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Sovereign Wealth Funds and State Capitalism

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Extended Abstract

With the beginning, in 2007, of the deepest financial crisis in the post-WWII era, Governments have come back to the fore as active players in firms and financial markets in almost all industrialized countries. The number of investments made by Governments and Government-Owned Entities (GOE) in national and foreign companies in the last few years has increased exponentially. Along with public interventions, by both Governments and central banks, another type of Government-linked entity has come to the rescue of distressed firms, especially in the financial sector: Sovereign Wealth Funds (SWFs).

SWFs are funds owned or directly controlled by Governments investing in any kind of financial asset, both domestically and abroad. While they share some features of other financial actors, such as the long-terminism of Pension Funds or the freedom to pursue any kind of investment strategy of Hedge Funds, SWFs have some unique characteristics which make them different from any other investor. Most notably, the main driver of interest on these actors is their connection with Governments often perceived as hostile by American and European observers; the identity of their shareholders could in fact entail they pursue political - rather than financial - targets.

Eventually, the distinctive features of SWFs suggest that their impact at a micro (i.e. on firms) and macro (i.e. on financial) level are ambiguous from a theoretical perspective. On the one hand, SWFs could play a beneficial role in financial markets, by providing a long-term perspective which other investors lack, especially in periods of financial turmoil. But, at the same time, other factors suggest that their investments could be driven by political objectives which could lead to distortions in capital allocation.

This work aims at assessing this fundamental question from two perspectives.

First of all, in order to judge whether SWFs investments follow a financially sound logic, it is necessary to define what would be a rational portfolio allocation for a SWF. Once a reasonable allocation is defined, a sound empirical strategy to verify if the actual allocation is in line with what suggested by the theory is required. To define what an optimal portfolio allocation would be is not a trivial problem for several reasons: as shown in chapter 1, SWFs present a strong degree of heterogeneity, this implying that no model could be appropriate for every Fund. Moreover, many information needed to compute an optimal portfolio are known with scarce precision, either because of technical reasons (e.g. assets expected returns) or because of the lack of transparency by SWF (e.g. its target return). In order to cope

with the first problem, I limit the scope of this part of my work to SWFs whose wealth derives from natural resources revenues, in particular oil. The so called oil-based SWF represent more than 50% of the whole SWFs universe in terms of Assets Under Management (SWF Institute (2011)). It sounds reasonable to state that all oil-based SWFs, if investing on a purely financial basis, should take into account their need for hedging oil revenues into their investment strategy[1]. As shown in chapter 2, Modern Portfolio Theory is a well suited framework in the sense that it easily allows to take into account the SWF need for hedging a non-shortable position like its country natural resources endowment. While the optimal portfolio can be estimated only with scarce precision, I show that studying portfolios in terms of relative deviations from a neutral benchmark instead of looking at absolute assets weights allows to implement some parsimonious tests for the SWF allocation optimality which are more robust to parameters uncertainty. To confirm the goodness of this empirical strategy, I show that the Norwegian Government Pension Fund - Global (one of the few oil-based SWFs which investment strategy can be fairly considered as purely financially driven) exhibits an asset allocation which deviate both in static and dynamic terms from the neutral benchmark in the same way as predicted by the theory. The proposed empirical strategy could be thus used in the future to evaluate the Strategic Asset Allocation of other SWFs, as increasing transparency and private data collection allow to reconstruct with a good degree of precision their portfolio composition.

Taking a micro-perspective, assessing whether SWFs can be considered as beneficial or detrimental means to study which kind of firms receive a direct investment from a SWF and what (if any) is their impact on targeted firms. As shown in chapter 3, previous literature on SWFs portfolio allocation from a micro perspective have found that they have a particular appetite for big, levered and more likely to experience financial distress firms. SWFs also appear to invest in poorly performing firms and to experience insignificant or even negative abnormal returns on their direct investments on a medium term basis. Some authors have suggested these results are a sign of SWFs being either mismanaged or pursuing political targets, and anyway to be considered detrimental for their portfolio firms. Using different models specification I find that SWFs appetite for poorly performing firms can be cast in doubt, while I also find further evidence of the positive impact of firms proxies for financial and cost of distress on their likelihood to be targeted by SWFs. The results on medium-term financial performances are in stark contrast with the evidence of significant positive short-term abnormal returns verified in all empirical studies on SWF, including this one. All in all, theories proposed so far to justify the performances of firms invested by SWFs seems to be unable to reconcile all the verified empirical results: pessimistic views of SWFs cannot explain their positive short-term effect; optimistic views cannot explain their often negative or insignificant medium-term

[1] Of course, this argument is valid only for "mutual fund-like" SWFs, i.e. investing in a broadly diversified portfolio. Viceversa, this line of reasoning cannot hold for "Private Equity-like" SWFs, investing in relevant stakes of relatively few firms.

effect on financial performances. Moreover, all previous theories seems to have a tough time when tested empirically with an analysis of determinants of abnormal performances.

Focusing on empirical results on the relevance of firms financial conditions for both SWFs investments likelihood and impact, In chapter 4 I propose an alternative theoretical framework to explain why SWFs are positively hailed by markets in the short-term, and especially so for financially distressed firms. I argue that SWFs - given their financial capacity and lack of short-term liabilities - can have a comparative advantage in providing their portfolio firms with fresh capital in case of need. While I cannot exclude that the rationale of SWFs activism in firms bail-outs is to be found in their aim at achieving a “political goodwill”, I argue that injecting new liquidity in distressed firms can also be considered a financially sound strategy for them. Assets bought from a “distressed seller” are in fact likely to be illiquid and underpriced, and can bring superior returns for an investor able to keep a purely long-term investment perspective. On the contrary, refusing to provide new capital could result in a default and a deadweight loss; this is especially true when the Fund not only have a financial but also a potentially strategic interest in firm. It is interesting to notice that SWFs wouldn’t be the only financial institutions to “exploit distressed sellers”: Hedge Funds[2] have long applied this strategy; however, SWFs would definitively have a comparative advantage in this sense, given their superior financial capacity and liquidity especially during a credit crunch. Seeking to invest in assets sold by distressed sellers would have the collateral consequence of making SWFs more likely than other shareholders to act as “investor of last resort”, thus certifying firms financial viability. In order to test this hypothesis, I look at SWFs impact on firms credit risk (measured using CDS spread), finding an abnormal reduction. Even more importantly, I find this reduction to be moderate by SWFs, deal and firms characteristics in a highly coherent fashion: SWFs more able to keep their long-term view have a stronger impact on credit risk; smaller firms which credit risk is more likely due to short-term financial issues (distressed sellers) rather than medium-term structural problems (distressed assets) are those who benefit the most from SWFs investments in this sense. Again, it could be argued that SWFs provide distressed firms with new capital because of political reasons, or that markets expectation of SWFs acting as white knights is irrational. Nonetheless it is a fact that, whatever the reason, firms targeted by SWFs do experience a credit risk stable reduction. Moreover, it must be further underlined how firms who benefit the most from SWFs are not “basket cases” because of structural problems (i.e. distressed assets) but are firms with short-term financial problems (i.e. distressed sellers): it would then be a rational behavior for a shareholder with no liabilities and a long-term view to increase its stake in such a firm, thus earning an expected superior return in the long run (while probably bearing negative medium-term performances) and helping to avoid a potential default caused by a credit crunch.

[2]For an interesting discussion on Hedge Funds seeking to exploit distressed sellers see “Waiting to turn trash into treasure”. The Economist, November 19th 2011.

All in all, I reckon that SWFs bring some economical and political issues that must be carefully addressed by policy makers; to this extent, I provide in this book a simple empirical strategy to test how much their portfolio allocation can be considered as financially sound. Nonetheless, I believe I show in this work that Sovereign Wealth Funds can also be considered as a positive force in financial markets: more importantly, I show how the stability they could bring does not necessary imply a politically-driven strategy, but it could fairly be the consequence of a rational behavior performed on a purely commercial basis.

1 An introduction to Sovereign Wealth Funds

1.1 Introduction

Sovereign Wealth Fund (SWFs hereafter) are funds owned or directly controlled by governments investing in any kind of financial asset, both domestically and abroad. They are usually set up to manage an "excessive wealth" in foreign currencies accumulated in countries characterized by a persistently positive surplus in the balance of payment. This surplus, typically, stems from the net export of goods or natural resources. Despite they exist since the early 1950s, the academic and public interest towards SWFs has risen sharply only in the past few years, as Figure 1.1 suggests; as a matter o fact, the term Sovereign Wealth Funds was firstly introduced in 2005 by Rozanov to qualify the increasing tendency, especially in emerging economies, to shift the management of part of the national wealth to newly created entities closer to mutual funds than typical holding companies or central bank-linked entities.

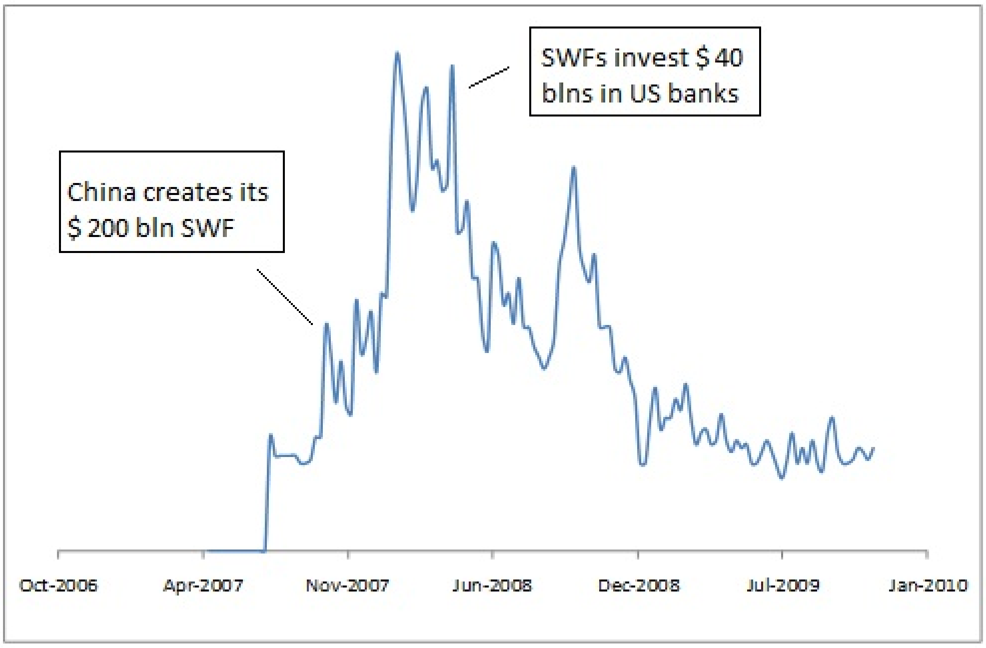
There are three main reasons for the increased interest in these actors.

First, SWF are fast becoming pretty big: they are estimated to manage between 3 and 4 trillions $ (SWF Institute, 2011) , that is larger than hedge funds (around 1 trillion $ according to Hedge Fund Research, 2011) but still smaller than other types of financial institutions like pension funds, with Assets Under Management (AUM) in 2010 estimated to be worth around 26. 5 trillion $ (GPAS, 2011), and mutual funds (24.7 trillion $; ICI, 2011). However, SWF are in a fast growth path both in number and size, as a result of high commodities prices and persistent global imbalances in the import-export of goods: of the 54 SWFs recognized by the Sovereign Wealth Fund Institute, 31 (57.4%) were born after 2000. Despite the non optimal market conditions, which have caused a reduction in the market value of their AUM in the first quarter of 2009, SWFs size[1] has increased by 48% in the last four years (see Figure 1.2), an implied compounded 10% yearly growth rate.

Moreover, assets managed by SWF are highly concentrated, and several SWFs are very large compared to other institutional investors. The world's largest SWF is the Abu Dhabi Investment Authority (ADIA) which is estimated to manage $627 billion in 2010. As a matter of comparison, in the same period the world's largest hedge

[1] along all this work, by SWF "size" I mean the estimated market value of their wealth under management, unless otherwise specified.

Figure 1.1: Interest towards SWFs: number of times the term "Sovereign Wealth Fund" has been googled



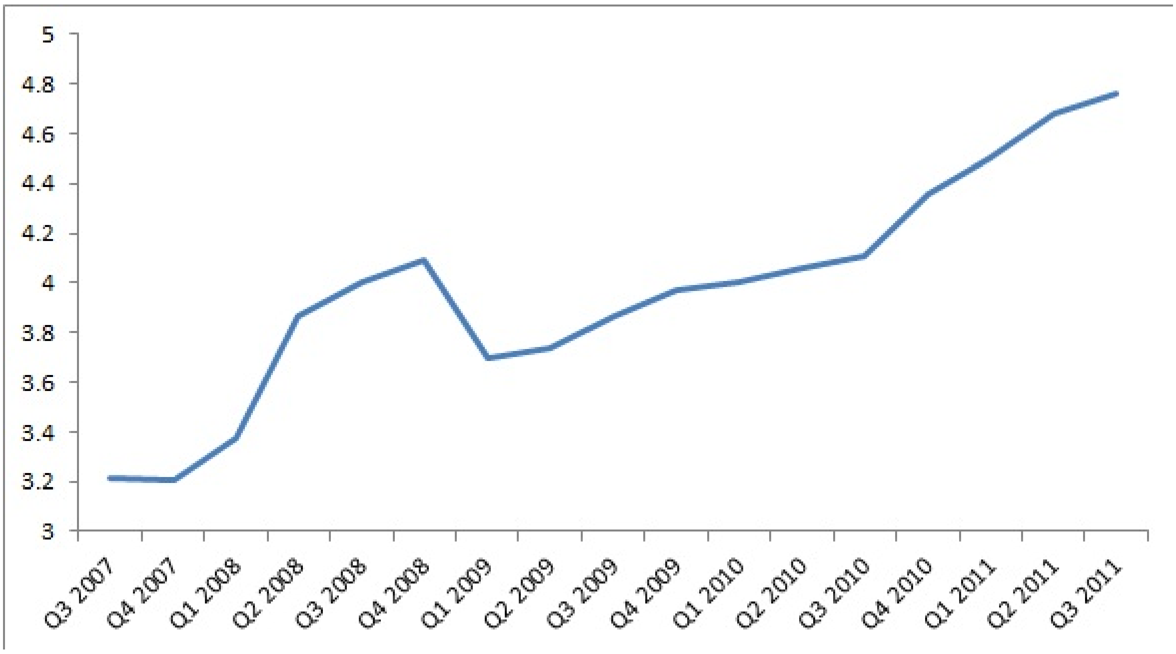
Source: Google Trends

fund portfolio is Bridgewater's, with about $50.9 billion in assets[2], and CalPERS, the US largest pension fund, has assets for $201.6 billion (CalPERS, 2010). The investment decisions of a single Fund, and the Government decision to let these entities to manage part of their foreign excess reserves are thus likely to have a non neglectable impact on asset prices and general market allocation: Beck and Fidora (2008) estimate that shifting excess reserves from Central Banks to SWFs investing in the market portfolio could result in US and European government bonds sells for as much as 1 and 0.5 trillion $ respectively. Even without considering excess reserves managed by the Central Bank, it is clear how SWFs have in the last few years strongly increased their investment activity towards foreign markets, especially in equity and often buying significant stakes: according to UNCTAD's World Investment Report (2008), $31 billion of the $39 billion Foreign Direct Investments (FDIs) by SWFs in the last 20 years have been made between 2005 and 2007.

Second, SWFs are Government-linked entities and, as such, their investment behavior could include political objectives. This has raised a large debate about the risk that SWF investments could entail for target companies, the political stability of their host countries and, generally speaking, national security (e.g. Bahgat, 2008; Gieve, 2008; Keller, 2008). The debate was fueled by the creation, in the second half of 2007, of the CIC, the $200 billion Chinese SWF (e.g. Cognato, 2008; Martin, 2008; Zhang and He, 2009; Martin, 2010). The link of SWFs with governments may also

[2]"The Billion Dollar Club". *AR Magazine*. September 30, 2010.

Figure 1.2: Aggregated market value of SWF assets under management



Source: SWF Institute website. Data in USD billions.

favor portfolio companies, allowing them more effective lobbying and giving them a privileged access to captive markets (e.g. Dewenter and Malatesta, 1997; Sojli and Tham, 2010).

Finally, SWFs are pretty different from any other institutional investor and financial institutions: Central banks (and their financial arms) invest only in a restrict class of assets. National holding companies mainly take controlling stakes in domestic firms. Mutual funds, hedge funds and private equity funds all have investors to which they have to report performance and who can use their voice and exit rights. Pension funds, both private and public, have pension liabilities against which they have to match their investment objectives. SWFs, instead, are characterized by a higher degree of freedom in their asset allocation than State-controlled entities, no threat of investor exit, and no explicit short-term liability. SWF liabilities towards the government (and, ultimately, citizens), tend to be expressed as very long-run, generic, investment objectives. For instance, the objective of the Norwegian Government Pension Fund Global is “[...] to safeguard and build financial wealth for future generations [...] to safeguard the owners’ long-term financial interests through active management and ownership.” (NBIM, 2010, p. 12). The lack of short term, explicit liabilities and withdrawal risk favors the pursuit of long-term investment strategies (Beck and Fidora, 2008). Essentially, SWFs combine some of the features of hedge funds and pension funds. As noticed by Bortolotti et al. (2010), SWFs are similar to hedge funds in that both are stand-alone, unregulated pools of capital allowed to pursue significant stakes in foreign firms. And SWFs are similar to pension funds for their long-term investment horizon. However, SWFs have some unique characteristics which make them different from any other private or public investor. Eventually, the distinctive features of SWFs suggest that their impact at a micro (i.e. on firms) and macro (i.e. on financial) level are ambiguous from a theoretical perspective. On the one hand, SWFs could play a beneficial role in financial markets, by providing a long-term perspective which other investors lack, especially in periods of financial turmoil. But, at the same time, other factors suggest that their investments could be driven by political objectives which could lead to distortions capital allocation.

Before moving to the study of SWFs investment decisions and of their impact, it is important to understand which are the characterizing aspects of these entities potentially influencing their activity. The rest of this chapter is dedicated to this scope. In section 1.2 I provide a general definition of SWFs and present which are the most important characteristics all SWFs share; in section 1.3 I provide a panoramic view of some of the main SWFs. Finally, in section 1.4 I discuss the sources of heterogeneity among SWFs and provide a classification of these Entities across some dimensions.

1.2 What is a Sovereign Wealth Fund?

Since Rozanov's work first appearance, many different possible definition of SWFs have been proposed .Balding (2008) presents an overview of different definitions and what they imply for the inclusion or exclusion of certain entities in the category; as Truman (2008) notes, the broadest possible definition of SWF is "a collection of government-owned or government-controlled assets". Clearly, under this definition we could consider as a SWF any Government-Owned Enterprise (GOEs, e.g. Eni), any Public Pension Fund (e.g. CALpers), any Government Sponsored Entity (e.g. Fannie Mae). Since none of the entities presented as example here is usually considered a SWF, a stricter definition is needed. According to the International Monetary Fund (2008), a SWF is a "special investment funds created or owned by government to hold foreign assets for long-term purposes". This definition is useful in the sense that it allows to exclude some potential candidates: first of all, a GOE is not a SWF; while it is Government owned and it can surely make investments, it is not an investment fund. Second, a SWF must own also foreign assets: this leads to exclude public holdings dedicated to manage public stakes and invest in domestic firms, such as the Italian *Cassa Depositi e Prestiti*.

The definition of SWF proposed by the OECD (2008) focuses on the source of their wealth under management: a SWF is in fact founded out of either i) foreign exchange reserves, ii) the sale of scarce resources (such as natural resources or GOEs), or iii) general tax or other Government revenues. Two important points can be made out of this definition: first of all, Government set up SWFs out of resources they are endowed with, not from resources specifically raised to fund a SWF: this excludes Public Pension Funds, as their Asset Under Management (AUM) comes from citizens pension contributions and are thus *linked to a specific liability*. Viceversa, resources transferred to SWFs have no specific "purpose" embedded but the generic country wealth. Second, to put this straightly, SWFs are created by countries who can afford it, i.e. they have revenues in excess of what is needed for fiscal balance purposes and thus needs to be invested. This is why public funds from countries characterized by constant trade and fiscal deficits, such as the United States, can hardly be considered SWFs.

