha_t \le 1 \qquad (2)$$

2 **Optimization**

Unlike what Cocco et al (1998) has described, a country had no need for consumption (and all necessary spending is assumed to be 0). In other words, a country under this model would allocate all of its wealth between risk-free and risky assets to maximize its utility. At each period t, we denote the wealth of the period as W_t and the percentage of risky investment as α_t, so the wealth of the next period should be:

$$W_{t+1} = W_t[1 + \alpha_t R_{t+1} + (1 - \alpha_t)R_f] + L_{t+1}$$

i.e., the next-period national wealth is the current investment return plus next-period income (if $t > K$, L_t equals to 0).

This transforms the optimization issue of a country into the question of how to maximize Equation (1) under condition (2). The Bellman function can be written as:

$$V_t(W_t) = \max_{0 \le \alpha \le 1}\left[\left(1 - p + p \cdot \mathrm{P}\left(W_{t+1} \ge SW_t\right)\right)\left(c + \delta E_t V_{t+1}\left(W_{t+1}\right)\right)\right]$$

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[3] We assume all random processes take the form of IID series and the correlation is 0.

In which $W_{t+1} = W_t[1+\alpha_t R_{t+1} + (1-\alpha_t)R_f] + L_{t+1}$.

3 **Solution**

As it is hard to obtain an analytical solution to the above Bellman Function, we have adopted a backward solution instead. If we assume the duration of the country ends in Period T, V_T then becomes a simple function, allowing us to derive the value of V_{T-1}, and then V_{T-2}, and so forth. And as T increases, the Blackwell condition will cause V_t to infinitely approach the real value solution.

4 **Result**

The base values of the various parameters used in our estimation/simulation are listed below:

National Income Depletion Period（K）	20
Size of Liquidity Shock（S）	1
Nation's Survival Utility（c）	1
Probability of Occurrence of a Liquidity Shock （p）	20%
Return on Risky Assets（μ_R）	6%
Return on Risk-free Assets（R_f）	2%
Fluctuation of Return on Risky Assets （σ_R^2）	20%
Function of National Income（f）	Log(t)
Fluctuation of National Income（σ_L^2）	10%
Discount Factor（δ）	0.9

Using the parameters selected above, we have estimated the optimal asset allocation strategy of a country and simulated the change of a nation's wealth. The simulation results are shown in the following two figures:

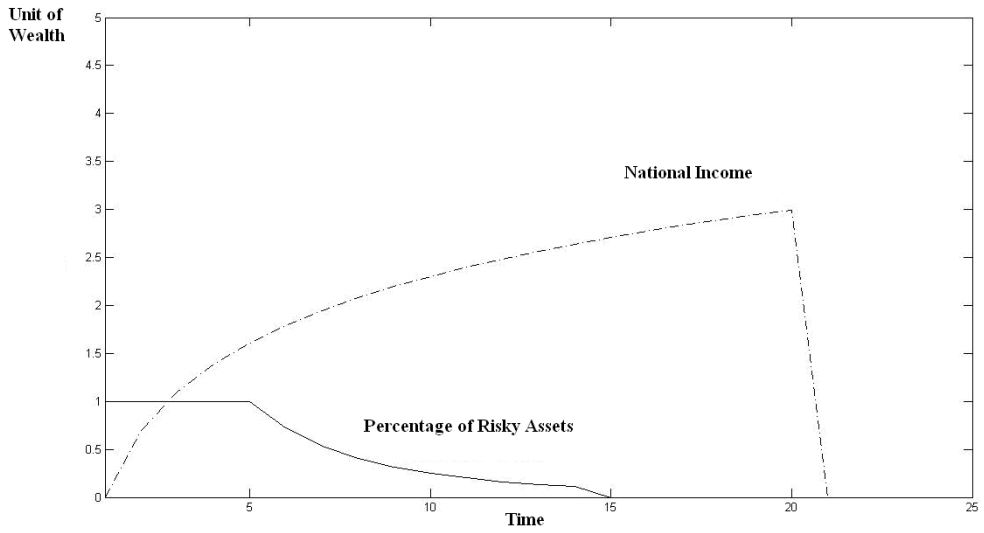


Figure 9 Risky Asset Percentage and National Income Trends

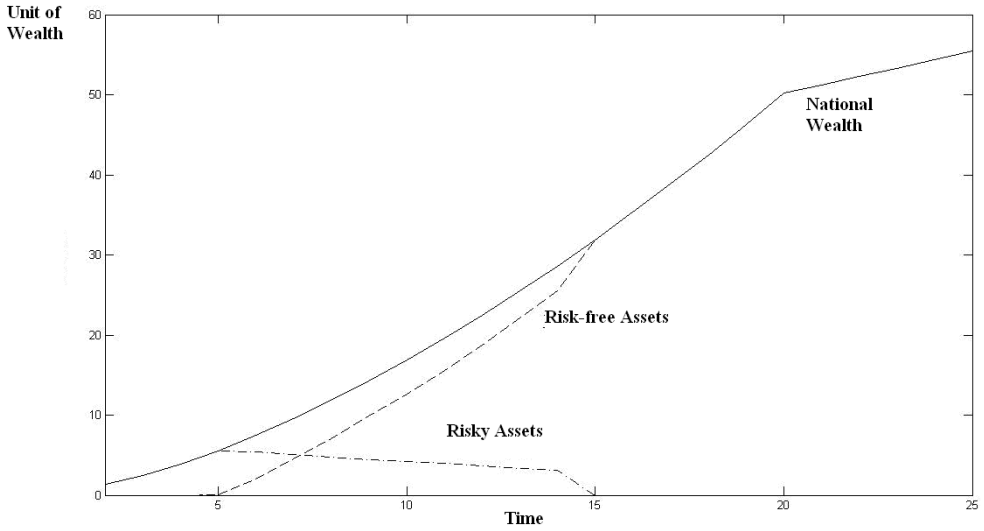


Figure 10 Total Risky Asset and Risk-free Asset Trends

The above simulation suggests a decreasing appetite of a nation towards risky assets over time. During the early stages when the national economy was just taking off, the nation's income would grow rapidly with fears for liquidity shocks relatively low. At this stage, a nation is usually more inclined to invest in risky assets.

National wealth accumulation escalates with the increase of national income. By Period K, the country will enter into a low-growth stage, i.e. no more foreign exchange reserves. And as the nation's wealth stabilizes, the need for cautious saving will kick in, making the country shift its investments from risky assets to risk-free assets to ensure its normal operation.

In terms of asset allocation, risky assets appear to be more attractive to countries at an early stage of development expecting to continue to earn income for many years to come. With their income larger than the wealth already accumulated, and the source of income relatively secure, these countries are promised a stable stream of regular income over a sustained period of time. Hence, they tend to tilt their portfolio toward risky assets. In a low-growth period however, with a certain amount of wealth already built up, countries tend to find risk-free assets more attractive due to precautionary motivation to avoid liquidity shocks. This explains the popularity of SWFs in developing economies.

This analysis is also consistent with what we have seen above. Because they remain in an early stage of economic development, with national income rapidly growing and national wealth quickly accumulating, many developing countries are strongly motivated to invest in risky assets, and as a result, have established the SWF.

II. **Experiential Evidence**

Although the establishment of an SWF is often prompted by a rapid increase of national wealth such as fiscal surplus or excess foreign reserves, the purposes of these SWFs are often varied. So far we have identified five different reasons for setting up an SWF as detailed below:

(1) To smooth national income across different time periods and mitigate the impact of unexpected income fluctuations on the economy and the fiscal budget. This is particularly true with countries whose economy depends heavily on exporting natural resources in exchange for foreign reserves. These countries have created SWFs to ensure a stable stream of income after depletion of natural resources and to prevent short-term production fluctuations of natural resources from destabilizing the economy. These SWFs maintain a diverse portfolio and extend the investment horizon to improve the long-term yield. This type of funds is also known as stabilization-oriented fund. For instance, in the 1990s, the fiscal

and foreign reserve surpluses of Norway, the world's third largest oil exporter, were increasing rapidly, of which the highest growth were coming from its oil export revenue. In order to better manage its oil wealth and prepare for the possibility of depletion, Norway founded an SWF in 1990 – the government oil fund. Since 1995, the Norwegian government has been allocating a portion of its annual fiscal surplus into the oil fund. In 1998, the central bank of Norway set up a specialized SWF - Norges Bank Investment Management, or NBIM, to further raise the long-term investment yield and to prevent the "Dutch disease".