A commonly accepted definition of SWF was set out by the IWG (2008): SWFs are special purpose investment funds or arrangements, created by the general government for macroeconomic purposes, which hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets. According to this definition, the only kind of public entities remaining borderline are Central Banks Vehicles: after all, they do invest in foreign financial assets and have financial objectives, but can they be considered SWFs? My approach along this work is to consider a Central Bank Entity (CBE) a SWFs only if it invests in foreign equity assets, as this can prove that the entity does not pursue exclusively the typical Central Banks stabilization targets.

Given this definition, Sovereign Wealth Funds are entities sharing the following characteristics:

1. *They are owned by a Government*: the (only) shareholder of a SWF is the Government; usually Government here means the country's Ministry of Finance, but at times it could be the Central Bank. While the ultimate owner of a SWFs are thus the country citizens, none of them can state a particular claim over SWFs assets.

2. *They are set up out of existing excess resources*: while SWFs AUM could of course be used to boost public spending and investments, they are usually created by countries characterized by a fiscal and/or trade surplus, and are always created with the idea of exactly avoiding the use of their resources for current spending, at least in the short-term. Sudden withdrawals, although possible, are thus less likely than for any other class of investors.

3. *They have a long-term view*: the absence of specific liabilities and the generic account situation of their countries makes SWFs able to keep a long-term perspective when investing. While part of their AUM revenues can be used to finance public spending, SWFs are exactly created with the idea of preserving and exploiting present resources for the good of future generations.

4. *They pursue different targets*: the main target of a SWFs could be the intergenerational transfer of wealth, the stabilization and/or the development of the economy etc. However, all the funds share the optimization of risk-adjusted returns among their objectives.

1.3 An overview of SWFs

This section presents an overview of some Sovereign Wealth Funds, with a particular focus on their investment policy, governance and relationship with the Government; until recently, very few information on SWFs were available, and a big heterogeneity still persist with this respect. Thus, the Funds singled out here are not only those considered to be the more "relevant" - because of their size, characteristics or country of origin - but also those where the necessary amount of information from official sources was available. This exclude for example the Chinese SAFE, which would have otherwise certainly been included according to the characteristics aforementioned. The purpose of this section is to highlight how SWFs can exhibit a significant heterogeneity in a number of relevant characteristics that, as explored in this work, are likely to moderate their impact as shareholders as well as their portfolio allocation decisions. In section 1.4, a taxonomy based on these characteristics for all the SWFs included in the analyses of chapter 4 is presented. It is worth underlying here that, despite these huge differences among SWFs, these entities still exhibit common characteristics, from their Government affiliation to their long-term investment framework passing through their general lack of short-term liabilities , which I believe makes sound to study them as a single "class" of institutions, as opposed to other groups of financial actors already investigated in the literature.

1.3.1 Abu Dhabi Investment Authority

1.3.1.1 History of the Fund

Abu Dhabi is one of the seven Emirates forming the United Arab Emirates (UAE). Each Emirate enjoy an high political autonomy and, in particular, has the complete control over its natural resources and the revenues they provide. Abu Dhabi alone controls around the 90% of UAE's oil reserves; for this reason, since 1967 it has been given to the *Financial Investment Board* (FIB), under the supervision of the Ministry of Finance, the task to manage the Emirate oil revenues. In 1976, the FIB has been replaced by the Abu Dhabi Investment Authority (ADIA), which is entirely owned by the Government. ADIA statement, revised in 1981, declares a complete distinction between the fund propriety, the Government and the Fund management. In the second half of the '80s the Fund starts including alternative assets within its investable universe and organize its workforce by asset class and geographical allocation. In 1993 ADIA starts a formal asset allocation process, with a set of benchmarks and guidelines, thus strongly reducing the relevance of high-profile strategic deals in its portfolio. For this reason, in 2007 it was splintered from ADIA the *Abu Dhabi Investment Council* (ADIC); little is known about ADIC, except that, according to the SWF Institute (2011), it should be significantly smaller than ADIA and its investment profile should be much more home biased. Since 2008, ADIA is co-chair with the International Monetary Fund of the *International Working Group of Sovereign Wealth Funds* (IWG).

Among SWFs, ADIA is one of the less transparent and one of the biggest Funds; the former characteristic makes hard to evaluate how big the Fund actually is: Blundell-Wignall et al. (2008) report various estimations ranging between 500 and 875 USD billions; The Sovereign Wealth Fund Institute (2011) evaluate its wealth under management in USD 675 billions; Seznec (2008), using an approach based on estimated oil revenues and budget expenditures since its creation, evaluate ADIA to be worth around 300 billions USD. Whatever the actual value of its wealth under management is, ADIA is certainly one of the biggest SWFs in the world.

1.3.1.2 Targets and Investment Policy

ADIA official goal is "to receive funds of the Government of Abu Dhabi allocated for investment, and invest and reinvest those funds in the public interest of the Emirate in such a way so as to make available the necessary financial resources to secure and maintain the future welfare of the Emirate" (IWG, 2008). As stated in the previous paragraph, ADIA investment policy is centered on an highly diversified allocation following the stated benchmark portfolio macro allocation. This benchmark allocation, defined by the Fund Strategic Unit, includes more than 12 asset categories with a long-term fixed weight; the "neutral" allocation, rather than following a present market allocation or focusing on the need for hedging the revenues from oil, represent the "ADIA's long-term vision of the world" (ADIA, 2010): any proposed changes to the neutral benchmark are subject to review by the Strategy Committee followed by the Investment Committee before a recommendation is made to the Managing Director. Despite this long-term perspective, the Fund allows for medium-term deviations from the neutral benchmark, as well as occasional off-benchmark opportunistic investments. Moreover, ADIA manages its portfolio in such a way as to ensure it holds a sufficient level of short-term liquidity to meet anticipated funding requests from the Government, thus minimizing the need to liquidate other investments.Table 1.1 reports the range for the fixed weights allocated to each asset class and geographical area.

While the 60% of the wealth under management is invested in index replicating strategies and the 80% is managed by external managers, in 2008 ADIA has grouped all its equity groups and established an Internal Equity Department which is in part devoted to the pursue of Active Investments. Little is known about ADIA direct investments in equity: between 1984 and 2010 the Sovereign Wealth Fund Transaction Database has registered 83 equity deals, performed especially in the Financial (19 investments) and Consumer Discretionary (16) sectors. An interesting aspect of these publicly known deals is their geographical distribution: while the North American region exhibit the higher weight in the neutral benchmark, the 76% of these active investments have been targeting European firms. It could be the case that this investment activity is partially explained by the hostile climate

Table 1.1: ADIA's neutral benchmark portfolio

	Min	Max
Asset class		
Shares (developed countries)	35.00%	45.00%
Shares (developing countries)	10.00%	20.00%
Shares (Small Cap)	1.00%	5.00%
Government bonds	10.00%	20.00%
Corporate bonds	5.00%	10.00%
Alternative Investments	5.00%	10.00%
Real Estate	5.00%	10.00%
Private Equity	2.00%	8.00%
Infrastructure	1.00%	5.00%
Cash	0.00%	10.00%
Region		
North America	35.00%	50.00%
Europe	25.00%	35.00%
Asia (developed)	10.00%	20.00%
Emerging	15.00%	25.00%

of US markets toward middle-east investments. Of this 83 equity investments, 71 have been directly performed by ADIA and 12 by directly controlled subsidiaries; these two deal classes exhibit very different patterns in terms of shares acquired: while investments performed directly by ADIA are on minority shares (on average 3.47%), coherently with the Fund stated policy of not pursuing the control of its portfolio companies, indirect investments through controlled firms often result in the acquisition of a majority stake (on average the 80.91%). Acquisitions of significant shares (i.e. >5%) have mainly concentrated in the Financial sector. An other aspect that is worth to notice is how the bulk of these deals were part of restructuring operations (e.g. Union National Bank, 40% acquired in 1991) or in general capital raise (e.g. GB Holdings SpA, 100%, 2004).

1.3.1.3 Governance and relationship with the Government

Th ADIA Board of Director is composed by a President, a CEO, an Executive Director and other 5 members; all the BoD members are representative of the Abu Dhabi Government, and half of them are part of the Royal Family. While the BoD evaluates the Fund operative performance, the ADIA investment activity is directed by the Executive Director, who should be able to execute his tasks independently from the Government. On a more practical basis, given the BoD composition it is hard to consider the Fund as truly independent from its shareholder. With almost 1,200 employees, ADIA has an operational structure resembling those of the biggest international private funds.

ADIA's assets are not classified as international reserves; on a periodic basis, the Government redirect toward the SWF part of the surplus to its budgetary requirements and other funding commitments. This wealth comes mainly from the revenues of the Abu Dhabi National Oil Company (ADNOC) and other companies operating in the oil&gas sector. While the Fund has no explicit liabilities toward its shareholder, the Government has the power to withdraw the wealth from the Fund in case extreme or prolonged weakness in commodity prices should result in a budgetary deficit (ADIA, 2010); while these events are stated as "infrequently" in ADIA Annual Report, no official statistics on cash flows from the Fund toward the Ministry of Finance is reported.

1.3.2 China Investment Corporation

1.3.2.1 History of the Fund

The China Investment Corporation (CIC hereafter) was officially born on September 29th 2007, after a two year period work by Chinese authorities (Cognato, 2008 and Zhang and He, 2009). The main official reason underlying the creation of the Fund was the tremendous opportunity cost bear by the Central Government for keeping all its official foreign exchange reserves in Government bonds and money market instruments. Between 1981 and 2010, Chinese foreign exchange reserves have grown at a 23% average yearly rate, while during the same period its GDP (in current US Dollars) has seen an 11% compounded yearly growth rate. These two trends combined resulted in a significant increase of the foreign reserves-GDP ratio; the cost opportunity of keeping this national wealth invested in a typical Central Bank portfolio has been estimated being around 1% of GDP in 2008.

In 2005, the *Policy Research Office* (A governmental think-tank) has proposed those reserves to be invested in other asset classes than US Treasury bonds; the institution identified in the two Singaporean SWFs (Temasek and the Government of Singapore Investment Corporation, GIC) the model to look at for the management of Chinese excess foreign reserves. In 2006, well before the CIC was born, the *Chinese State Administration of Foreign Exchange* (SAFE), a Central Bank-Vehicle entitled with the management of Chinese foreign exchange reserves, started pursuing a more diversified investment policy, including foreign equity within its investable universe. As for domestic active investments, the identified solution was to expand the scope of the *Central Huijin Investment Company* (Huijin), a company initially created to hold and manage the Government-Owned Entities in the Financial sector. As SAFE was under the management of the People Bank of China (PBoC, the Chinese Central Bank), this *status quo* resulted in a conflict of interest with the Ministry of Finance (MoF): the identified solution was to create a new Fund (the CIC) under the direct influence of the Mof.

In 2007 CIC was endowed with USD 200 billions; almost one third of the amount was allocated to acquire the 100% of Huijin. An other significant portion of the original endowment was used soon after CIC initiation to inject new capital in two troubled financial institutions whose control was inherited through Huijin's acquisition, the China Development Bank and the Agricultural Bank of China. All in all, the amount initially allocated to CIC foreign investments was about USD 100 billions. As of December 2010, the official Owner's Equity (Including Hujin) was USD 374.3 billions.

1.3.2.2 Targets and Investment policy

Officially, CIC invests only on a commercial basis; the underlying investment objective is to seek long-term, sustainable, and high financial returns for its shareholder within acceptable risk tolerance. As a financial investor, it does not seek to control any sector or company. While the allocation strategy is centered on the definition of a Strategic Asset Allocation following a benchmark portfolio, as of 2010 still the 24% of CIC portfolio (considering all asset classes) was invested in "concentrated holdings" (CIC, 2010). At the end of 2009, direct investments were declared to be the "largest individual position in CIC's global investment portfolio" (CIC, 2009). While it could be the case that CIC will eventually become an highly diversified, mainly investing in index-replicating strategies SWF, it can be considered in its first years of activity as mainly pursuing direct, high-profile deals. Actually, the first CIC investment in a foreign firm was dated even before it was officially born, when it participated to Blackstone IPO acquiring around the 10% of the firm shares. Few months after, it participated to Morgan Stanley recapitalization with a USD 5 billions injection and invested around USD 100 millions in VISA IPO. After these mega-deals, the Fund has experienced a transitional period due to both the international markets uncertainty and the operational difficulties in creating a managerial structure able to manage the capital endowed; as a result, in 2008 the 87.4% of the portfolio was still invested in monetary instruments.

In 2009 the CIC was ready to pursue new high-profile investments; other than the Financial sector, those deals focused especially in the Energy, Commodities and Real Estate sectors, which have been identified as strategical for the Chinese economy (see Table 1.2).

1.3.2.3 Governance and relationship with the Government

While originally founded using a debt contract forcing the Fund to pay around USD 8 billions in interests to the Central Government, this system was soon changed using a debt-to-equity swap agreement which converted this fixed liability in variable dividends payments to the Central Government; this crucial change is supposed to have further increased the CIC investment horizon. Aside this, little is known about CIC relationship with its shareholder; while fixed liabilities were removed, the SWF is still expected to pay frequent dividends (CIC, 2009). No official withdrawal policy is known.

Table 1.2: Main CIC Investments

Firm	Country	Industry	Date	USD Mln.
Blackstone	USA	Finance	06/2007	3,000
Morgan Stanley	USA	Finance	12/2007	5,600
VISA	USA	Finance	03/2008	100
Teck Resources	Canada	Commodities	07/2009	1,500
Goodman Group	Australia	Real Estate	08/2009	421
Songbird Estates		Real Estate	08/2009	350
KazMunaiGas	Kazakistan	Commodities	09/2009	940
PT Burni Res.	Indonesia	Energy	09/2009	1,900
Noble Group	Singapore	Commodities	10/2009	270
SouthGobi Energy	Canada	Commodities	11/2009	500
AES	USA	Energy	11/2009	1,581
Poly Energy	Hong Kong	Energy	11/2009	700
Blackrock	USA	Finance	<12/2009	700
Vale do Rio Doce	Brazil	Commodities	<12/2009	500
Zoomlion	China	Manufacturing	02/2010	816
Apax Partner	USA	Finance	02/2010	956
Penn West	Australia	Commodities	05/2010	1,200
Chesapeake Energy	USA	Enenrgy	05/2010	300

Source: SWFTD, author's elaboration

In assessing the CIC portfolio policy, it is important to distinguish between its international assets allocation and its domestic asset allocation, mainly formed by the holdings inherited by Huijin. These two portfolios have different governance systems, with Hujin executive managers directly nominated by the Chinese Central Government. The different nature of national and international CIC holdings is reflected also in its revenue accounting rules: while the global portfolio returns are computed on a market base, Huijin returns are cash-based (i.e. computed as dividends over the equity book value). The two portfolios should also pursue different investment strategies; while the global portfolio is generally invested in minority stakes (albeit often significant) with the stated limitation of not acquiring the control of a foreign firm, stakes owned in Chinese firms give the CIC the control on a relevant numbers of Government-linked Companies, especially in the financial sector.

1.3.3 Government of Singapore Investment Corporation

1.3.3.1 History of the Fund

the Government of Singapore Investment Corporation (GIC) was incorporated in 1981 under the Singapore Companies Act and is wholly owned by the Government of Singapore. Differently from the other SWF of Singapore, Temasek, it was set up with the sole purpose of managing Singapore's foreign reserves (GIC, 2010). An other relevant difference with Temasek is that the GIC only manages its portfolio on behalf of the Government, while Temasek Holdings is to be technically considered as the owner of the wealth it manages. Finally, GIC mainly invests outside Singapore, while Temasek portfolio is highly home "biased".

1.3.3.2 Targets and Investment policy

The main target of the GIC is "to achieve a reasonable rate of return above global inflation, with due regard to risks, over an investment horizon of 20 years" (GIC, 2010). The anchor of GIC's investment activities is the policy portfolio, which defines the asset classes that GIC invests in, and how it allocates funds to these asset classes. While the Strategic Asset Allocation its central to GIC investment policy, operating ranges are specified to accommodate acceptable deviations arising from short and medium-term volatility and technical causes, and to give management some latitude to operate tactically in response to changes in market conditions. respectively to other SWFs performing a benchmark-driven highly-diversified asset allocation, the GIC portfolio (Table 1.3) resemble more that of a neutral investor (i.e. the market portfolio) .

Table 1.3: GIC benchmark portfolio, 2010

		Share (%)
Asset Class		
Public Equities	Developed Markets	41
	Emerging Markets	10
Fixed Income	Nominal Bonds	17
	Inflation-linked Bonds	3
Alternatives		25
Cash&Others		4
Region		
Americas		43
Europe		30
Asia		24

1.3.3.3 Governance and relationship with the Government

As stated above, GIC wealth under management comes from sustained balance of payments surpluses and accumulated national savings. The reserves provide a stream of returns that can be discretionally spent or invested by the Government. However, the Constitution of Singapore stipulates a spending rule that determines how much of the investment returns on its reserves the Government can spend. The spending rule allows up to 50% of the long-term expected real return on the reserves managed by GIC and those owned by the Monetary Authority of Singapore, to be taken into the Government's annual budget. An Investment Mandate from the Government to GIC sets out the terms of appointment, investment objectives, investment horizon, risk parameters and investment guidelines for managing the portfolio. The Government, which is represented by the Ministry of Finance in its dealings with GIC, officially neither directs nor interferes in the company's investment decisions. It holds the GIC Board accountable for the overall portfolio performance. GIC provides monthly and quarterly reports to the Accountant-General. These reports list the investment transactions executed, as well as the holdings, bank accounts and balances. However, as for Temasek, the President has veto power on GIC BoD appointments or members removal (GIC, 2010).

1.3.4 Government Pension Fund - Global

1.3.4.1 History of the Fund

Norway owns about 0.6% of oil and 1.7% of natural gas reserves worldwide (BP, 2008) against only around 0.07% of world's population. In 2005 Norway was the world's third largest oil exporter and the eighth largest oil producer, and the petroleum sector accounted for 25% of country's GDP, 52% of exports, and 33% of total central government revenues (Eriksen, 2006). The Storting (the Norwegian parliament) decided to set up a fund to support the long-term management of oil revenues in 1990. Besides its own returns, the fund would receive from the central government transfers out of cash flows from petroleum activities, subject to budget surplus GPF (2005). This latter condition was not met until 1994, thus delaying the initiation of the fund (Eriksen, 2006).

In 1996 the Petroleum Fund of Norway (renamed in 2006 as Government Pension Fund - Global, GPF) received its first capital transfer from the Ministry of Finance. In 1997 the fund passed under the Norges Bank that, in 1998, created a separate entity, the Norges Bank Investment Management (NBIM), to manage the fund on behalf of the Ministry of Finance, that was in charge of setting the overall investment strategy advised by the Norges Bank itself (NBIM, 2007). With some USD 571.5 billion in assets, the GPF is the largest SWF with stabilization objectives in the world (SWF Institute, 2011)

1.3.4.2 Targets and Investment policy

The GPF is characterized by a long-term prospective, is not earmarked for specific liabilities and has no short-term liquidity requirements (Norwegian Ministry of Finance, 2008). Withdrawal is subject to approval from the Norwegian parliament and is limited to the expected real return on GPF investments, thus preserving the real value of the fund (Eriksen, 2006). The investment strategy set by the Ministry of Finance is translated into a benchmark portfolio, which NBIM has the mandate to track (with a maximum allowed tracking error of 1.5%) and, possibly, outperform through a combination of active and passive management (Norwegian Ministry of Finance, 2005).

The GPF is mainly invested in index-replication strategy, with active management only accounting for a tiny fraction of the overall return (Ang et al., 2009). The benchmark portfolio changed substantially over time, as well as the set of investable assets. Investments in emerging market equities were allowed since 2000. Corporate bonds and asset-backed securities were included since 2002. In 2006 new forms of fixed income securities, such as inflation-linked bonds and below-investment-grade bonds became eligible. In 2007 the maximum percentage of equities was increased to 60% (NBIM, 2007). In 2008 real estate and property investments were included and the maximum ownership stake in individual companies was increased from 5% to 19% (MoF, 2009). Despite these frequent changes in the benchmark portfolio, the GPF must strictly track the benchmark composition, with a defined limit for both tracking error and volatility.