(2) To assist the central bank in distributing foreign reserves, intervening in the foreign exchange market and offsetting the excess liquidity in the market. According to the definition by the IMF, the foreign exchange assets held as mid- to long- term investments in the form of an SWF are not counted as national foreign reserves. Therefore, to mitigate appreciation pressure brought by dramatic increases in the foreign reserves, some countries have set up an SWF to channel away some of their foreign reserves. This type of funds is also known as sterilization-oriented funds. For instance, in 1998, the Hong Kong Monetary Authority created a foreign exchange fund to help stabilize the exchange rate of the HK dollar.

(3) To smooth national wealth across generations and accumulate wealth for future generations. To cope with an aging society and pressures on the pension system from a declining income of natural resources, some countries set up specialized SWFs, known as savings-oriented funds, aiming at a fairer wealth distribution across generations. The Middle Eastern countries are typical examples. The savings-oriented funds emphasize longer-term, stable cash flows and investment returns, thus their principal investment instruments are higher rated bonds, stocks and other related products.

(4) To prevent social and economic crises and promote steady development of the society and the economy. Like individuals putting away preventive savings, many Asian countries hold huge amounts of foreign reserves to prepare for potential social or economic crises or development uncertainties. This type of SWFs is called preventive fund. For example, Kuwait's ability to regain independence and reconstruct the country after the Iraq War is to a large extent owing to the buildup and management of an SWF by the Kuwait Investment Authority (KIA).

(5) To support the national development strategy, optimize global distribution of resources, develop world-class enterprises and better reflect the nation's interest in global economic activities. This type of SWFs is known as strategy-oriented fund. By diverting foreign reserves, the strategic fund strives to generate competitive returns enough to cover the sterilization cost of the central bank and achieve a yield higher than that of official reserves. Therefore, the investment strategy of such funds is more aggressive, such as the Government of Singapore Investment Corporation, whose investment portfolio includes stocks, real estates and private equity.

To sum up, stabilization-oriented funds should focus more on short-term fluctuations in the market due to a relatively short investment horizon while savings-oriented and strategy-oriented funds should emphasize more long-term return than short-term fluctuations given its longer investment horizons. For example, despite reporting negative returns in 2001 and 2002 (-2.47% and -4.74% respectively), the Government Pension Fund of Norway still achieved an average return of 6.49% from 1997 to 2006.

CHAPTER 5 CONCLUSION AND IMPLICATIONS

This thesis has applied the "National Economic Man" investment behavior model to prove that the act of a nation setting up an SWF is consistent with the rational economic behavior of any individual or enterprise with an infinite life cycle. Therefore, a nation can be seen as an "Economic Man" pursuing its maximized utility. As a pure commercial investment entity, SWFs possess no fundamental difference from any commercial entity in investment behavior. Since pursuing for commercial return is the sole purpose of SWF, it should not and cannot undertake a nation's political mission. By giving SWFs a long-term investment mandate, the nation can help minimize the pressure on SWFs to serve short-term political goals and hence take the short term budget constraints off SWFs. Moreover, through such mechanisms as effective corporate governance, transparency requirements, regulations and return targets, the SWF operation can be highly professional and more commercialized. This approach not only frees national wealth management from interruptions due to changing priorities of different administrations, but also helps the government build its credibility and ensures the national wealth is passed on from generation to generation. China's SWF, China Investment Corporation (CIC), set up from the very beginning an independent commercial operating model, indicating there was a general understanding of the nature of SWFs among all parties involved.

A few implications can be drawn from the above conclusion:

(1) Representing the nation's accumulated wealth, SWFs can serve as a national pension fund by helping to smooth the flows of national wealth and build up wealth for future generations. In addition, they can be used to support the national development strategy. In China, the CIC takes on an important role of managing the nation's financial assets, which is consistent with the nature and the functional positioning of an SWF. The Temasek Holdings of Singapore is also positioned the same way. In addition, to prepare for an aging society, CIC should target overseas investments that bear little connections with the growth of the Chinese economy. This way it will be able to leverage overseas returns to bridge the capital gap in the national pension system once the aging problem becomes more acute or the economic growth slows down. In fact, as a best practice in SWF, Norges Bank Investment Management plays exactly such a role of national pension fund manager.

(2) The rise of SWFs is a natural result of economic development for most emerging markets and developing countries. It is under a similar context, rapidly rising foreign exchange reserves, that China has set up CIC to increase the yield of foreign reserve investment, create more channels to leverage the reserves and thus improve the foreign exchange reserve system.