According to Kjaer (2001), the GPF serves two primary purposes. In the short-term, it serves as a buffer for the government budget to shelter the domestic economy from fluctuations in the income from petroleum. In the long-term, the GPF intends to help the Government face the decline in resource revenue and the expected increase in pension expenditure. Both short and long term goals make clear that in setting the investment strategy of the GPF, commodity price risk should be taken into account. The Norges Bank suggests that geographical allocation of GPF should take into account "the risk in the other components of Norway's national wealth" (Norges Bank, 2002). This components include fixed capital and human resources, foreign assets held through the Petroleum Fund and the Petroleum in the North Sea. While the Norges Bank recognizes that it may not be feasible to manage all these different forms of wealth altogether, "efforts should be made to manage the Petroleum Fund in such a way that the return on the Fund does not co-vary strongly with the other components of Norway's wealth" (Norges Bank, 2002). The Ministry of Finance seems however skeptical regarding the use of GPF as a tool for diversification from other sources of national wealth, claiming that benefits from reducing return's correlation with oil would be offset by costs associated with reduction in expected returns and increase in expected volatility (MoF, 2009). This notwithstanding, there is a general agreement among academics and practitioners that stabilization ranks high among the objectives of the GPF (Kunzel et al., 2010).

1.3.4.3 Governance and relationship with the Government

As stated above, the GPF operational management is under the Central Bank (via the NBIM), while the investment strategy is under the responsibility of the Ministry of Finance. The Government is allowed to withdraw capital from the Fund in case of need; however, the maximum allowed petroleum revenues spending is limited at 4% of the GPF value, thus clearly insuring the long-term viability for the SWFs of its wealth under management.

The investment policy have historically made the GPF a purely passive investor; however, the maximum allowed share owned in a single company has been raised significantly, and a potentially more active attitude in portfolio companies BoD has been considered (Norwegian Ministry of Finance, 2008).

1.3.5 Mubadala

1.3.5.1 History of the Fund, Targets and investment policy

Mubadala, the second Abu Dhabi SWF by size, was established in 2002 by the Government, who is the sole shareholder of the Fund, with a mandate to facilitate the diversification of Abu Dhabi's economy. Since 2008, Mubadala has been issuing *sukuk* to finance its investment activity.

Mubadala focus is on managing long-term, capital-intensive investments that deliver strong financial returns and tangible social benefits for the Emirate. The principles that underpin Mubadala mandate and guide their business strategy are different from those of the bulk of SWFs discussed in this section; while commercially viable, Mubadala investment activity has explicit mandate to deliver strong social returns to Abu Dhabi and the United Arab Emirates. In other words, Mubadala investments are highly strategical and officially evaluated on a basis that is not only financial. These collateral targets include bringing the knowledge, expertise and technical skills that the Emirate needs to build a balanced and sustainable economy and high value employment opportunities to the UAE, encouraging foreign direct investment and providing them with access to new global markets.

From a portfolio composition point of view, Mubadala allocation is highly under-diversified and exhibit a strong bias toward some regions (Middle East and North Africa in primis) and sectors (Energy), as Table 1.4 shows. Moreover, Mubadala invests only directly and assumes majority positions: of its 65 biggest investments, 55 are in fact in controlling stakes (i.e. equal to or higher than 20%) (Mubadala, 2010).

1.3.5.2 Governance and relationship with the Government

Coherently with its scope, Mubadala is organized in different business units, each managing its investments in a specific industry. The Board of Directors is responsible for the direction and oversight of Mubadala on behalf of its shareholder and is accountable to it for all aspects of Mubadala's business, including corporate governance, focusing on activities that enable it to promote its shareholder's interests

Table 1.4: Mubadala portfolio (2010)

Panel A: Number of portfolio companies by Region

Country	UAE	USA	MENA (ex. UAE)	Europe	Other
UAE	69	14	11	7	8

Panel B: Total asset book value by Business Unit

Unit	Capital	Energy	Industry	ICT	Infrastructure	Real Estate	Services
Capital	30,599	20,724	3,686	11,663	8,408	12,359	1,996.5

Source: Mubadala, 2010, Author's elaboration. Values in Panel B are in AEM millions.

and ensure Mubadala is fulfilling its mandate. Certain aspects of the Board's authority are delegated to the CEO, Khaldoon Khalifa Al Mubarak, and members of the Investment Committee. This delegation is subject to ongoing review as well as the limitations set out in Mubadala's Delegation of Authority. The Board's governance mandate deals with its relationships with the Government and executive management, the conduct of the Board's affairs, and the tasks and requirements of Board committees. The Board also monitors Mubadala's focus and commitment to activities that promote its shareholder's interests including, in particular, the active consideration of strategy, risk management, and financial planning and performance. The CEO describes to the Board in the Annual Business Plan and Budget how Mubadala's strategy is to be delivered, together with an assessment of risk and compliance issues. During the year, the Board monitors the progress made in achieving the goals set out in the Annual Business Plan. The CEO is obliged to review and discuss with the Board all strategic projects and developments, and all material matters currently or prospectively affecting Mubadala and its performance, in accordance with the Delegation of Authority.

Once a year, Mubadala, based on its annual budget, proposes, and the Government approves, an amount of capital contribution to be granted to the Group. Since its establishment, the Company has received capital contributions from the Government totaling AED 61.1 billion as at 31 December 2010. The relationship with the Government in terms of financing is ambiguous: while the Government has historically provided adequate cash and other contributions to Mubadala to support its projects and investment objectives, it is not legally obliged to fund any of the Mubadala's projects or investments, even if it has previously approved the proposed budget for the project or investment concerned. Accordingly, there can be no assurance that Mubadala will continue to receive adequate contributions from the Government. At the same time, as a result of the continuing financial support offered by the Government, Mubadala has been awarded by Moody's a rating which is only one notch inferior to that assigned to the Government (i.e. Aa2 vs Aa3). Moreover, the Rating Agency recognizes how "[Mubadala is a] vehicle of government policy, and is embedded in a framework of government funding and oversight that enables it to achieve ratings close to the ratings of the sovereign itself. It remains heavily funded directly by the government in addition to its own capital market and bank borrowing activities. Indeed, the government has historically provided the funding requirements of this entity that were not raised in the debt markets, which is a business model expected to be followed for the foreseeable future" [3]. All in all, the evidence support the idea that Mubadala can be expected in the near future to receive from the Government more cash than it pays back as dividends.

1.3.6 Temasek Holdings

1.3.6.1 History of the Fund

Temasek Holdings was born in 1974 to manage the Singaporean stakes in Government Owned Enterprises (GOEs), previously held by the Ministry of Finance. The idea was to create a financial entity combining the Governmental ownership with a governance resembling that of private firms: the long-term purpose underpinning Temasek creation was in fact to fully privatize those GOEs. For this reason, the new company was registered under the *Singapore Companies Act*, which regulates the private firms activity in the former United Kingdom colony. In 1979 Temasek starts to be managed as an independent entity, and in the first half of the '80s few companies previously entirely held by Temasek get listed; The 1985 Singapore Airlines IPO is the first case of an effective divestment of the Government, as half of the offered shares (c.a. the 16% of the equity) were previously owned by Temasek.

In 1986 the Singaporean Government creates the *Public Sector Divestment Committee*, an institution in charge of identifying which GOEs were to be privatized, as well as deciding the timing and form of privatization; in about two years, between 1985 and 1987, Temasek sold the control of 10 firms (keeping no or minority stakes) and an other 9 firms got partially privatized (with Temasek remaining the main shareholder). Since it was the Government to decide which stakes were to be sold by Temasek and when, it became necessary to assess the problem of how to shield the privatizations revenue from Government spending. Thus, in 1991 all the Government-linked Enterprises, including Temasek, were regulated under the *Fifth Schedule*, which protected Temasek wealth under management (only with the agreement of both the President and the Parliament and under special conditions a withdrawal is allowed) and limited to half the net investment income (i.e. revenues from dividends and interests minus operational costs) the "dividends" payable by Temasek to the Government.

In the '90s, as part of the general program of liberalization of the Telecommunication, Energy and Commercial Ports sectors, the whole ownership of the three main GOEs, Singtel (1993), SingPower (1995) and Ports of Singapore Authority (1997)

[3]Moody's credit report, 4 March 2010. Available at http://www.moodys.com/research/Moodys-concludes-review-of-Abu-Dhabi-UAE-government-related-issuers--PR_195726

was transferred to Temasek. In 2003 Temasek inherited also the 16% of DBS, an Asian bank. In the same years, part of the shares of the three aforementioned companies was sold to private investors through IPOs or private placement. As revenues from those operations started to amount[4], the Fund slightly passed from being a pure holding to operate as an active investors, as that liquid capital needed to be reinvested. In 1991 an Hong Kong subsidiary was created with the goal of identifying new investments opportunity outside the domestic market; in the first half of that decade, Temasek mainly invested in Asian Venture Capital and Private Equity funds as well as funds investing in local infrastructures.

The first relevant investment outside the Asian market was in 1897, when it bought the 37.24% of Nesco Investment PLC, an UK conglomerate in the Energy industry, through its subsidiary Baytree Investments. The first relevant deal in the US market dates back to the 1989, when Temasek acquired a minority stake in Chun King, a firm operating in the Food industry. In 1997, the Fund signed an agreement with CalPers (a Californian pension fund) to jointly invest USD 100 millions in US and Asian private firms. In the last two decades Temasek investments toward non Asian countries have soared: in the fiscal year 2007/2008, for the first time net investments outside Asia were higher that those in the domestic continent.

Table 1.5: Main Asset transfers from Singaporean Government to Temasek (S$ billions)

Year	Firm	Market Value	Book Value
1993	Singtel*	40-60 (1993)	2.45 (1993)
		47.15 (2009)	20.5 (2009)
1995	Tuas Power**	4.235 (2008)	1.269 (2008)
1995	Singapore Power	-	4.052 (2009)
1995	PowerSeraya**	4 (2009)	1,2 (2009)
1995	PowerSenoko**	3.65 (2008)	0.617 (2008)
1997	PSA International	-	8.3 (2009)
2003	DBS* (16%)	2.63 (2003)	2.34 (2003)

Government owned stakes transferred to Temasek. The market book value is either the market capitalization for listed companies (*) or the implicit value from private transactions (**). In parenthesis is reported the year the valuation refers to.

Source: Author's elaboration

Table 1.5 synthesize the main assets transfers from the Singaporean Government to Temasek. The only known cash injections was in 2007, when the Fund received S$ 10 billions to cope with several losses reported on its portfolio in the first year of the crisis. It is interesting to notice that, while the Government officially declares transfers to Temasek have been around S$ 20 billions during the whole life of the Fund[5], this value is coherent with known transfers only when book values are con-

[4]The sell of 11% of Singtel alone during its 1993 IPO brought to Temasek S$ 4.3 billions)

[5]"$10b cash boost from Finance Ministry". The Straits Times (Singapore), 27 August 2007.

sidered; looking at market values, it can be seen how a more realistic estimation of Government injections value should be one order of magnitude higher.

Despite these relevant assets transfers, Temasek differs from other SWFs, especially from oil-rich countries, in that it cannot rely on new capital injections from the Government on a regular basis. This is one of the reasons why it has been one of the first SWFs to resort to debt capital to finance its investments. In 1998 Temasek issued through Fullerton Global Corporation Ltd its first tranche of 5 years maturity zero coupon bonds for a countervalue of USD 1 billion. The peculiarity of this issue was an embedded option allowing the conversion in Singtel shares (c.a. 3% of the firm's equity). Despite the issue was denominated in US Dollars, it was placed only in Asia (20%, by DBS) and in Europe (80%, by Morgan Stanley)[6]. Along with the collection of new capital to invest, this deal allowed the development of the Singaporean bond market and contributed to Singtel privatization process. In 2005 Temasek Financing issued a new S$ 1.6 billions tranche, this time with a longer maturity (10 years) and a fixed coupon (450 bps). In 2009 Temasek launched the *Guaranteed Global Medium Term Note Program*, with 10 planned bond issues denominated in US Dollars for a total value of 10 billions. Despite Temasek has received a triple-A rating from both Moody's and S&P, its 2005 vintage bond has seen its spread over Singaporean Government bonds ranging from 42 bps in September 2005 to 282 bps in January 2009. All in all, it is clear how the market recognizes Temasek as an independent entity who cannot back on a fully guarantee and financial support from the Singaporean Government, even though its credit risk evaluation is generally aligned with that of the Government. Along with bonds issues, an indirect form of debt financing for Temasek is constituted by its controlled firms commercial borrowing (cfr. Table 1.6)

Table 1.6: Temasek Net Financing Cash Flows

year	2002	2003	2004	2005	2006	2007	2008
amount	4.181	-7.922	6.77	-4.793	-0.238	2.259	13.277

Values in S$ billions. Amount refers to Temasek consolidated financial statements, thus including both parent company and controlled firms financing activity. Data from Temasek Holdings Annual Reports

1.3.6.2 Targets and Investment Policy

The main official target of Temasek Holdings is to maximize its risk-adjusted long-term returns. Despite this general time framework, the Fund does not preclude the possibility to perform single deals with a shorter horizon, as well as to keep a significant share of its wealth in liquid assets, waiting for adequate investment opportunities. Temasek official strategy is centered around four themes:

[6] "Temasek to launch novel US$ 1b bond issue". Business Times (Singapore), 26 March 1998.

1. Transforming economies: The Fund focuses on sectors correlated with a country economic development
2. Growing middle class: The Fund focuses on sectors which growth correlates with the variation of the middle class purchasing power
3. Deepening comparative advantages: The Fund invests in firms who are believed to have a medium-term sustainable comparative advantage respectively to competitors
4. Emerging champions: The funds seeks to invest in "best-in-class" firms both in the region as well as globally

Officially, all the investment and divestment decisions are performed on a commercial basis, without any interference from the Government nor any political or economical target either (Temasek Holdings, 2008). Despite its increasing geographical diversification, Temasek Holdings portfolio still shows a strong bias toward Singaporean - and Asian in general - firms. In 2009, the 31% of the portfolio was invested in Singaporean firms, the 27% in North Asian and the 7% in South Asian countries, and the 9% in ASEAN countries (Temasek Holdings, 2009). Of course, this home bias can be partly explained by the Fund history discussed in the previous paragraph. As for the industrial allocation, the Financial (33%) and Telecommunication (26%) sectors have a prominent role; while for the latter the main reason is to be found in the (still) large stake owned in Singtel, the appetite for the Financial sector is a consequence of the strategy to focus on sectors who can highly benefit from the rapid growth of the Asian middle class wealth (Temasek Holdings, 2008). More generally, and despite its purely financial stated target, Temasek portfolio appears to be largely underdiversified, with almost the 70% represented by controlling (i.e. >20%) stakes, especially in listed firms.

1.3.6.3 Governance and relationship with the Government

Other than having a veto power on capital injections and withdrawals, under the Singapore Companies Act the President has to approve all the boards nominations. The Temasek board is composed by a chairman and a CEO with different functions and by 9 members. The board meets at least every 4 months. Of the 9 non-executive members, 7 are officially stated as independent. Along with the board, the Fund has 3 Committees; the Executive Committee (EXCO) is in charge of evaluate and approve decisions regarding control and financing issues, M&As, changes in ownership structures, dividends policies and main business decisions. The Audit Committee (AC) is responsible for the Fund financial reporting as well as the internal and external auditing and law compliance. Finally, the Leadership Development & Compensation Committee (LDCC) is in charge of establishing policies for compensations, roles and duties.

It is hard to establish how independent from the Singaporean Government Temasek can be considered. On the one hand, the decision to transfer under its control all the GOEs to be privatized is indicative of the expected ability of the Fund to reduce the agency problems typically associated with firms directly owned by the Government (see, for example, Megginson and Netter, 2001). On the other hand, Temasek investment and divestment activity is strongly influenced by the privatization plans established by the Government, this clearly reducing its effective independence. Moreover, Temasek have had as a general policy to not push toward managerial turnover of formerly GOEs at the time of the stake acquisition. Executive members have thus remained those directly appointed by the political apparatus.

There are other decisions undermining the idea of Temasek being a truly independent entity; as a matter of example, the creation of the Century Private Equity Holdings[7], a fund which goal is to help Singaporean small and medium enterprises in their internationalization process, seemed to be more driven by industrial policy rather than purely financial goals. An other example is 2003 Temasek capital injection in Danamon, an Indonesian bank; this operation has been read by many analysts as a State aid aiming at stabilizing the regional financial system[8].

As a shareholder, Temasek can be considered an active investor using its voting rights to defend its commercial interests. Officially, the Fund does not interfere with firms business operations decision, evaluating the performances on a purely financial basis. For Singaporean portfolio firms, Temasek performs a series of coaching, consulting and networking activities aiming at positively affecting the firm value through the quality of its governance, similarly to what Venture Capital and Private Equity funds do. Interconnections between Temasek and its portfolio firms are rather complex, as almost all its board members are or have been members of the board of directors of its controlled companies. As a matter of example, Dr. Dhanabalan, Temasek chairman since 1996, has been chairman of the DBS group from 1999 to 2005 and of SIA from 1996 to 1998, and held several cabinet positions in Singapore government from 1978 to 1994. The potential implications of this tight relationship between the Singapore Government, Temasek and its portfolio companies becomes clear when analyzing firms investment activities; while M&As activities are in theory independent from the Government, the latter has created a Committee chaired by the prime Minister in charge of monitoring investments over USD 500 millions or with potential political implications (Goldstein, 2008); this Committee has thus the potential to influence the investment activity of Temasek portfolio companies. It is emblematic in this sense the DBS M&A activity between the 90s and the 2000s; the banking group has performed a series of acquisitions which looked more driven by an internationalization goal externally imposed than by financial considerations, as the market shares price has severely collapsed after each announcement. As Temasek controlled only the 29% of the Group, this has eventually brought a sudden stop in DBS internationalization activity. In 2003, the Financial Times reported an alleged

[7] "Taking Singapore Inc to a new peak", The Straits Times, 25 June 1999.

[8] "Temasek pursues aim to become global player: Singapore's investment arm looks to expand beyond the island's shores, says John Burton". Financial Times, 29 October 2003.

declaration by Temasek CEO[9], suddenly denied[10], expressing his disappointment for the interruption of DBS internationalization process and stating as a Temasek goal to support the expansion abroad of Singapore firms in sectors considered of strategic interest. An other example is a 1997 joint venture between Temasek and Singtel for big investments (i.e. > USD 100 millions) in the Telco Industry in Asia. Despite the bulk of capital (82%) was provided by Singtel, the uniqueness of this venture makes reasonable to suppose the resulting internationalization process was *in primis* a Temasek rather than Singtel management goal[11]. Aside from its boost toward internationalization, Temasek Holdings has appeared to influence its portfolio companies decisions in several other ways; for example, the PowerSenoko private placement was made possible by a subsidized credit by DBS and Standard Charter, both under Temasek influence, to the private investor[12] .

Temasek attitude toward its participated companies has proved very different when it comes to European and US firms; despite being the main shareholder of Merrill Lynch between 2007 and 2009, the SWF always refused to nominate a board member for fears of being interpreted as a politically rather than financially driven entity. A similar case is represented by its investment in Barclays. This policy could eventually change in the future: after the severe losses from its investments in the western financial sectors, the Fund has declared it will assume a more active shareholding approach also when investing abroad[13].

1.4 The Taxonomy of Sovereign Wealth Funds

In section 1.3 it has been provided some factual evidence over few SWFs relevant characteristics. First of all, it can be noticed how all the Funds describe their investment policy as characterized by a long-term horizon, even though with possible secondary medium-terms targets; second, and related to this aspect, no Funds has up to date fixed liabilities with its only shareholder[14] . Finally, for all the Funds its hard to tell how much they can be considered as truly independent from Government decisions.

The brief case studies presented above have also highlighted how SWFs can exhibit a strong heterogeneity with different aspects; in this section, I try to identify the

[9]"Temasek pursues aim to become global player: Singapore's investment arm looks to expand beyond the island's shores, says John Burton". Financial Times, 29 October 2003.

[10]"Temasek Holdings' response to Financial Times article of 29 Oct 03". Temasek News Release, 31 October 2003.

[11]"SingTel-Temasek tie-up replaces STI as key overseas vehicle". The Straits Times (Singapore), 20 September 1997.

[12]"Temasek to finance $2bn power company sale". Financial Times, 3 September 2008.

[13]"Temasek to become more active investor; Singaporean state updates charter in move that may herald wave of engagement among wealth funds". The Daily Telegraph, 26 August 2009

[14]As seen, the CIC was originally obligated to pay fixed revenues to the Chinese Government, but this organization has been soon changed toward a voluntary dividends approach.

dimensions which can be considered as more relevant to describe them and provide an according taxonomy of SWFs.

1.4.1 Size and Source of Wealth

The first two dimensions to be considered are the Fund wealth endowment and the source of the wealth they manage. A first macro distinction could be done between Funds who does or does not derive their wealth from revenues associated with a natural resource (mainly oil). As Table 1.7 shows, around half of the biggest SWFs are oil-based. These SWFs are generally created with the scope of granting a wealth transfer toward future generations, as natural resources are expected to eventually disappear; along with this generational transfer target, Oil-based SWFs (OBS) are usually created to limit the adverse consequences of the so-called “Dutch Disease” (Corden and Neary, 1982), where inflation is boosted and the competivity of national firms not operating in the oil sector is reduced as a result of the increase in foreign currency-denominated cash inflows. Finally, many OBSs include among their targets the stabilization of revenues; in fact, while this source of wealth grants the Government and the Fund with sure net inflows, the high volatility of oil price results in Governmental clear budgetary problems which the SWF can help to smooth. This double nature of oil revenues (sure *but* hardly predictable net capital inflows) is reflected in the governance of OBSs, which can usually rely on capital transfers on a regular basis by the Government but are also more likely to seen the wealth they manage withdrawn in case of particularly low oil prices. An other direct consequence is that OBSs are less likely to focus exclusively on long-term results, even when stabilization is not stated among their primary targets. Finally, OBSs have to (or should) take into account the underdiversification of revenues sources faced by countries endowed with significant natural resources; for some SWFs, this means making strategic investments in sectors in which the Government would like to refocus the national economy on a long-term basis, or that in general can create positive externalities for national firms not operating in the oil industry. Other OBS are instead in charge of investing on a purely commercial basis, building a well diversified portfolio which could generate long-term revenues regardless of (or even hedging from) oil revenues.

At the other spectrum, some Sovereign Wealth Funds (e.g. Temasek Holdings) derive their wealth from the proceedings of privatizations. These Funds are likely to face specular problems to OBS; as the number of Government Owned Entities has generally reduced in the last two decades (with the notable exception of State interventions to bail-out distressed firms during the current crisis), wealth transfers from the Government have ceased or reduced in frequency; however, a significant part of their portfolio is kept in controlling stakes of big GOEs generally operating in monopoly sectors, which can serve as “cash cows” for financing the Fund investment activities. In other words, these SWFs do not receive frequent capital injections but generally have stable dividends from their main portfolio firms; moreover, as Government generally decide to constitute a SWFs with the proceeding of privatizations in order to avoid this wealth is used for budgetary purpose, this class of Funds is generally less keen to face sudden withdrawals from its main stakeholder.

A number of SWFs have characteristics lying somehow in between those of oil-based and privatization-based Funds; SWFs born to manage foreign excess reserves, for example, are more likely to be provided with new wealth to manage by the Government than privatization-based SWFs but, while the inflow for the Government is easier to predict than for oil revenues, transfers to the Fund generally happen on a purely discretionary basis. Funds which wealth comes from reserves denominated in foreign or domestic currency should in fact be further divided into Funds which directly manage excess reserves and Funds receiving discretionary allocation, usually by the Central Bank or the Ministry of Finance. Typically, the first class of Funds are Central Banks investments vehicles, which are included in the SWFs category because they are also allowed to pursue direct and prominent investments in foreign firms equity (the Chinese SAFE is a relevant example); nonetheless, these SWFs generally exhibit an investment policy coherent with that of the Central Bank, i.e. they are much more risk-adverse that the "typical" SWF. Other Funds discretionally allocated part of the national excess reserves, like GIC or CIC, show instead a portfolio allocation where equity is generally 50% or more of the overall portfolio (see, for example, GIC portfolio reported in Table 1.3).

In this work I define as SWFs size the value of its wealth under management. SWFs clearly exhibit a huge heterogeneity with this respect, as the order of magnitude ranges between few hundreds millions to hundreds of billions USD. I use estimations for the size of SWFs provided by the SWF Institute, which somehow allows to use a coherent approach to the issue. However, it must be stressed here how estimations of this variable present two severe caveats: first, as treated below, SWFs have very different degrees of transparency. This means that, while for some Funds the value of their asset under management is a publicly available information, for other Funds this must be guessed from other information that necessarily differ across Funds. For example, the size of ADIA is estimated starting from Abu Dhabi oil revenues, while Chinese SAFE stated size derives from estimation of Chinese foreign excess reserves invested in assets other than Government bonds. Second, even when information are freely available, technical issues necessarily arise: some Funds report in their financial statements the market value of their portfolio at the end of fiscal year, while other provide a well detailed balance sheet which is however based on book values and often consolidate with different approaches SWFs subsidiaries and controlled portfolio firms; holdings in asset classes other than equity could be an other source of significant discrepancy in how the size is estimated across Funds. All in all, the values reported in Table 1.7 are necessarily to be considered as scarcely precise, and are not available on a time-varying basis. Despite these problems, which are to be necessarily stressed upfront, the use of these estimations in this work is considered acceptable by the author for two reasons: first, while not perfect, the wealth under

Table 1.7: Size, Year of inception and Source of wealth of the main SWFs

Country	Name	Asset	Year	Source
Abu Dhabi	ADIA	627	1976	Oil
Norway	GPF – Global	512	1990	Oil
Saudi Arabia	SAMA	439.1	NA	Oil
China	SAFE	347.1	1997	Foreign Reserves
China	CIC	332.4	2007	Foreign reserves
Singapore	GIC	247.5	1981	Reserves
Kuwait	KIA	202.8	1953	Oil
Singapore	Temasek	133	1974	Privatizations
Qatar	QIA	85	2005	Oil
Libya	LIA	70	2006	Oil
Australia	AFF	67.2	2004	Privatizations
S. Korea	KIC	37	2005	Fiscal surplus
Brunei	BIA	30	1983	Oil
Malaysia	KN	25	1993	Privatizations
Abu Dhabi	IPIC	14	1984	Oil
Abu Dhabi	Mubadala	13.3	2002	Oil
Bahrain	MHC	9.1	2006	Oil
Oman	SGRF	8.2	1980	Oil&gas
Saudi Arabia	PIF	5.3	2008	Oil

Source: SWF Institute (2010)

management value estimated by the SWF institute is likely to provide a correct order of magnitude and to give a fair representation of the rank of the Funds with this respect. Second, Funds size reported by the Institute are likely to represent the *common beliefs* on the issue by both academics and practitioners. This consideration is of particular relevance for the use of this variable in chapter 4 analyses: whether the SWFs size used is correct or not, conclusions derived about its relevance are conceptually correct as long as the variable capture what is considered by the market to be the Fund portfolio value.

1.4.2 Transparency and Best Practice

An other relevant source of SWFs heterogeneity is their transparency. While some Funds publish detailed Annual Reports including their investment policy, performances, withdrawals rules and portfolio allocation, for others the amount of official information is very limited. So far two measures of SWFs transparency have been proposed: the Truman score (Truman, 2008) and the Linaburg-Maduell (LM) Index (SWF Institute, 2010). While, as illustrated below, the Truman score relies on a more complete and deep methodology, the LM Index covers a broader number of SWFs and has been computed every three months since 2008, thus resulting more appropriate for the analyses presented in this work. the Truman score identifies four areas of “best practice” SWFs should implement, and assign a point for each practice the Fund officially declares to follow. The four areas are Structure, Governance, Transparency and Behavior. The first class measures whether the Fund officially states its targets and investment policy; the Governance score measures how clearly the role of the Government in the Fund management is defined, how independent the Fund is from the Government itself and the existence of ethical and social responsibility guidelines. Transparency quantifies the degree of detail and the timing on actual portfolio allocation and investment activities. Finally, Behavior evaluate whether the SWFs have clear rules for portfolio adjustment, use of debt financing and influence on portfolio companies management (e.g. maximum stake in a single firm). In Table 1.8 are reported the Truman scores for the main SWFs.

Table 1.8: Truman scores for the main SWFs (2008)

SWF	Structure	Governance	Transparency	Behavior	Total
Norway - GPF	94	100	100	67	92
Kuwait – KIA	75	80	41	0	48
Singapore - Temasek	50	50	61	0	45
Singapore – GIC	63	40	39	17	41
China – CIC	50	50	14	17	29
Brunei – BIA	31	0	25	0	18
UAE- ADIA	25	0	4	8	9
Total Average	*67,8*	*40,6*	*44,0*	*24,5*	*47,7*

Source: Truman (2008). Total Average refers to all the 34 non-pension Government-linked Funds classified as SWFs by Truman. Values are rescaled on a 100 points basis.

A first thought looking at Truman scores values in 2008 is that, on average, SWFs are quite opaque: less than 50% of the proposed best practice were implemented at the time of this study. An other thing to observe is that, while many Funds mainly reveal their investment policy (the average Structure score is 67.8), the information on their investment Behavior is scarce (24.5), making hard to evaluate the degree of coherency between the official and the actual investment activity. SWFs Transparency has been a crucial point since 2007, where the number of their investments in European and US firms have surged. Concerns regarding the potential political aims of SWFs have resulted both in a stronger scrutiny of their activity by markets regulators and on a “voluntary” decision by SWFs to increase their transparency in the near future. In 2008, the SWFs of 23 countries, the IMF, the OECD and the World Bank have created the IWG (International Working Group of Sovereign Wealth Funds), which scope was to establish some guidelines for SWFs behavior regarding this aspect. This workgroup, after a general meeting in Santiago de Chile, has produced a list of Generally Accepted Principles and Practice (GAPP) for SWFs, also known as “Santiago principles” (IWG, 2008). There are 24 GAPPs, which closely relate to those best practice identified by Truman. It must be stressed that the GAPP are not mandatory and focus exclusively on the kind of information SWFs are willing or not to publicly share rather than their effective behavior; for example, while SWFs have generally accepted to declare their investment policies, no GAPP states what could or could not be a acceptable target for SWFs, even though all the SWFs have declared to include "investing on a commercial basis" as part of their aim.

To evaluate the impact of GAPP on SWFs transparency is opportune to look at the LM index; differently from the Truman score, the LM index exclusively focus on Transparency and identifies only 10 classes of information (cfr. Table 1.9) the Fund can or cannot disclosure, thus assigning for each SWF a score ranging between 0 and 10. During 1998, as a consequence of the Santiago meeting, the average LM Index has passed from 4.61 to 5.18; in the second quarter of 2011 the mean value was 6, a clear indication of the general tendency toward a greater transparency by SWFs. However, it must be noticed how different SWFs from the same country exhibit different levels of transparency (for example, CIC has an LM index of 7, while SAFE LM index is 4): it could be the case that Funds characterized by scarce transparency are those used to perform more delicate deals in terms of political implications.

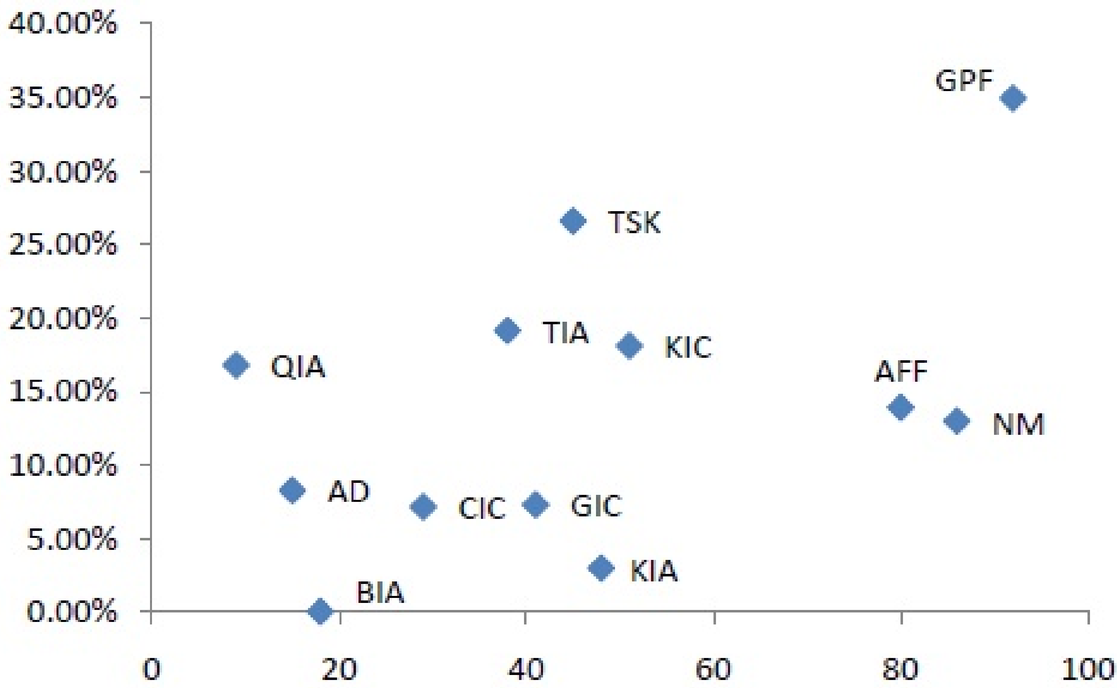
Table 1.9: LM Index definition

Score	Information disclosure
+1	Fund provides history including reason for creation, origins of wealth, and government ownership structure
+1	Fund provides up-to-date independently audited annual reports
+1	Fund provides ownership percentage of company holdings, and geographic locations of holdings
+1	Fund provides total portfolio market value, returns, and management compensation
+1	Fund provides guidelines in reference to ethical standards, investment policies, and enforcer of guidelines
+1	Fund provides clear strategies and objectives
+1	If applicable, the fund clearly identifies subsidiaries and contact information
+1	If applicable, the fund identifies external managers
+1	Fund manages its own web site
+1	Fund provides main office location address and contact information such as telephone and fax

1.4.3 Investment targets and portfolio allocation

Given the generally scarce transparency of SWFs, it is hard to analyze in details their investment strategies. While the general public has focused on SWFs mega-deals, especially in troubling western banks during the period 2007-2008, many investments remains unknown, either because the share acquired is below that of disclosure in the hosting country or for other contingent reasons. It is sufficient to look at data collected by Chhaochharia and Laeven (2009) to realize that the ratio between the market value of known investments in public equity and the reported value of SWFs portfolios is significantly smaller than those officially reported by some SWFs. As a matter of example, in 2007 the Korean Investment Corporation, one of the first SWFs to give official information on its portfolio benchmark composition, declared investments in equity to account for the 28.8% of its portfolio, while known investments resulted in a share of 18.1%. As a matter of fact, the share of known investments in equity value over the wealth under management is inversely proportional to the Fund transparency, as Figure 1.3 shows.

Figure 1.3: Equity share (only known investments) of SWFs portfolio and Truman score



Source: Chhaochharia and Laeven (2009), Truman (2008), Author's elaboration

While some SWFs seems thus to apply a mainly passive index replicating strategy, thus reducing the need for opaqueness, those SWFs who are less transparent can also be those more likely to be engaged in strategic deals. "Strategic" in the context of SWFs could means different things: some Funds have explicit mandate to acquire controlling stakes in foreign firms in sectors considered strategic by the Government in the sense of being synergic with those characterizing the national economy; other SWFs could be used to create or tighten political relationship with other countries by investing in firms strategic for the hosting country and in need for new capital. The strategicity of the investment could thus be a characteristic of either the Sector, the Country or even highly idiosyncratic of the invested firm. Given the aforementioned problems, it is hard to tell whether a single investment could be considered as strategic: for this, in the present work I consider as strategic the investments of those SWFs for which there is evidence they operate mainly through direct high-profile deals, as opposite to Funds with a broadly-diversified portfolio mainly invested in index replicating strategies and through external managers. The rationale behind this choice is that a broadly-diversifying Fund is less likely to nurture a specific interest in a specific portfolio firm, as its general portfolio allocation overcome the relevance of the single investments composing it. Viceversa, Funds with few investments in big stakes, or generally with a specific mandate to perform direct, strategic investments rather than passively allocate the wealth are for obvious reasons more likely to have a specific interest on each invested firm.

In this work I thus divide SWFs in two categories: those more likely to perform strategic investments are those with few investments and generally performed directly and in relevant stakes; at the other side of the spectrum lies those SWFs who mainly follow a benchmark-tracking style of investment. While this distinction has a certain degree of subjectivity which it is impossible to fully eliminate, I have tried to be as objective as possible, using only official available information to motivate the inclusion of a specific SWF in one or the other category and, in case of no information available, herring on the side of caution (i.e. avoiding to declare a SWFs as more likely to perform strategic deals when this was hard to justify). The SWFs classified as strategic investors are the following:

- CIC (China)
- Future Fund (Australia)
- IPIC (UAE)
- Khazanah Nasional (Malaysia)
- KIC (Korea)
- LIA (Libya)
- Mubadala (UAE)
- QIA (Qatar)
- Temasek (Singapore)

The Table at the and of this Section provide the piece of information backing the classification adopted for the main SWFs investigated in this work.

1.4.4 Relationship with the Government

Sovereign Wealth Funds relationship with their main (or usually only) shareholder has been the main argument in the international debate on this new class of investors, and in particular how much the Government influence SWFs investments decisions. As shown in the previous paragraphs, it is impossible to tell whether the Government can decide about the single allocation decisions beyond the broad official scope of the Fund - even though a possible indirect measure of a SWF allocation correspondence to purely financial targets is assessed in chapter 2. Officially, no SWFs have to follow indications from the Government in terms of operational decisions; nonetheless, the surge of their foreign investment activity as raised concerns regarding their potential as a "political weapon" (Drezner, 2008).

An other interesting - and easier to assess - aspect of the relationship between SWFs and Governments are the rules governing cash flows between SWFs and Governments. With the notable exception of CIC during its first year, no SWFs have fixed mandatory payments to its shareholder; however, not all the SWFs can relies on continuous cash inflows from the Government and, maybe even more importantly, not all the Funds are shield from withdrawals by clear rules limiting the Governmental influence with this respect. While few OBS are allocated a portion of revenues from oil, the majority of SWFs relies on wealth transfers which could by "once in a while" or on a more frequent basis, but in both cases it is fully discretionary. A first simple way to evaluate whether the SWF can reasonably expect the Government to provide it with net cash inflows is its decision to resort or not to debt capital to finance its investment activity. The use of debt capital by a SWF has also clear implications for its investment horizon, as it creates a short-term liability. Among the more relevant SWFs, four resort to debt financing, mainly by issuing bonds or sukuk:

- Temasek (Singapore)
- IPIC (UAE)
- Khazanah Nasional (Malaysia)
- Mubadala (UAE)

It should be noted that, while SWFs issuing bonds are likely to exhibit a lower financial capacity than unlevered SWFs, these Funds does not appear to be considered as completely "neglected" by their Government when it comes to credit support. For example, even though no Government officially guarantees SWFs liabilities, only IPIC and Mubadala (Aa3) have received by Moody's a credit rating (slightly) lower than Abu Dhabi's Government; as of November 2011, Temasek Holdings (Aaa), and Khazanah Nasional (A3) can all exhibit the same long-term issuer rating as Singapore and Malaysia Government respectively. Thus, on the one hand levered SWFs are surely different from unlevered SWFs, in the sense that they are characterized by a short-term liability other Funds lack and are likely to receive new wealth to manage on a less regular basis; on the other hands, their credit risk is generally considered as similar to that of the Government itself, this fact clearly distinguishing them from private investors.