(3) Given the stable and long-term nature of its fund sources, SWFs have a higher risk tolerance and investment return target than traditional foreign exchange reserves. Therefore, SWF investments usually suffer much greater fluctuations than foreign exchange reserve investments in the short term, but enjoy significantly higher return in the long term. This also explains why SWF assets have shrunk considerably since the onset of the current financial crisis with an average book loss of 20%. However, SWFs remain to be an important stabilizing force in financial turmoil. One prominent example is their capital injection of over 71 billion US dollars to M&A deals of financial institutions since the outbreak of the subprime crisis in the U.S. in July 2007. Therefore, it is important to establish a long-term investment view for SWFs and allow for greater short-term fluctuations.

(4) The strategic asset allocation for an SWF should be to keep a diversified portfolio. To effectively hedge against the macro risk of inflation, a resource export oriented SWF should allocate more financial assets while foreign exchange

oriented SWF should allocate more physical assets in addition to financial assets. China's SWF should apply the same diversification rule to strategic asset allocation in order to effectively avoid macro risks and maximize return under given risk tolerance.

(5) To achieve the purpose of an SWF, China should make sure an effective corporate governance structure, internal control mechanisms, and a risk management system are in place for its SWF as soon as possible. A professional business operation model should be adopted to ensure the split of the government's public management function and the equity management function. The successful experiences of Singapore and Norway suggest that a market-oriented management model is the most effective way to execute the government's ownership of the SWF. There are several ways to measure the soundness of the governance structure of a SWF: whether there are separate entities and roles between the government's public management function and the ownership function; whether there is a clear, firm boundary between the rights of the government and those of the owners; whether the company utilizes funds effectively towards its business goals; whether high caliber talents are staffed on the company's board and in the top management; and whether the decision making process is efficient and scientific. These are all key factors to efficient operation of our SWF. To meet the requirement of modern corporate governance, CIC has set up from the beginning a board of directors and a board of supervisors as an important first step in creating a commercialized and professionalized operation model.

(6) SWF transparency has become an issue of great concern in the international community. Currently, only few SWFs are recognized as having high degree of transparency. Our SWF, China Investment Corporation, is perceived as one of the un-transparent funds. The lack of transparency however, can often lead to groundless conjectures among outsiders around the fund's investment behaviors or its strategic intentions, causing some Western countries to boycott SWFs and resort to protectionism. To achieve our purpose and goals for setting up the SWF, we should and can, provided that no commercial confidentiality is compromised, increase our transparency by disclosing such information as the investment objective, organizational structure, financial information and asset allocation in a timely manner to seek understanding from the Western societies and to win ourselves a friendlier international investment environment. Meanwhile, Western nations should also recognize that the rise of SWFs is driven by the structural change of the world economy and should seek to strengthen dialogue with such SWF holders as China, Russia and Middle Eastern countries in order to build a set

of fair rules for investment. The ability of the SWFs of a country to buy and control the assets of another country should be matched with the level of openness of its home market.

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The Theoretical Logic of Sovereign Wealth Funds

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Abstract: Sovereign wealth funds (SWFs) form a new class of institutional investors with significant influence on the global financial market. Assets under management (AUM) of global SWFs totaled around US$3.0 trillion at the end of 2007, and are still rising. Three developments are behind the current cause of SWFs: First, reform of international monetary system is the core reason for the rise in SWFs; Secondly, the phenomenal raise of energy price is an important reason contributing in the expansion of SWFs; finally, the economic globalization facilitates SWFs' operation. According to the "National Economic Man" model, the foreign reserve of a nation will increase sharply and gradually this nation will invest surplus wealth during the economic stage of early expansion or fast-growing stage. Whereas, with the decreasing of the production factors, accumulated wealth of a nation will gradually attain to peak. When the economy enters into wealth-oriented stage or the stage of sustainable low growth, the nation will increasingly rely on wealth accumulated by consumption, and incline to invest in risk-free assets. At present, the aims of SWFs are mainly focused on the following five aspects, including stabilization of the national balance sheet for different periods, diversification of the central bank's reserves, smoothening inter-generation revenue of country, prevention of national socio-economic crisis and assistance to the government's overall development strategy.

Keywords: Sovereign Wealth Funds; Foreign Exchange Reserve; Investment