While SWFs resorting to debt capital could anyway be exposed to a "sudden stop" in capital inflows from the Government, other SWFs are more likely to be exposed to a "sudden withdrawal" of the allocated wealth. In other words, the Government could decide to force the SWFs to liquidate some of its investments and use those resources to boost domestic spending or reduce the budget deficit. This possibility have several possible consequences: first, SWFs for whom a sudden relevant withdrawal is possible have to keep a consistent part of its portfolio in highly liquid instruments; second, ceteris paribus SWFs short-term performances become more relevant, both because: a) poor performances could make the Government to decide to allocate differently their wealth (a risk similar to that faced by private investment funds) and b) because poor short-term performances are more likely to happen in a period of global crisis, when the Government has a stronger incentive to deviate its resources toward domestic spending. Finally, the absence of protection from withdrawals exposes the SWF to be considered as a potential source of capital to increase public spending and investments for political purpose, regardless of the general economic condition. This risk is likely to be higher in democratic countries (e.g. Norway) while it is moderated where the power is highly concentrated (e.g. China).

To prevent this kind of issues, some SWFs enjoys clear rules defining the maximum amount the Government can withdraw. In particular, the following Funds can be fairly considered as protected from bank run-like phenomena:

- GIC (Singapore)
- GPF (Norway)
- Temasek (Singapore)
- QIA (Qatar)
- IPIC (UAE)
- Mubadala (UAE)
- Future Fund (Australia)

As expected, all the Funds from countries where the power is not highly concentrated exhibit some kind of “Shield rule”; as for Middle-East countries, it must be noticed how the two UAE Funds included in this list are also those resorting to debt capital and performing the country strategic investments; it is thus fair to assume that shield rules are in this case a way to insure markets about the Funds solvibility and long-terminism. The Qatari Investment Authority represents thus the only SWF whose shield rule is hard to rationally justify. As for the classification of SWFs between those performing Direct, strategic investments and those who are mainly passive investors, the classification of SWFs between “Shielded” and not presents a certain degree of subjectivity. While keeping a prudent approach, in this case have been considered has protected from withdrawals also those Funds who have constantly experienced net inflows from the Government or which are generally defined as “fully backed” by the Government, as capitals net outflows should be fairly considered as an extremely unlikely output. Again, the Table at the end of this section presents the rationale used for this classification.

All in all, Funds not resorting to debt capital and protected by withdrawals are those that, above all SWFs, can be expected to have a “pure” long-term view investment horizon. In chapter 4, the implications of these characteristics for portfolio companies will be analyzed.

Table: Justification of SWFs as shield from Governmental withdrawal and pursuing Direct, strategic investments

SWF	Direct	Justification	Shield	Justification	Source
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009
BIA	0	No information available	0	No information available	n.a.
CIC	1	"Direct investments constitute the largest individual positions in CIC's global investment portfolio".	0	"Income from CIC's investments is expected to provide dividend income to the shareholder"	CIC annual report 2009
Future Fund	1	Few limitations on asset allocation or selection of markets. 20% maximum in each company. A long-term portfolio composition defined only for assets macro classes	1	"The governing legislation stipulates that money may not be withdrawn from the Future Fund until 2020 except for the purpose of meeting the operating costs or unless the Fund's balance exceeds the target asset"	Future Fund annual report 2009
GIC	0	The anchor of GIC's investment activities is the policy portfolio. It defines the asset classes that GIC invests in, and how it allocates funds to these asset classes.	1	"The spending rule allows up to 50% of the long-term expected real return on the reserves managed by GIC and those owned by the Monetary Authority of Singapore"	GIC annual report 2010
GPF	0	"The Ministry of Finance has defined a limit on the expected volatility in the discrepancy between the return on the actual portfolio and the benchmark portfolio".	1	"Under the government's fiscal rule, petroleum revenue spending must not exceed 4 percent of the fund's value"	National budget 2009 - Chapter 5
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009

SWF	Direct	Justification	Shield	Justification	Source
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009
IPIC	1	"For IPIC, creating value is about Investing in strategic partnerships that in turn contribute to Abu Dhabi's long term economic growth"	1	"The Company has not paid any dividends to the Government to date. While the Government does not guarantee the obligations of the Company [...] in terms of credit risk, it is impossible to differentiate between the Government and the Company"	IPIC website
Khazanah Nasional	1	"Khazanah Nasional is empowered as the Government's strategic investor in new industries and markets".	0	No information available	Kazanah Nasional website
KIA	0	"KIA aims to achieve a rate of return on its investment that, on a three-year rolling average, exceeds its composite benchmarks by designing and maintaining an asset allocation consistent with its mandated return and risk objectives".	0	"KIA also provides liquidity to the State's Treasury when needed"	KIA website
KIC	1	"A small amount of assets is kept in passive index replication"	0	Article 9 of the Korea Investment Corporation Act: The Steering Committee has the authority to increase or decrease capital	KIC annual report 2009
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009

SWF	Direct	Justification	Shield	Justification	Source
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009
LIA	1	Strategic investments account for more than 50% of the Equity portfolio	0	No information available	LIA management information report 2010
Mubadala	1	"While our investments have to be commercially viable, generating sustainable profits over the long-term, they also have to deliver strong social returns to Abu Dhabi. We bring together and manage a diverse portfolio of opportunities, investing for the long term as an active and diligent partner".	1	"Through the patient and robust support of its shareholder, Mubadala is able to take a long term perspective when developing projects and deploying capital, both within the UAE and internationally".	Mubadala website
QIA	1	"QIA is responsible for investing funds in asset classes such as equities and fixed income and private equity, as well as through direct investment. The QIA takes a flexible approach [...] If a portfolio company has synergies with Qatar, it is a positive factor".	1	"QIA benefits from being a central part of the State of Qatar's economic vision which allows it to invest in a manner which transcends the cyclicality of economic cycles and fluctuations of the financial markets".	QIA website
SAFE	0	Central Bank Vehicle	0	No information available	SWF Institute
SAMA	0	Central Bank Vehicle	0	No information available	SWF Institute
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009

SWF	Direct	Justification	Shield	Justification	Source
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009
Temasek	1	"As an active shareholder, we act to enhance sustainable value, consolidating or transforming our holdings where it makes sense. As an active investor, we invest, hold or divest where we can achieve clear shareholder value".	1	Less than 50% of net investment income. Protection of past reserves (previous governments)	Temasek Annual Report 2010
ADIA	0	60% of assets are invested in index-replicating strategy	0	"ADIA is required to make available to the Government of Abu Dhabi, as needed, the financial resources to secure and maintain the future welfare of the Emirate".	ADIA annual report 2009

2 Assessing SWFs optimal allocation

2.1 Introduction

As already stated in previous chapter, the emergence of SWFs has raised significant concerns about the possibility of a political use of these investment vehicles (see e.g. Cognato, 2008; Gieve, 2008; Keller, 2008; Rose, 2008; Wu and Seah, 2008; Zhang and He, 2009). These concerns have been fueled by the general lack of transparency of SWFs (Truman, 2008) and by some large investments in major western companies (mainly US banks) during the financial crisis. Despite all the interest SWFs attract, there are still only very little theoretical and empirical works about their investment behavior. Evaluating the strategic asset allocation (SAA) of SWFs is in fact not trivial.

Kunzel et al. (2010) identify four different investment objectives of SWFs (namely: stabilization, saving, pension reserve, and reserve investments) and argue that they are characterized by substantially different optimal SAA. This means, on the one hand, that no one-size-fits-all for SWF's SAA can be developed. On the other hand, building separate benchmarks for different objectives would be of little help, since most SWFs pursue multiple objectives at the same time. In summary: the optimal SAA for a SWF could deviate substantially from the market portfolio, and this deviation is likely to be highly idiosyncratic (i.e. different across SWFs) and unstable (i.e. changing over time for any given SWF).

The absence of a robust model about how SWFs *should* invest has several consequences. From the perspective of the home country, it makes both the design of a SWF (e.g. set of investable asset classes, sectoral and geographical constraints to the asset allocation), and the assessment of its performance (e.g. choice of the benchmark and time-period for performance evaluation) very difficult (Das et al., 2009). From the perspective of a host country, the absence of a model on the optimal SAA by SWFs jeopardizes any attempt to evaluate whether they pursue political, rather than purely financial, objectives. There is, for instance, some evidence that SWF investments are disproportionately concentrated in Financials (e.g. Bortolotti et al., 2010). Is this the result of an attempt to gain clout over a critical sector in developed economies, or is it consistent with the optimal SAA of SWFs?

The difficulty in answering this question is not only due to the complexity of deriving a theoretical optimum for SWF's SAA. It is also the result of the lack of transparency of SWFs. As treated in the previous chapter, disclosure about the actual asset allocation of SWFs is normally limited to a breakdown by asset classes, industries and geographic areas, and deal-level information often covers a very limited portion of SFW's portfolios (Chhaochharia and Laeven, 2008). Moreover, even if theoretically an optimal SAA could be identified, evaluating the extent to which the actual SAA of a SWF is consistent with this benchmark would probably require more information than what is normally disclosed by the SWF itself. I will show later that it is possible, in principle, to outline the optimal SAA for a stabilization fund of a resource-rich country once some parameters are known, such as: fund's return target and assets under management, the value of country's reserves of natural resources, and the prominence of stabilization among SWF's investment objectives. In a real-world application it is highly unlikely that all these parameters are available (and sometimes none of them is available to researchers).

In this chapter I contribute to the debate by developing a set of informationally parsimonious tests on the correspondence between the theoretical and the actual SAA of a particular class of SWFs. I focus on SWFs created by resource-rich countries which have, at least in part, stabilization among their objectives. While this is clearly a limitation, which I acknowledge upfront, this choice greatly simplifies the development of the optimal SAA and leaves with a sizable portion of SWFs. According to the SWF Institute, commodity SWFs account for about 60% of all assets managed by SWFs, the largest portion being from countries rich in oil and gas (SWF Institute, 2011). Moreover, smoothing revenues from the extraction of natural resources is an investment objective for most, if not all, of these funds (Kunzel et al., 2010). Accordingly, my results still apply to a large portion of world's SWFs.

Building on the model proposed by Gintschel and Scherer (2008), I derive a closed form expression for the deviation between the "globally efficient" portfolio for a stabilization fund and the "locally efficient" portfolio. A globally efficient portfolio takes into account the commodity price risk to which a resource-rich country is naturally exposed. A locally efficient portfolio is efficient on a stand-alone basis but does not diversify the commodity price risk and is hence not globally efficient. The idea behind the distinction between global and local efficiency is indeed pretty straightforward: in order to achieve their stabilization objective, SWF created by resource-rich countries should take commodity risk into account in their asset allocation; securities whose returns are strongly (weakly) correlated with commodity risk will then be under (over) weighted in a globally efficient portfolio with respect to a locally efficient portfolio. The deviations between the globally and the locally efficient portfolios depend on a series of parameters but exhibit some regularities which allow me to derive a set of econometric tests. The most interesting feature of these tests is that they are robust to uncertainty about some characteristics of the SWF. As mentioned earlier, this may be extremely welcomed, given the difficulty to obtain reliable information on SWF's characteristics.

To check the validity of this empirical strategy, I present an application to the largest commodity SWF which, according to Kunzel et al. (2010), has stabilization among its objectives: the Norwegian Government Pension Fund-Global (GPF). The GPF was created in 1990 (albeit it became operative only in 1996) to spread the wealth deriving from oil extraction over future generations and to avoid the transmission of fluctuations in oil price to current consumption (Eriksen, 2006). The fund underwent several stages of development but, more or less explicitly, it has always been given a stabilizing role with respect to oil price risk and, as such, it is a good candidate for testing whether its SAA reflects deviations from the locally efficient portfolio which are consistent with the theoretical predictions. I collect information from annual reports and reconstruct GPF's portfolio throughout a 4 year period (2002-2005) during which the fund had a stable set of rules defining its investment activity (see: NBIM, 2007). I then compute the optimal SAA in a Markowitz (1952) framework, using Michaud (1998) Monte Carlo technique to cope with the under-diversification and parameters oversensitivity of the original model, and compare them to the actual portfolio allocation of the GPF. My findings evidence that the SAA of the GPF deviates substantially from the locally efficient portfolio, and that these deviations are in line with those predicted by the model. The results are robust not only to uncertainty in the parameters, but also to the inclusion of control variables to account for other sources of geographical and sectoral biases.

The structure of this chapter is the following. In section 2.2 I review the theoretical and empirical works on the asset allocation of SWFs. In section 2.3 I model the deviations between the globally efficient portfolio and a locally efficient portfolio and present three empirically feasible econometric tests. In section 2.4 I illustrate the empirical application of the tests to the GPF. Finally, in section 2.5, I discuss the findings, illustrate the limitations of the work, and suggest directions for future research.

2.2 SWFs and their asset allocation

2.2.1 The unique nature of SWFs

As already stated, SWFs are still relatively unexplored by the academic literature: while a vast literature deals with mutual funds and hedge funds, there is virtually no scientific work on SWFs which dates earlier than 2007. Rozanov (2005) was the first to highlight the increasing tendency, especially in emerging economies, to shift the management of part of the national wealth to newly created entities which were closer to mutual funds than typical holding companies or central bank emanation. One of the most interesting aspect of SWFs is their hybrid nature. SWFs are characterized by a unique blend of characteristics borrowed by central banks, mutual funds, pension funds, and government-owned entities. They have a close relationship with central banks, of which they are often a spin-off. Nevertheless, SWFs pursue different objectives than central banks and have fewer constraint on the asset classes they can invest in. From this perspective, SWFs resemble more closely mutual funds, pension funds or private equity funds. However, SWFs have no explicit liabilities (unlike pension funds), no open-end structure (unlike mutual funds), and no limited life-span (unlike private equity). In summary: SWFs combine in a unique mix the elements characterizing other classes of investors.

The element which is possibly most peculiar of SWFs is their close relationship with the government and, consequently, their exposure to the risk of political pressure. This aspect is of particular importance: SWF are created, owned and controlled by governments and it is very difficult to ensure that they are completely sheltered from political influence. In addition, the lack of information about their objectives, governance, behavior, and investment practice (Truman, 2008) raised significant concerns among practitioners, policymakers and, in general, the public opinion in both home and host countries (see e.g. Cognato, 2008; Gieve, 2008; Keller, 2008; Rose, 2008; Wu and Seah, 2008; Zhang and He, 2009). As a consequence, in the past few years SWFs have been under close scrutiny by regulators. This situation led in October 2008 to the creation of the Generally Accepted Principles and Practices (GAPP, also known as Santiago Principles), a document in which SWFs agreed on increasing their transparency and adopting stricter governance (IWG, 2008). The principle which lies behind the GAPP is that host countries, from a parochial perspective, want to be sure that SWFs are no "Trojan horses" used by emerging economies to increase their political clout or to accelerate technological catching-up. At the same time, SWFs do not want to be subject to stricter rules than other professional investors which could jeopardize their investment process. By signing the GAPP a SWF, among other things, commits that its "[...] investment policy should be clear and consistent with its defined objectives, risk tolerance, and investment strategy, as set by the owner or the governing body(ies), and be based on sound portfolio management principles" (GAAP 18: IWG, 2008). Obviously this principle is useless without a theory about how a SWF should invest according to sound portfolio management principles. Unfortunately, no such universally accepted model has yet been developed. Moreover, as noted by Truman (2011), compliance to the GAPP is still partial and there are several areas where the principles could be improved.

2.2.2 Asset allocation by SWFs

The literature about the determinants of SWF asset allocation can be broadly classified in two streams which mirror the dual nature of SWFs. The first stream of literature focuses on the interaction between SWF investment decisions, central bank targets, GDP growth, and the sustainability of global imbalances. The typical SWF considered in these works derives its wealth from foreign excess reserves due to trade imbalances. Aizenman and Glick (2008) model the decision by the Treasury to split the management of reserves between the central bank and a SWF, which are given different objectives. They show that if the central bank pursues the objective of reducing the probability of sudden stops, it will place a higher weight on the downside risk of holding risky assets abroad, and will tend to hold primarily safe foreign assets. In contrast, if the SWF, acting on behalf of the Treasury, maximizes the expected utility of a representative domestic agent, it will opt for relatively greater holding of more risky foreign assets. Chen (2009a) considers a dynamic model for GDP growth which includes the possibility of liquidity shock. The work shows that the higher the GDP growth rate, the higher a SWF risk tolerance should be. Alberola and Serena (2008) and Chen (2009b), using different approaches (respectively a modified version of a Lucas-type model for economic-driven asset pricing, and a scenario approach), also take into account the possible endogeneity of asset returns (i.e. returns are not independent from the investment decision by SWFs). By doing so, they assess the impact of SWFs on global imbalances sustainability and exchange rate stability. They find that little or no impact should be expected. Beck and Fidora (2008) consider foreign excess reserves under management by SWFs and central banks and use a CAPM approach (Sharpe, 1964) to estimate their optimal allocation. They forecast a potential strong shift of wealth from mature to emerging economies and from bond to riskier assets that could affect both returns and the source of wealth for export-led based SWF. Finally, Ploeg and Venables (2008) suggest that other issues which enter into the utility function of the government, like national debt, public infrastructure, and consumption, could influence the investment objectives of a SWF.

The second stream of literature on SWFs assets allocation looks primarily to SWF from commodity (mainly oil) rich countries and concentrate focuses more on their nature of long-term investors. SWFs are modeled by focusing on their inter-generational wealth transfer and diversification targets and their lack of explicit liabilities. Hoevenaars et al. (2009) focus on the trade-off between interests of different generations, proposing the use of a value-based asset liabilities management approach, which is typical in pension funds policy evaluation (Kortleve and Ponds, 2006; Hoevenaars and Ponds, 2008). This approach, however, relies on the existence of explicit liabilities, which is often not the case for SWFs. Yu et al. (2010) develop a multi-objective algorithm to reflect the SAA of SWFs based on maximum constant relative risk aversion utility and minimum value-at-risk. They do not, however, include hedging of commodity risk in their model. Finally, Pascuzzo (2008) suggests that SWFs should exploit their alleged long-term view and the absence of defined, short-term liabilities as a strategic advantage by investing in asset paying a premium for their scarce liquidity.

The work which is most closely related to mine is that of Gintschel and Scherer (2008), who model an oil-based SWF portfolio optimization using a Markowitz-type model, considering the oil endowment of the country as an inherited investment which cannot be shorted. An oil-based SWF should allow to reduce yearly government revenues dependency on oil. Gintschel and Scherer (2008), computing oil sensitivity of different assets returns, estimate a possible reduction in risk for the economy between 1% and 10% when oil exposure is considered in SWF portfolio allocation. They prove that the frontier of efficient portfolios for SWFs can be seen as weighted sum of a "locally efficient frontier" which represents the set of efficient portfolios for unconstrained investors (i.e. investors whose wealth can be freely invested in whichever financial security) and a zero-investment hedging portfolio. The weight of the hedging component is increasing in the relative size of undiversifiable wealth (i.e. the size of oil reserves relative to the assets under management of the SWF).

A limitation of the work by Gintschel and Scherer (2008), which I inherit, is that portfolio optimization is conducted in a single-period model. Multi-period extension have however been proposed. Scherer (2009) extends the model by Gintschel and Scherer (2008) to a multi-periodal framework taking into account SWFs long term investment horizon and obtain a three-fund separation. The optimal portfolio is split into speculative demand as well as hedge demand against oil price shocks and shocks to the short-term risk-free rate. Balding and Yao (2011) simulate a dynamic portfolio maximizing risk-adjusted returns taking into account the continual depletion of natural resources. They find that the continual depletion of natural resources results in a preference for low-volatility liquid fixed income and equity indexes.

2.2.3 Empirical evidence

None of the theoretical works presented in the previous section has been used in an empirical analysis on the actual SAA of SWFs. As mentioned earlier, this is the result of three concurrent factors. First, no one-size-fits-all model can be developed for SWF's SAA: each SWF may have a different mix of objectives which could well vary over time (see, e.g., the discussion in Das et al., 2009). Accordingly, it would be fairly complex to determine the optimal SAA for SWFs even if information about their objectives and characteristics were known. Second, information about the investment objectives of SWFs is normally not sufficiently detailed to determine their optimal SAA. For instance, a fund which declares to have saving and stabilization objectives normally would not disclose its long-term return objective or the extent to which it is supposed to diversify commodity risk. Third, the information about the SAA of SWFs, when available, is often very aggregated, which hampers the attempts of external observers to assess its correspondence to theoretical benchmarks.

By and large, empirical works on the SAA of SWFs rely on the hypothesis that the SAA of SWFs should mirror the market portfolio, and try to determine whether deviations from this benchmark exhibit systematic patterns. Some interesting results are found with respect to home-bias. Generally speaking, SWFs are found to invest a disproportionate fraction of their portfolio in their country of origin (Dyck and Morse, 2011). Bernstein et al. (2009) find evidence that home-bias is higher when politicians are involved in fund management. Chhaochharia and Laeven (2008) find that SWFs with a higher level of transparency, measured using Truman (2008) index, tend to pursue industrial diversification but overweight trading partners. They also find that low-transparency funds overweight culturally and geographically close countries. Knill et al. (2009) show that SWFs are more likely to invest in countries which they have weaker political relations with; the investment tends to relatively improve (deteriorate) the political relation with more closed (open) countries. Finally, Caner et al. (2011), in a study of the SAA of the Norwegian SWF, show that, after controlling for institutional quality, GDP per capita is the primary determinant of investment. Some regularities are also found regarding industrial patterns of investment. Most studies highlight that Financials represent a large portion of SWF's portfolios. Financials account for 23.2% of SWF investments used for the analyses reported in chapter 4 and 36.1% in the work by Bortolotti et al. (2010). Overall, Dyck and Morse (2011) find that SWFs own as much as 4.8% of Financials equity worldwide. Beck and Fidora (2008) suggest that the appetite of commodity SWFs for Financials could be driven by their low correlation with oil returns.

A related stream of literature deals with the assessment of SWF activity. The complexity of evaluating a SWF is well described by Ang (2010), who takes a very broad perspective and suggests that four dimensions should be considered. The first two dimensions are considered as prerequisite and relate, respectively, to the ability of a SWF to serve future generations, and to its role in supporting government fiscal and other macro policies. The third dimension is long-term risk-adjusted returns. The fourth dimension is about the externalities which a SWF may have on financial markets and the economy as a whole. This classification allow us to highlight that the focus on SWF returns, which is dominant in the literature (including this work), is only dealing with one aspect of the issue. One of the few attempts to explore a dimension other than pure returns is a paper by Bagattini (2011), who looks at the effectiveness of stabilization SWFs in terms of their ability to support fiscal policy, very much in the vein of the second dimension in Ang (2010). Bagattini (2011) measures the success of a SWF by its impact on: fiscal revenues, fiscal expenditures and savings. Back to the third dimension, the most in-depth exercise of return evaluation has been conducted by Ang et al. (2009) on the Norwegian GPF. The authors focus on tactical asset allocation (TAA) and show that, overall, it has had a very limited impact of fund's performance. The return achieved by TAA for GPF between 1998 and 2010 has a mean of 0.02% per month and is not statistically significant. The same figure, prior to 2008, was instead 0.03% and highly significant. This seems to suggest that returns from TAA have been jeopardized by the financial crisis but, even in their "grace period" their economic contribution has been relatively small. Put differently: the GPF case suggests that returns from SAA are by far the dominant source of SWF total returns, in line with previous evidence on pension funds (e.g. Brinson et al., 1991).

2.3 Testing the SAA for stabilization SWFs

In this section I present the theoretical and empirical problems in setting the optimal portfolio for a stabilization SWF and in evaluating its actual SAA. In subsection 2.3.1

I present a slightly modified version of the model developed by Gintschel and Scherer (2008), in which I focus on the deviation between the "globally efficient" portfolio for a SWF and the standard market portfolio. In subsection 2.3.2 I present the empirical problems which stem from the application of theoretical benchmarks. An empirically feasible method to estimate the SAA for a SWF is presented in subsection 2.3.3.

2.3.1 Theoretical framework

Following Gintschel and Scherer (2008), I analyze theoretically the investment decisions of a commodity SWF by dividing a country's wealth into two components: a fraction ω is represented by a natural resource (e.g. oil) with expected return r_c, whose risk σ_c the country wants to diversify. The remaining fraction of country's wealth, $(1-\omega)$, is a SWF, which can freely invest in a set of financial securities. It is worth noticing that, in general, a country might want to diversify only a part of the risk linked to its stock of natural resources. In other words, ω is not only a function of the size of the whole stock of natural resources of a country, but is also influenced by the prominence of stabilization among the objectives of a SWF. This latter element determines what fraction of the whole stock of natural resources is actually expected to influence the SAA of a SWF.

The set of investable securities is made of N risky assets whose expected return is given by the $N \times 1$ vector $\mathbf{z}$, and whose covariances are given by the $N \times N$ matrix $\mathbf{\Sigma}$. The sensitivity of risky assets to commodity risk is given by the $N \times 1$ vector $\mathbf{b}$, whose element b_i is the correlation between the return of asset i and commodity price risk.

The set of investable securities also contains a risk-free asset with return R_f. Portfolio choice is fully described by a $N \times 1$ vector representing the portfolio of risky assets $\mathbf{w}$ (i.e. $\mathbf{1}^T\mathbf{w} = 1$), and by a scalar α which indicates the amount of wealth invested in the risky portfolio. The amount invested in the risk-free asset is then $1-\alpha$.

2.3.1.1 Locally efficient portfolio

I begin by analyzing the portfolio allocation for a SWF which totally neglects country's commodity risk. In a mean-variance framework, a SWF which invests as a stand-alone entity, aiming to achieve a return μ, will choose, among the infinite portfolios such that $\mu = R_f + \alpha\left(\mathbf{w}^T\left(\mathbf{z} - R_f\mathbf{1}\right)\right)$, the one whose stand-alone risk, $\sigma_L = \alpha\left(\mathbf{w}^T\mathbf{\Sigma}\mathbf{w}\right)^{1/2}$, is minimum. Following Gintschel and Scherer (2008) I call this portfolio the *locally efficient portfolio*. By standard convex programming, the locally efficient portfolio is found to be the following:

$$\begin{array}{rcl} \mathbf{w}_L(\mu) & = & \mathbf{w}^* \\ \alpha_L(\mu) & = & \frac{\mu - R_f}{\mu^* - R_f} \end{array} \tag{2.1}$$

where $\mathbf{w}^* = \boldsymbol{\Sigma}^{-1}(\mathbf{z} - R_f\mathbf{1})\left(\mathbf{1}^T\boldsymbol{\Sigma}^{-1}(\mathbf{z} - R_f\mathbf{1})\right)^{-1}$ is the market portfolio and $\mu^* = R_f + (\mathbf{z} - R_f\mathbf{1})^T\boldsymbol{\Sigma}^{-1}(\mathbf{z} - R_f\mathbf{1})\left(\mathbf{1}^T\boldsymbol{\Sigma}^{-1}(\mathbf{z} - R_f\mathbf{1})\right)^{-1}$ is its return.Equation 2.1, consistently with the two-fund separation theorem, shows that the local efficient portfolio for a SWF is a "scaled" versions of the market portfolio $\mathbf{w}^*$; whichever return the SWF wishes to achieve, its locally optimal portfolio allocation will be to invest a fraction $\alpha_L(\mu)$ in the market portfolio, and the remaining part in the risk-free asset. The amount invested in the market portfolio will be strictly increasing in the desired return μ.

2.3.1.2 Globally efficient portfolio

I turn now to deriving the optimal asset allocation for a SWF including commodity risk, which I call the globally efficient portfolio. Among all the infinite portfolios such that $\mu = R_f + \alpha\left(\mathbf{w}^T(\mathbf{z} - R_f\mathbf{1})\right)$, a SWF will choose the one minimizing the "global" risk, defined as:

$$\sigma_G = \left(\alpha^2(1-\omega)^2\mathbf{w}^T\boldsymbol{\Sigma}\mathbf{w} + 2\alpha\omega(1-\omega)\sigma_c^2\mathbf{w}^T\mathbf{b} + \omega^2\sigma_c^2\right)^{1/2}$$

It can be easily proved (see section 6.1 in Appendix) that, for any given desired return, the optimal portfolio is given by:

$$\begin{array}{rcl} \mathbf{w}_G(\mu,\omega) & = & \mathbf{w}^* - K(\mu,\omega)\boldsymbol{\Delta} \\ \alpha_G(\mu,\omega) & = & \alpha_L\left(\mu + \frac{\omega}{1-\omega}\mu_{\boldsymbol{\Delta}}\right) \end{array} \tag{2.2}$$

where: $\boldsymbol{\Delta} = \sigma_c^2\left(\mathbf{I} - \mathbf{w}^*\mathbf{1}^T\right)\boldsymbol{\Sigma}^{-1}\mathbf{b}$ is a perturbation term which is zero-investment (i.e. $\mathbf{1}^T\boldsymbol{\Delta} = 0$) and whose return is $\mu_{\boldsymbol{\Delta}} = \sigma_c^2(\mathbf{z} - \mu^*\mathbf{1})^T\boldsymbol{\Sigma}^{-1}\mathbf{b}$; and $K(\mu,\omega) = \frac{\omega}{1-\omega}\frac{\mu^* - R_f}{\left(\mu + \frac{\omega}{1-\omega}\mu_{\boldsymbol{\Delta}}\right) - R_f}$ is a scalar which acts as an amplification term. If we exclude some rather special cases like when the commodity is riskless (i.e. $\sigma_c^2 = 0$), when its risk is orthogonal to all other risks (i.e. $\mathbf{b} = \mathbf{0}$), or the country does not want to diversify commodity risk in the first place (i.e. $\omega = 0$), Equation 2.1 and Equation 2.2 depict two obviously different portfolios. First, for any given level of desired return from a SWF, the amount invested in risky assets by a globally efficient portfolio will be different from the amount which a local efficient portfolio would invest to get the same expected return (i.e. $\alpha_L(\mu) \neq \alpha_G(\mu,\omega)\ \forall\omega > 0$). Second, the portfolio of risky assets will be a "perturbed" version of the market portfolio $\mathbf{w}^*$, where the perturbation term $\boldsymbol{\gamma} = K(\mu, \omega)\,\boldsymbol{\Delta}$ is proportional to the zero-investment term $\boldsymbol{\Delta}$ and its amplification coefficient $K(\mu, \omega)$. The most obvious consequence of the difference between Equation 2.1 and Equation 2.2 is that a globally efficient portfolio for a SWF is *not* locally efficient: for any given level of return a globally efficient portfolio $\mathbf{w}_G(\mu, \omega)$ will have higher stand-alone risk (and a lower Sharpe ratio) than a locally efficient portfolio with the same return, $\mathbf{w}_L(\mu)$. Analyzing the performance of a SWF as if it was a stand-alone fund would give systematically wrong conclusions about its efficiency.

A SWF effectively pursuing a stabilization target will not invest in the market portfolio $\mathbf{w}^*$ but, rather, will relatively underweight securities which exhibit high sensitivity to commodity risk $\mathbf{b}$.I show in Appendix (section 6.1) that the first order partial derivatives of the amplification term with respect to the size of the commodity endowment is $K_\omega > 0$. In other words, the perturbation of $\mathbf{w}_G$ away from $\mathbf{w}^*$ is increasing in ω: other things being equal, the smaller the SWF (respectively to the country's stock of natural resources), the larger will be the deviation of its optimal SAA from the market portfolio. Moreover, the size of the perturbation also depends upon μ and $K_\mu < 0$: SWFs aiming to achieve a higher return will invest in portfolios which are relatively closer to $\mathbf{w}^*$.

An interesting property of Equation 2.2 is that $\boldsymbol{\Delta}$ itself depends neither on μ nor on ω. As we will see in subsection 2.3.2, this allows an external observer to analyze the correspondence of a SWF's SAA to the benchmark even when μ and ω are unknown.

2.3.1.3 Illustration

Some interesting insights about Equation 2.2 can be derived by looking at the case in which the set of risky assets is composed by only 2 uncorrelated assets. Let us assume, without loss of generality, that $z_1 \geq z_2 > R_f$. By solving Equation 2.2 we obtain that the perturbation term Δ_1, for asset 1, is positive if:

$$b_1 \leq b_2 \frac{z_1 - R}{z_2 - R} = \tilde{b}_1 \qquad (2.3)$$

Condition stated byEquation 2.3 essentially shows that asset 1 will be over-weighted in a globally efficient portfolio (relative to the market portfolio) if its sensitivity to commodity risk is not too high with respect to that of asset 2. It is interesting to observe that since $z_1 \geq z_2$ than $\tilde{b}_1 \geq b_2$, which means that higher (excess) returns also generate higher tolerance towards commodity risk. It is also found that when condition represented by Equation 2.3 is met the following inequality holds: $\alpha_G(\mu, \omega) > \alpha_L(\mu)$. The interpretation of this inequality is the following: if asset 1 is highly sensitive to commodity risk, it will be under-weighted in a globally efficient portfolio; in order to maintain the same level of portfolio return, the fund will have to compensate the loss in return from asset 1 with a reduction in the risk-free component of the portfolio, which will be invested in asset 2. More generally, when high-return assets also exhibit strong sensitivity to commodity risk, we should observe SWFs with below-average levels of risk-free investments compared to a locally efficient portfolio. If we assume that extra returns are driven by securities market *beta* (or in general their exposure to non-commodity risk factors), we can restate this finding in a more appealing fashion. A security will be over-weighted in the global efficient portfolio when it has a high market *beta* and a low commodity risk exposure. When high market *beta* securities are also those with higher (lower) commodity risk exposure, a SWF will invest a larger (smaller) portion of its wealth in risky assets than would be locally optimal; moreover, the return from the risky portion of its portfolio will be lower (higher) than the return of the market portfolio and its diversification incomplete. Again, if we look at SWF performance locally we would interpret this evidence, which comes from an optimal response to broader objectives, as a sign of poor management of the fund. In order to correctly assess the SAA of a SWF, is thus crucial to properly take into account its country's commodity exposure.

2.3.2 Assessing the SAA of stabilization SWFs

Assume now that the actual asset allocation of a SWF $\mathbf{w}_A$ is observed. What can we say about its optimality, based on the discussion above? First, we should restrain from using, as a benchmark for $\mathbf{w}_A$, the market portfolio $\mathbf{w}^*$. The SAA of a stabilization SWF should over- or under-weight asset classes based on Equation 2.2. The SAA of a stabilization SWF should be globally, not locally efficient, so that $\mathbf{w}_A$ should be compared to $\mathbf{w}_G$, rather than $\mathbf{w}^*$. We should, instead, expect systematic differences between $\mathbf{w}_A$ and $\mathbf{w}^*$. Incidentally, evidence reported in subsection 2.2.3 suggests that, on aggregate, systematic differences do exist between the asset allocation of SWFs and the world market portfolio, but current evidence is inconclusive about whether such differences arise from the attempt to diversify commodity risk or, rather, by other (e.g. political) objectives, extraction of private benefits or simple mismanagement. A direct comparison between $\mathbf{w}_A$ and $\mathbf{w}_G$ is needed to address this issue.

However, translating this theoretical framework into a procedure to assess the asset allocation of commodity SWFs proves not to be trivial. No one-size-fits-all benchmark $\mathbf{w}_G$ for all stabilization funds exists. A global efficient portfolio is highly dependent on which commodity risk the SWF seeks to diversify and to the hedging properties of individual investable ($\mathbf{b}$). Even when narrowing the benchmark to a specific commodity (e.g. oil), the deviation of globally efficient portfolios from market portfolios, as shown by Equation 2.2, will still depend on the relative size of the SWF with respect to the portion of country's endowment whose risk the country wants to diversify (i.e. $(1 - \omega)$) and by SWF's target return μ. In summary, each

SWF will have its own benchmark which will change over time together with parameters in Equation 2.2. In order to be feasible, benchmarking would then require μ and ω to be observable with precision and timeliness for each fund. Alas, SWFs are, on average, pretty opaque and a more parsimonious performance evaluation approach would be highly preferable.

It is useful to restate the comparison between $\mathbf{w}_A$ and $\mathbf{w}_G$ in terms of their deviation from $\mathbf{w}^*$. The actual SAA of a SWF should exhibit deviations from the market portfolio ($\boldsymbol{\delta} = \mathbf{w}_A - \mathbf{w}^*$) which are identical to the deviations of the globally efficient portfolio from the market portfolio ($\boldsymbol{\gamma} = \mathbf{w}_G - \mathbf{w}^*$). The reason why a comparison based upon $\boldsymbol{\delta}$ and $\boldsymbol{\gamma}$ is preferable to a direct comparison between $\mathbf{w}_A$ and $\mathbf{w}_G$ is that $\boldsymbol{\gamma}$ exhibits some properties which do not depend upon μ and ω. This allows us to test the correspondence of $\mathbf{w}_A$ to $\mathbf{w}_G$ even when $\mathbf{w}_G$ itself is unknown because we lack precise information about return objectives, SWF size, and the dollar amount of commodities at risk. The "invariance" of $\boldsymbol{\gamma}$ derives from the fact that it is the combination of a scalar (K) and a vector ($\boldsymbol{\Delta}$), where only the former depends upon μ and ω (i.e. $\boldsymbol{\gamma} = K(\mu, \omega)\,\boldsymbol{\Delta}$).[1] This means that the sign, ranking, and relative size of elements in $\boldsymbol{\gamma}$ is independent from μ and ω. We may then use this invariance to test whether $\boldsymbol{\delta} = \boldsymbol{\gamma}$ based on the relationship between $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$. More precisely, the *sign*, *rank* and *scale* of elements in δ should be closely related to those of elements in $\boldsymbol{\Delta}$.

First, if $\boldsymbol{\delta} = \boldsymbol{\gamma}$, elements in $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$ should have the same sign. This can be easily tested. If $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$ were independent, the probability distribution of the number of times they should have the same sign follows a binomial distribution $B(n, \theta)$ with $\theta = 0.5$, where n is the number of events (e.g. $n = N$ if observations are cross-sectional over the N asset classes, and $n = N \cdot T$ if cross-sectional observations are repeated for T time periods). If the SAA of a SWF follows Equation 2.2, I would instead expect asset classes to be over or under-weighted in the SAA consistently with what predicted by the sign of elements in $\boldsymbol{\Delta}$. Given the non-parametric nature of this test, the null hypothesis can be tested even when the number of events n is relatively small.

Second, if $\boldsymbol{\delta} = \boldsymbol{\gamma}$, the assets which are most over-weighted (under-weighted) by the SWF should be those whose corresponding elements in $\boldsymbol{\Delta}$ are the highest (lowest). More formally: $\boldsymbol{\delta}$ should be monotonically increasing with $\boldsymbol{\Delta}$. This can be tested by computing the Spearman's rank correlation coefficient ρ between the two vectors. Under the null hypothesis that $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$ are unrelated $\rho = 0$. A positive and significant ρ should instead be observed if the model predicts correctly the SAA of a commodity SWF.

Finally, an even stronger relationship holds between elements in $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$. As long as $\boldsymbol{\delta} = \boldsymbol{\gamma}, \boldsymbol{\delta}$ should be proportional, through the scalar $K(\mu, \omega)$, to $\boldsymbol{\Delta}$. This means that we can estimate a linear model in which $\boldsymbol{\delta} = \beta \boldsymbol{\Delta} + \boldsymbol{\epsilon}$, where β is an unknown

[1] In geometric terms, for whichever value of μ and ω, $\boldsymbol{\gamma}$ and $\boldsymbol{\Delta}$ are two coincident vectors, having the same direction but different magnitude.

parameter and $\boldsymbol{\epsilon}$ is a random disturbance term. Under the null hypothesis that $\boldsymbol{\delta}$ and $\boldsymbol{\Delta}$ are unrelated $\beta = 0$. Thanks to the flexibility of linear models, it is easy to augment this specification by including time, regional, and asset class specific disturbance terms.

2.3.3 Empirically feasible benchmarking

Unfortunately, the approach presented in the previous section presents some problems when confronted to real-world portfolio optimization. Even if all parameters were know, direct estimation of $\boldsymbol{\Delta}$ would be problematic. First, Markowitz techniques for the computation of efficient frontiers are affected by some well-known problems of robustness and sensitivity of optimal portfolio weights to changes in the parameters (e.g. Meucci, 2005; Fabozzi et al., 2007). This is aggravated by the presence of commodity risk. A simple example can be useful to understand how sensitive the optimal solution can be.

Suppose only two uncorrelated risky assets exist whose expected return (z_i) and risk (σ_i) are given by $z_1 = 8\%$, $z_2 = 4\%$, $\sigma_1 = 8\%$, $\sigma_1 = 12\%$, $\sigma_2 = 10\%$; the risk-free rate is $R_f = 3\%$ and the fraction of wealth constrained in the commodity (whose risk is $\sigma_c = 10\%$) is $\omega = 50\%$. We assume that $b_1 = 0.1$ and that the fund wants to achieve an overall return $\mu_{SWF} = 5.5\%$. I compare in Table 2.1 the local efficient portfolio and the global efficient portfolios corresponding to different values of b_2.

Table 2.1: Sensitivity of Equation 2.2 to parameters in input

	α	w_1	w_2	γ_1	γ_2
Local	60.89	77.64	22.36	-	-
Global ($b_2 = 0$)	62.41	75.15	24.85	-2.49	2.49
Global ($b_2 = 0.1$)	54.84	88.97	11.03	11.33	-11.33

Simulation of Equation 2.1 and Equation 2.2 with two uncorrelated risky assets exist whose expected return (z_i) and risk (σ_i) are given by $z_1 = 8\%$, $z_2 = 4\%$, $\sigma_1 = 8\%$, $\sigma_1 = 12\%$, $\sigma_2 = 10\%$; the risk-free rate is $R_f = 3\%$ and the fraction of wealth constrained in the commodity (whose risk is $\sigma_c = 10\%$) is $\omega = 50\%$; $b_1 = 0.1$ and $\mu_{SWF} = 5.5\%$. All figures are in percentage.

The locally efficient portfolio (which clearly does not depend on $\mathbf{b}$) is 60.89% allocated in risky assets; out of this 77.64% is allocated in Asset 1 and 22.36% in Asset 2. If the correlation between asset 2 and the commodity is zero, as shown in the second row of Table 2.1, the SWF invests, compared to a locally efficient portfolio, *more* in risky assets (62.41%) and slightly *less* in asset 1 (75.15%), that is: $\gamma_1 < 0$. Interestingly, if the sensitivity of Asset 2 to commodity risk is instead $b_2 = 0.1$, the direction of the differences is reversed: the SWF invests *less* in the risk portfolio (54.84%), and substantially *more* in Asset 1 (88.97%), that is $\gamma_1 > 0$, with a portion of Asset 2 which is half that in the local portfolio (11.03%). A slight change in commodity sensitivities has a dramatic impact on the globally optimal portfolio allocation. This requires empirical estimates of $\mathbf{w}_G$ and $\mathbf{\Delta}$ to be based on very robust techniques.

To address these problem I do *not* estimate directly Equation 2.1 and Equation 2.2 from sample data but, rather, adopt an optimization process which gives more stable and reasonable solutions. To cope with the sensitivity of actual portfolios to parameters estimates, I compute the market efficient frontier using a resampling technique, as presented by Michaud (1998). The idea is to generate, using Monte Carlo simulations, a certain number of random return series following a multivariate normal distribution with the same parameters as those estimated from historical data, and then to average the optimal portfolios weights resulting from simulation. The use of resampling techniques, according to Scherer (2002), allows a strong reduction in under-diversification of estimated portfolio, especially in case of constrained weights.

It is important to notice that the independence of $\mathbf{\Delta}$ from μ and ω holds in each run of the Monte Carlo simulation and, hence, also holds when $\mathbf{\Delta}$ is estimated using resampling. As a consequence, sign, rank and proportionality criteria are still valid and the three tests presented in subsection 2.3.2 can still be estimated consistently using, respectively, a sign test test, a Spearman rank test and an OLS regression.

2.4 Application to the Government Pension Fund - Global

In this section I illustrate how tests developed in section 2.3 can be applied to a real-world SWF with stabilization objectives: the Norwegian GPF, which characteristics have already been discussed in subsection 1.3.4. The data collection process and the identification of the parameters is described in subsection 2.4.1. subsection 2.4.2 reports the analyses.

2.4.1 Assessing the SAA of the GPF

I focus my analysis on the SAA of the GPF on the 4 year period between 2002 and 2005. This period has the advantage of being characterized by a stable set of investment rules for the fund, which allows us to neglect the effect of additions of asset classes to the portfolio allocation and frictions in re-balancing. In the rest of this section I illustrate how each parameter in Equation 2.1 and Equation 2.2 is estimated. subsubsection 2.4.1.1 deals with the size of oil reserves (compared to that of the SWF). subsubsection 2.4.1.2 illustrates how the market portfolio and the globally efficient portfolio are estimated. subsubsection 2.4.1.3 explains how the actual SAA is determined.

2.4.1.1 Size of the oil reserves (ω)

For each year in the analysis I compute the market value of Norwegian oil reserves by multiplying the year-end estimated number of barrels in Norwegian reserves as reported by OPEC (2002-2005) (R_t), by the average daily price of the Brent-Europe during year t (P_t), as reported by the US Energy Information Administration[2]. The year-end market value of the GPF (GPF_t) is obtained from annual reports published by the Norges Bank (NBIM, 2002-2005) and converted in local currency using the average daily closing USD/NOK exchange rate during year t (e_t). The fraction of national wealth held in oil (vs. the SWF), is then estimated at the end of year t using the following:

$$\omega_t = \frac{P_t \cdot D_t}{GPF_t \cdot e_t + P_t \cdot D_t} \tag{2.4}$$

I report in Table 2.2 values of parameters in Equation 2.4 by year. As expected, due to the depletion of oil reserves and the increase of GPF assets, ω_t has a long-term downward slope. Nonetheless, significant shocks in any variable can revert this general trend, as observed between 2004 and 2005: ω_t increased 2.8% (from 69.10% to 71.90%) driven by a 42.6% surge in oil price (from 38.26 to 54.57 USD/barrel).

Table 2.2: Oil weight estimation 2002-2005

Year	2002	2003	2004	2005
GPF market value (billion NOK), GPF_t	609.01	845.3	1016.4	1399
USD/NOK exchange rate, e_t	0.14	0.15	0.16	0.15
GPF market value (billion USD)	82.83	124.09	166.28	206.77
Oil deposits (million barrels), D_t	10,401	10,099	9,722	9,697
Oil price (USD per barrel), P_t	24.99	28.85	38.26	54.57
Oil deposits (billion USD)	259,921	291,356	371,963	529,165
Oil Weight, ω_t	*75.80%*	*70.10%*	*69.10%*	*71.90%*

Sources: OPEC (2002-2005), NBIM (2002-2005), US Energy Information Administration, Datastream.

It is worth noticing that Equation 2.4 implicitly assumes that the GPF considers the risk associated to all Norway's reserves in its SAA. The tests that I will perform are actually only marginally affected by this assumption. Cross sectional tests are independent from ω, and tests based on pooled observations from different time

[2] Brent-Europe price reflects the market price, in US Dollars, of a barrel of blended crude stream produced in the North Sea region. See http://www.eia.doe.gov.

periods are valid to the extent to which the relevance of stabilization (i.e. the portion of oil reserves which is considered at risk), whichever it is, does not change over time. As far as I know, there is no indication about changes in the relevance of stabilization among GPF's objectives during the period and, in addition, parameter estimates shown below seem to be pretty stable over time, thus confirming ex-post the validity of this assumption.

2.4.1.2 Globally efficient portfolio and market portfolio

The first step to determine the locally and globally efficient portfolios is to identify the set of financial securities to be included in the analysis. I derive $\mathbf{w}_G$ using resampling over 300 Monte Carlo simulations. In each simulation the covariance matrix ($\mathbf{\Sigma}$) and the vector of (expected) oil-price correlation ($\mathbf{b}$) are computed using historical (resampled) weekly returns. Expected returns are computed using CAPM with an equivalent annual market risk premium obtained as the geometric mean of the excess return of the market portfolio over the risk free rate (as defined below) in the period considered. Following Gintschel and Scherer (2008), I proxy world equities using MSCI indexes. I compute weekly returns (in local currency) for MSCI indexes on 10 sectors (Energy, Materials, Industrial, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication, and Utilities) and 3 macro region (Europe, North America, and Pacific), for a total of 30 equity indexes. The global market equity portfolio is proxied by the MSCI All Country (AC) World equity index. To capture oil price risk I use the Brent - Europe Crude Oil Price. The risk-free rate is computed from the average yearly yield of 3 month T-bills during the reference year (source: Federal Reserve). To take into account investments in fixed income I include the Citigroup WBGI All Maturities Index. I do not have detailed information about the type of fixed income investments performed by the GPF, so I include this asset class only to improve estimates on the equity portion of the local and global efficient portfolios. In all portfolio optimizations I include a constraint on the minimum and maximum weight for fixed income securities. The interval is centered around the actual allocation observed in the reference year and the width of the interval is set to 2.5%, that is the normal deviation from the benchmark portfolio accepted by the Executive Board (Gjedrem, 2010). Short-selling is also excluded in all optimizations.

I consider the equity market portfolio to be a weighted combination of the 30 industry-region MSCI indexes. I reconstruct the weight of each index in the equity market portfolio by solving the following problem:

$$\min_{\mathbf{w}^*}(\mu_M - \mathbf{R}\mathbf{w}^*)^T(\mu_M - \mathbf{R}\mathbf{w}^*) \tag{2.5}$$

subject to $\mathbf{1}^T\boldsymbol{w}^* = 1$; μ_M is a $W \times 1$ vector of returns of the MSCI AC World index over the W weeks considered, $\mathbf{R}$ is a $W \times N$ matrix of returns of the N ($N = 30$)

industry-region MSCI indexes. To avoid the risk of null weights assigned to certain industry-region I, somewhat arbitrarily, impose a minimum weight of 0.5% for each sub-index. For each year considered in the empirical analysis (i.e. 2002-2005), I estimate $\mathbf{w}^*$ using an 8 years rolling period, thus $W = 416$.[3]

2.4.1.3 Actual portfolio ($\mathbf{w_A}$)

The starting point to compute the SAA of GPF is the list of all GPF investments disclosed by the Norges Bank at the end of each calendar year[4]. The number of listed companies invested by the GPF varies from 2,427 in 2002 to 3,278 in 2005. The rationale for deriving the actual aggregate GPF portfolio starting from the share invested in each firm is that official statistics on the GPF portfolio allocation do not provide a detailed breakdown by both region and industry; looking at individual investments, I am instead able to describe both the industrial and regional composition of the GPF equity portfolio; this allows me to jointly assess these two dimensions when analyzing the difference between actual weights and those estimate for the globally efficient portfolios.

I thus hand collect ISIN, Sedol or Cusip identification codes for each portfolio company and retrieve, using Worldscope via Thomson One Banker, the corresponding primary 2-digits SIC code. Whenever identification code are not found (about 9% of cases), I look directly for the primary SIC code using several of alternative sources (e.g. Lexis Nexis and Factiva); when the code was still not available (15 cases) I associated a SIC code to the company based upon business description in financial reports and company's website. Each 2-digit core SIC code is matched to one of the 10 industries of the MSCI Indexes. The table of associations is reported in Appendix section 6.2.

Each stockholding is also associated to one of the three regions covered by MSCI indexed (North America, Europe and Pacific). While most of the times the association is trivial, in some cases it requires some degree of approximation: investments in Central and South America are matched to a North America Index firms equity and African and Middle Eastern investments are associated to the Pacific region. Considering the very little weight of these investments in GPF's portfolio, this approximation can be considered acceptable: overall African, Middle Eastern, and Central and South American firms in 2005 represented only 1.6% of the equity holdings (at market value) of GPF.

Table 2.3 illustrates the actual allocation of GPF by industry and region. For the sake of readability I report average values over the period 2002-2005. The two results which stand out more clearly from Table 2.3 are the relevance of European

[3] I re-estimate all the tests using, for $\mathbf{w}^*$, the estimated tangency portfolio from Monte Carlo simulations. Results are qualitatively identical to those shown below.

[4] GPF equity holdings can be found at http://www.nbim.no/en/Investments/holdings.

Table 2.3: Average GPF equity portfolio composition by industry and region between 2002 and 2005

Industry	Europe	North America	Pacific	*Total*
Cons. Discretionary	2.48	3.43	1.54	*7.45*
Consumer Staples	4.00	1.53	0.57	*6.10*
Energy	3.94	3.01	0.28	*7.23*
Financials	13.56	8.28	3.69	*25.53*
Health Care	0.10	0.16	0.01	*0.27*
Industrials	6.12	7.59	3.17	*16.88*
IT	2.96	3.09	3.17	*9.22*
Materials	8.05	5.45	2.18	*15.68*
Telecom	4.88	2.03	0.60	*7.51*
Utilities	2.46	1.18	0.49	*4.13*
Total	*48.56*	*35.74*	*15.70*	*100.00*

Source: Authors computations based on data provided by NBIM. Details in subsubsection 2.4.1.3.

equities and Financials: European accounts for 48.56% of GPF's equity portfolio and Financials for 25.53%. Both this results are in line with existing evidence on SWF investments illustrated in subsection 2.2.3: SWF's SAA is geographically biased and exhibits a particular appetite for Financials. I will investigate, in the next section, the extent to which this can be explained by diversification objectives.

2.4.2 Results

Table 2.4 reports the average deviations from the market portfolio of the GPF's SAA (Panel A) and the globally efficient portfolio (Panel B) between 2002 and 2005 by region and industry. Again, for the sake of readability, I report average values during the period.

Panel A of Table 2.4 confirms that the GPF over-weights, with respect to the market portfolio, European equities. The deviation is estimated to be 23.52%, and is mostly at the expense of North American equities which are instead under-weighted by 19.53%. Almost half of the over-weighting of European equities is due to Financials, which are over-weighted by 10.64%. Interestingly, North American Financials are only slightly over-weighted (1.39%) and Pacific Financials are under-weighted (-3.51%).

A first inspection at Panel B of Table 2.4 reveals that deviations of the SAA of the GPF from the market portfolio are generally consistent with what predicted for a globally efficient portfolio. For instance, between 2002 and 2005 European

Table 2.4: Deviations from the market portfolio of GPF's SAA and the globally efficient portfolio by industry and region (average between 2002 and 2005)

Panel A: Average deviations from the market portfolio of GPF's SAA ($\boldsymbol{\delta}$)

Industry	Europe	North America	Pacific	Total
Cons. Discretionary	-4.79	-5.44	0.05	*-10.17*
Consumer Staples	3.50	-0.96	-0.87	*1.67*
Energy	3.44	-1.02	-0.23	*2.19*
Financials	10.64	1.39	-3.51	*8.53*
Health Care	-0.40	-7.60	-0.93	*-8.93*
Industrials	5.62	2.59	1.50	*9.72*
IT	1.47	-6.59	1.17	*-3.95*
Materials	7.55	0.01	1.28	*8.85*
Telecom	0.72	-2.50	-0.30	*-2.07*
Utilities	-4.24	0.56	-2.15	*-5.83*
Total	*23.52*	*-19.53*	*-3.98*	*0.00*

Panel B: Average deviations from the market portfolio of the globally efficient portfolio (γ)

Industry	Europe	North America	Pacific	*Total*
Cons. Discretionary	-5.60	-5.26	0.37	*-10.49*
Consumer Staples	3.26	2.66	-0.37	*5.54*
Energy	0.66	-3.40	1.32	*-1.43*
Financials	3.24	-2.36	-5.38	*-4.50*
Health Care	5.73	-0.31	3.26	*8.68*
Industrials	-0.35	-4.26	-1.19	*-5.80*
IT	9.44	-6.13	0.50	*3.82*
Materials	2.47	-2.27	0.67	*0.87*
Telecom	3.36	-0.18	0.99	*4.16*
Utilities	-4.69	2.48	1.35	*-0.87*
Total	*17.50*	*-19.03*	*1.52*	*0.00*

The table reports the average deviations from the market portfolio $\mathbf{w}^*$of GPF's SAA and the globally efficient portfolio (respectively indicated by $\boldsymbol{\delta}$ $\boldsymbol{\gamma}$). Values of $\boldsymbol{\delta}$ and $\boldsymbol{\gamma}$ are computed for each year between 2002 and 2005 following the procedure explained in subsubsection 2.4.1.2.

consumer discretionary, which I predict should be under-weighted in a globally efficient portfolio by 5.60%, are under-weighted in the actual portfolio by 4.79%. European consumer staples, which I predict should be over-weighted by 3.26%, are over-weighted by 3.50%. It is also interesting to point out some divergences. Financials are given an even larger share in the portfolio of GPF than our model predicts: I expect deviations of 3.26%, -2.36% and -5.38% for European, North American and Pacific Financials but observe deviations of, respectively, 10.73%, 1.45% and

-3.48%. In other words, the appetite of the GPF for financial seems to be much larger than what can be explained purely by diversification of commodity risk. The largest deviation I observe between Panel A and Panel B of Table 2.4 is in Health Care, where I predict a over-weight by 8.68% but observe an under-weight by 8.93%. Market depth can partially explain this divergence. Given the size of the GPF, a significant over-weight could actually be unfeasible in some industries and regions due to the self-imposed limits in the concentration of stockholdings. While this problem is probably limited in our setting (with the possible exception of Heath Care), it should probably be taken into account, and modeled explicitly, if a more fine-grained industry classification was used.

To formally test the extent to which deviations of the actual SAA from the market portfolio are consistent with diversification of oil-price risk, I estimate several econometric models reported in Table 2.5.

Table 2.5: Consistency between actual SAA and the globally efficient portfolio

Model	H0	2002-2005	2002	2003	2004	2005
Sign	$\theta = 0.5$	*0.600***	*0.633**	*0.600**	*0.600**	*0.567*
Rank	$\rho = 0$	0.452***	*0.453***	*0.409***	*0.520****	*0.416***
OLS	$\beta = 0$	0.491***	*0.565****	*0.492***	*0.572****	*0.371***
Augmented OLS	$\beta = 0$	0.612***				
Random effects	$\beta = 0$	0.182***				
Fixed effects	$\beta = 0$	0.124*				

Legend: *: p-value<10%; ** p-value<5%; *** p-value<1%. Figures in italic refer to tests which are robust to different assumptions about the scale parameter K in Equation 2.2.

It is worth pointing out that, following the discussion in subsection 2.3.2, some of the tests in Table 2.5 are robust to uncertainty about parameters that determine the scalar K_t in Equation 2.2 in year t. These robust, or parsimonious, tests are in italic in Table 2.5. Out of the 120 observations (30 asset classes over 4 years) the two vectors have the same sign in 72 occurrences; this yields an estimate for $\hat{\theta} = 0.6$ which allows to reject the null hypothesis that $\theta = 0.5$ at the 95% a confidence level (p-value is 4.9%). I repeat the test for each year separately and still obtain (weakly) significant results for all years but 2005. It is worth pointing out that each of these tests is valid even if parameters that determine the K_t are unknown.

Second, I compute the Spearman's rank correlation coefficient ρ on the whole period and separately by year. I obtain a rank correlation ranging between 0.409 and 0.520; the null hypothesis that $\rho = 0$ can be rejected at the 95% (or higher) in each estimation. All rank tests, but the one pooling the whole period, remain valid even if parameters that determine the scale parameter K_t in each year are unknown.

I then estimate a series of linear models. First, I estimate the β coefficient by OLS. Again, I repeat the estimates in the pooled sample and year by year. The coefficient ranges between 0.371 and 0.572 and the null hypothesis that $\beta = 0$ can be rejected at the 95% (or higher) confidence level in each estimation. Again, tests on yearly samples are valid regardless of errors in the estimation of K_t. Interestingly, the coefficients are also significant lower than unity, which is what it would be expected if the GPF diversified all the commodity risk deriving from Norway's oil reserves, as we implicitly assumed in Equation 2.4. Put differently, the SAA of the GPF is most consistent with a diversification of about half (49.1% in the pooled sample) of the risk that derives from fluctuations in the value of its oil reserves.

I augment the linear model by including a full set of time, sector and region dummies and obtain a coefficient of 0.612, rejecting the null hypothesis at the 99% confidence level. The inclusion of these dummies is particularly important as a robustness test. As I mentioned earlier, the literature finds significant biases in the asset allocation of SWFs which could be due to non-financial reasons, including regional biases and a particular appetite for some industries (e.g. Financials). By including regional and sectoral dummies, I control for these confounding effects. The fact that the null hypothesis can still be rejected confirms that my results are consistent with risk diversification even when these potential biases are controlled for. Finally, I estimate two models in which the panel structure of the data is fully exploited. I estimate a random effect model and a fixed effect model and obtain a coefficient of 0.182 (p-value<0.01) and 0.124 (p-value<0.1) respectively. These results are particularly worthy of notice. In these estimates all unobservable time-invariant heterogeneity is captured by a asset-specific effect.[5] What I am essentially estimating is thus how variations over time in γ_i are followed by similar variations in δ_i. Put differently, using a panel data estimation I am testing the extent to which changes in the SAA of the GPF from one year to the next are compatible with changes in the parameters that determine the globally efficient portfolio. The fact that, despite the small size of the panel, results are still significant is reassuring as to the extent to which Equation 2.2 is able to capture the essence of risk-diversification not only in static but also in dynamic terms.

2.5 Concluding remarks

With this chapter I contribute to the literature on SWFs by developing and implementing a series of simple tests to verify the correspondence between the theoretical and the actual SAA of stabilization SWFs. I build on the model proposed by Gintschel and Scherer (2008) who distinguish between global and local optimality of SAA. At a conceptual level, this approach highlights that the evaluation of the SAA of a stabilization SWF should not ignore that deviations from the market portfolio

[5]Hypotheses regarding the nature of the asset-specific effect are different between the random and fixed effect models. For an overview see: Baltagi (2005).

are necessary to pursue hedging objectives. In other words the globally optimal SAA of a stabilization SWF is not locally optimal, and will systematically over or under-weight some asset classes and regions.

Building on this approach, I derive a closed-form expression for the deviation between the globally efficient portfolio for a stabilization SWF and the market portfolio. The deviation from local optimality concerns both the fraction of the overall portfolio invested in risk-free assets and the allocation of the portfolio among risky assets. The comparative statics show that, other things being equal, the magnitude of the deviations is decreasing with the size of the SWF and with its expected return.

The most interesting feature of this model, however, is that some properties of the deviation of the global portfolio from the market portfolio are independent from some parameters which characterize the problem. This allows to derive some parametric and non parametric tests to evaluate the correspondence between the theoretical and actual SAA of a stabilization SWF that are valid even when some crucial variables are known with uncertainty (or unknown), such as: the SWF target return, the size of the fund, the size of a country's endowment of natural resources, and the relevance of stabilization among SWF's objectives.

To check the validity of this empirical strategy, I present an application to the largest stabilization SWF: the Norwegian GPF. I find consistent evidence that GPF's SAA takes into account diversification of risk connected to Norway's oil reserves. The sign, rank, and relative size of deviations from the market portfolio are significantly correlated with those predicted by the model both in static and dynamic terms. The evidence is robust not only to uncertainty in the parameters of the problem, but also to the presence of any other regional and sectoral bias in the asset allocation. Stabilization, however, seems to be only partially reflected in the SAA of the GPF, whose deviations from the market portfolio are, on average, about half what predicted by the model. Interestingly, the over-weighting of Financials is much higher than what predicted by the model, so that reasons other than diversification should be sought to explain it.

Overall, the empirical application of the model to the GPF suggests that the tests that are proposed here can indeed be successfully applied to a real-world SWF. The availability of a simple and parsimonious set of tests on the SAA of stabilization SWFs can improve our understanding of how their investments are based on sound portfolio management principles, as recommended by the GAAP (IWG, 2008). Different stakeholders could benefit from the empirical strategy I propose here. First, policymakers of host countries. There has been much debate about the political use of SWFs ((see e.g. Cognato, 2008; Gieve, 2008; Keller, 2008; Rose, 2008; Wu and Seah, 2008; Zhang and He, 2009)). However, in the absence of a set of feasible and robust empirical tests to verify the correspondence of SAA to a theoretical benchmark, policymakers do not have a sound basis for their interventions to regulate SWF investments. Second, finance professionals. This model could help financial institutions in identifying which SWFs, given their current and target SAA, and based only on publicly available information, are most likely to benefit from particular financial products (e.g. the inclusion of alternative investments). Third, market participants. We have shown that changes in the SAA of the GPF respond, at least in part, to changes in the parameters of the model. This could allow market participants to predict SWFs' moves based on forecasts on changes in fundamentals (e.g. oil price). Given the large size of SWFs and the fact that most of them are actually exposed to very similar sources of commodity risk, the rebalancing of their portfolios could have a substantial impact on market returns. Finally, citizens of home countries. A perspective that has received surprisingly little attention in the analysis of SWFs is the extent to which they best serve the interests of their citizens (a notable exception is the work by Fox et al. (2008)). Unfortunately, citizens themselves often have insufficient information to evaluate to what extent their interests are being served. This methodology could give them a more efficient way to use the little information they have to judge how effectively their money is being invested.

3 SWFs Target Selection and Financial Performance

3.1 Introduction

In the previous chapter I assess the SWF investment activity from a portfolio allocation perspective; in this chapter I take a complementary perspective and analyze the impact of SWFs investments and investment decisions at firm level. Previous literature, surveyed in section 3.2, has already investigated the impact of SWFs investments on firms financial and operative performances on different time frameworks. Medium term evidence is mixed: some studies find a positive impact of SWFs as shareholders, while others find no or even negative influence from these investors. However, all studies find positive Cumulative Abnormal Returns (CARs) sorrounding SWFs investments, suggesting markets hail cheerfuly the advent of these investors, at least in the short term. Given the (only) recent surge in interest for SWFs activity, previous research has been based on hand-collected, proprietary database on SWFs transactions; this heterogeneity of data used could be a potential source of discrepancy among their results and makes difficult to compare existing evidence. On the contrary, all the analyses presented in this and the next chapter are based on the Sovereign Wealth Funds Transaction Database (SWFTD), the first available commercial dataset on SWFs activity. The clear advantage of using a commercial dataset is that in principle it is possible to exactly replicate all the analyses here presented, thus providing a base for more consistent conclusions over SWFs investments impact and determinants.

The first aim of this chapter is thus to present the dataset and check its consistency with hand-collected ones used in former studies. In section 3.3 I present the SWFTD, highlighting its similarities and differences respectively to other previously used dataset in terms of aggregate statistics. As said all studies, regardless of the dataset used, find positive abnormal financial performances for firms invested by SWFs; replicating their short-term analysis using the SWFTD is thus important to check whether it leads to results in line with the only well-established piece of empirical evidence about SWFs investments at micro level. As shown in

section 3.4 I can replicate previous results on CARs using the SWFTD, confirming once again the (short-term) positive market view toward SWFs investments.

The second aim of this chapter is to investigate the SWFs target selection at a micro level. Kotter and Lel (2011) find that target firms are bigger, more levered and exhibiting an higher credit risk, but they also find they the have a lower asset intangibility (a result partially in contrast with that on credit risk) and, more importantly, they have lower operative performances than otherwise comparable non targeted peers. Using the SWFTD I show that, while I can replicate almost exactly their results, the latter are not robust to different - and possibly more adequate - model specifications. In particular, while my analyses provide further evidence that SWFs tend to invest in bigger and more levered firms, it is unclear whether their targets exhibit, ceteris paribus, worse or better (as I find) operative performances. Also, firms characteristics relating to potential shareholders-bondholders conflicts other than financial leverage appear to have a different (and more coherent with general findings) impact once the model specification is changed. All in all my results, summarized in section 3.6, suggest that SWFs have a particular appetite for big firms which are more likely to experience financial distress but with relatively good operative performances. Of all the theories about SWFs impact illustrated in section 3.2, none seems to be fully able to explain why SWFs could have a particular interest for this kind of firms. In the next chapter, I propose a theory for the impact of SWFs investments on portfolio firms which is highly coherent with the verified SWFs target selection, and provide a more adequate empirical strategy to test it rather than looking at shares returns.

3.2 Previous literature

Several works have verified positive Cumulated Abnormal Return (CAR) in the days following SWF investment announcements. CAR is statistically significant and ranges, depending on the study, between 0.5% and 2.0% (e.g. Chhaochharia and Laeven, 2008; Bortolotti et al., 2010; Dewenter et al., 2010; Knill et al., 2010; Kotter and Lel, 2011). Similar results are found after investments by hedge funds (e.g. Klein and Zur, 2009) and pension funds (e.g. English et al., 2004).

However, findings about the long-term impact of SWF investments on target firms is mixed. Dewenter et al. (2010) find that Buy an Hold Abnormal Returns (BHAR) are not significantly different from zero considering 1, 3 and 5 year post-event windows. They also find significantly positive Cumulative Market Adjusted Returns (CMAR) in the 3 and 5 years window (but not 1 year). Bortolotti et al. (2010) find (weak) evidence of negative BHAR over 1 and 2 years horizons; Kotter and Lel (2011) also find (non significant) negative BHAR over 1 and 2 years, but a significantly positive BAHR over 3 years. Fernandes (2009) and Sojli and Tham (2010) find a significant long-term increase in Tobin's Q for firms invested by SWFs.

Findings about long-term impact on operating performance are equally mixed. Fernandes (2009) finds that firms with higher ownership by SWFs have better operating performance; Sojli and Tham (2010) find weak evidence that firms invested by SWFs have better operating performance than a matched sample of non-invested companies. Bortolotti et al. (2010) find evidence of a decline in long-term operating performance after SWF investments.

A possible explanation for the ambiguity in empirical results can be found in the heterogeneity of SWF investments. SWFs include fiscal stabilization funds, savings funds, reserve investment corporations, development funds, and pension reserve funds without explicit pension liabilities (IWG, 2008). These differences are likely to reflect in investment practices and time horizon (Kunzel et al., 2010). Accordingly it is not surprising that different studies, based on different samples and methodologies, may find inconsistent results. In order to understand the impact of SWFs on firm performance, a deeper understanding of its theoretical underpinnings is needed. So far, two main explanations have been proposed to justify theoretically a potentially significant impact, either positive or negative, of SWFs investments on firms performances.

The first one focuses on SWFs being large institutional investors: SWFs may act as blockholders and active shareholders in target companies and may bring value by monitoring and reducing free-riding along the lines of Grossman and Hart (1980) and Shleifer and Vishny (1986). Following the classification by Chen et al. (2007), SWFs, being independent long-term investors, should be particularly keen on engaging in monitoring and influencing, especially when they own large stakes in target companies. However, when the stake they own is such that they gain a controlling influence on the company, tunneling could arise (Johnson et al., 2000), reducing firm value. Consistently with this view, Dewenter et al. (2010) find that short-term abnormal returns have a non-monotonic relation with the stake acquired.

When more direct evidence is sought, little is found in support of an active involvement of SWFs. Bortolotti et al. (2010) find that only in 14.9% of the cases SWFs are represented in the board of directors, and that their presence in the board is actually associated with a negative, statistically significant effect on 1 year financial returns. They also find 1 year returns to be negatively correlated with the size of the stake acquired. Also Dewenter et al. (2010) find that senior management turnover in the year following the investment is about 14%, which is similar to average yearly turnover for CEOs worldwide, as reported by DeFond and Hung (2004). Moreover, no impact on financial performance is found on a 1 to 5 years horizon. Similarly, Kotter and Lel (2011) find CEO turnover and operative performance to be non statistically different from a control group of similar firms in the year following the investment.

Bortolotti et al. (2010) provide a compelling explanation about why SWFs could actually be ineffective in monitoring. Since they are seen as representing the interest of a foreign (often non-democratic) government, they may be restrained by public opinion and political pressure from challenging existing management. While this explanation is clearly supported by the absence of evidence on SWF monitoring activity and by the weak long-run performance of SWF investments, it does not explain the short term positive market reaction to SWF investment announcements.

The second distinctive feature of SWF is their relationship with the government. Generally speaking, SWFs have been seen as a symptom of a new surge in State-capitalism, conflicting with the long-run trend of privatizations worldwide (Lyons, 2007). It is however unclear the extent to which the results obtained by the vast literature on privatizations (e.g. Vickers and Yarrow, 1991; Megginson and Netter, 2001; Bortolotti and Faccio, 2009) can be used as a guideline to understand the potential impact of investments from investors linked to foreign governments, like SWFs.

The foreignness of SWFs changes the nature of their influence on portfolio companies. For instance, SWFs could add value to target firms by granting them a favorable access to their home market. An illustrative case is the \$1.5 billion investment made by CIC in Teck Corp, a Canadian mining company. Don Lindsay, Teck's CEO, declared in an interview that:

> "This transaction is an endorsement of Teck's future and provides an immediate and very positive impact on Teck's balance sheet. [...] It puts Teck back on the growth track and allows us to deepen our relationship with the largest customer of our core products. [...] Clearly, CIC knows so much about the Chinese economy and all the people who run those [state-owned] companies. And not every mining company has a very friendly relationship with China right now."[1]

This argument could explain, at least partly, why positive short term market reactions are observed after SWF investments. Consistently with this view, Sojli and Tham (2010) find a significant increase in the degree of internationalization and in the number of government contracts in the year following a SWF investment.

Moreover, SWFs could provide their governments with an incentive to which could shape their political agenda. Dewenter et al. (2010) find that in 8.2% of the cases, SWF domestic governments make some decision which favor portfolio firms in the year following the investment. Unfavorable decision are observed, instead, only in 1.6% of the cases. In 35.3% of the cases, SWFs engage in active networking with portfolio companies.[2] Both government favorable decision and networking activity are found to have a positive impact on firm medium-term financial returns. Preferred access to emerging markets however also entails some risks: these countries are generally characterized by a high volatility of productivity (Aizenman, 2003) as well as financial and political risk (Click, 2005), which could increase return volatility.

[1] "CIC on Teck: the Commodities Buying Spree Continues". *China Stakes*. July 6, 2009.

[2] Examples of both network transaction and government action can be found in Dewenter et al. (2010, Table 12).

3.3 Data

3.3.1 Sovereign Wealth Funds Investments

All the analyses included in this work, with the notable exception of those presented in chapter 2, are based on the Sovereign Wealth Fund Transaction Database (SWFTD); the SWFTD is provided by the Sovereign Wealth Fund Institute, a for-profit organization dedicated to the study of and consultancy for SWFs. This work is based on the second release of the database, covering investments from 1984 to 2010. The bulk of studies on SWFs so far have relied on proprietary hand-collected lists of SWFs transactions; the obvious advantage of using a commercially available dataset instead of a proprietary one is that all the analyses presented here can be in principle exactly replicated[3].

The SWFTD initially includes 1,827 investments[4] in 1,194 listed firms between 1996 and 2010, the period under cover in this study. After controlling for duplicated observations, firms with duplicated names and firms that, while stated as listed, are not identifiable in Datastream, a list of 772 firms is left. Of these, 676 have been invested before March 2010, the last date considered for the analysis of equity returns (1,043 events). The number of SWFs investments in a single firm can be as low as 1 and as high as 14. As a result of the recent surge in SWFs activity, the period 2008-2009 alone includes more than the 70% of the events. Among with the date of the event, the firm interested and the SWF performing the investment, the SWFTD reports some other statistics such as the share acquired, whether the operation is open market or a private deal, and the countervalue of the transactions. However, some of these information are missing for a significant part of the observations, thus limiting their potential use in all the analyses. For example, in 24.16% of the cases nor the share acquired nor the share owned after the transaction either are known. Looking at descriptive statistics in Table 3.1 , and confronting our data with those used in other studies (see, for example, Bortolotti et al., 2010) , the main difference to be underlined is that in the SWFTD the bulk of transactions are open market. As for the rest, the SWFTD confirm some factual evidence already shown in previous studies: SWFs operates mainly abroad (ownership in GOEs is usually the result of transfers from the Government rather than direct investments) and generally acquire minority stakes: considering only investments for which the acquired stake is known, less than 4% of the times SWFs own a majority stake, and only in c.a. 22% of the cases the Fund can be considered a relevant blockholder (i.e. the share is higher than 5%).

[3]As shown in the next sections, it is possible to use these data to replicate many of the results from previous studies, confirming that the use of SWFTD instead of other dataset does not bring any systematical bias.

[4]Excluding investments made by Funds such as Dubai World or the French Strategic Investment Funds, which are included in the SWTD but are not SWFs according to the definition here used.

Table 3.1: SWFTD descriptive statistics

Descriptive statistics for the information available on the SWFTD. N represents the number of observations; Share is the percentage of the observations over the total number.

	N	Share
Private Deal vs Open Market		
Private	169	16.20%
Open Market	874	83.80%
Crossboarder vs Domestic		
Crossboarder	885	84.85%
Domestic	158	15.15%
Share Acquired		
Share is known	791	75.84%
Share < 5%	616	77.88%
Share > 5%	175	22.12%
Share > 50%	30	3.79%

The most active SWF in the period considered is the Government of Singapore Investment Corporation (GIC), who performed 227 acquisitions (21.76% of the sample); the cumulated countervalue of these deals[5] is around USD 27.78 billions, or around 10% of its total estimated wealth under management at the end of 2010. Jointly with Temasek Holdings, they represent the 28.19% of the dataset, making Singapore the most represented investor country. Among oil-based SWFs, the most active in performing direct investments are the Kuwait Investment Authority (KIA) and the Abu Dhabi Investment Authority (ADIA), with respectively 147 and 109 transactions. Among the less active SWFs are some of the smallest ones, such as Mubadala (5 transactions, USD 13.3 billions size). It is worth noticing, however, that SWFs activism data could be misinterpreted due to the lack of transparency of some Funds. For example, there are only 4 investments in the SWFTD performed by the Libyan Investment Authority (LIA) , but information included in a "leaked" report dated June 2010 (LIA, 2010) shows evidence of at least 27 firms in which LIA owned a direct stake.

The high level of transparency heterogeneity can be noticed looking at the data coverage for transactions amount presented in Table 3.2, which varies from 50 to 100%.

The main hosting country of SWFs investments is the United Kingdom, with the 45.35% of the transactions and the 26.33% of the total amount. This is partially in contrast with what is observed in dataset used in other studies, where the United States resulted as the preferred market for SWFs. One possible explanation is that many firms originally not from the UK are classified as such as they are listed there, while for the US market the original country classification is used. Nonetheless,

[5]The information is available for the 97.36% of the observations

Table 3.2: Main Sovereign Wealth Funds Included in the SWFTD

This table presents some statistics for the Sovereign Wealth Funds Included in the SWFTD. Obs. is the number of registered investments in listed equity firms; % Obs. is the percentage of the whole number of Observations included in the dataset. Value is the cumulated amount (in USD billions) invested in recorded transactions; Value Coverage is the percentage of transactions for which the amount invested is known.

Fund	Country	Obs.	% Obs.	Value	Value coverage
GIC	Singapore	227	21.76	27.78	97.36
KIA	Kuwait	147	14.09	21.34	99.32
ADIA	UAE	109	10.45	14.83	96.33
KIC	S. Korea	98	9.40	2.62	100
GPF	Norway	92	8.82	15.10	100
CIC	China	67	6.42	7.02	98.51
Temasek Hold.	Singapore	67	6.42	17.27	85.07
SAFE	China	52	4.99	8.82	100
Khazanah Ns.	Malaysia	21	2.01	4.99	80.95
QIA	Qatar	16	1.53	27.84	62.50
SAMA	Saudi Arabia	14	1.34	1.30	100
IPIC	UAE	7	0.62	9.63	100
BIA	Brunei	5	0.48	0.15	100
Mubadala	UAE	5	0.48	1.82	80
LIA	Libya	4	0.38	2.54	75
Future Fund	Australia	2	0.19	7.58	50

US listed firms constitute the 16.68% of transactions and account for the 16.73% of the total amount, thus confirming the importance of this market for SWFs. Due to the significant amount of domestic investments, representing c.a. the 14% of all recorded deals, the Chinese, Malaysian and Singaporean markets are respectively the third, fourth and fifth in terms of number of transactions.

The number of usable observations in SWFTD strongly varies across analyses. Usable observations are in fact further reduced when considering investments on a yearly rather than daily basis, as it is the case for the target selection study presented in the next section. There are in fact 54 cases of subsequent investments in the same year performed by the same SWF (in 43 cases also through the same vehicle). 159 are the investments performed by an other SWF in the same year. There are thus 807 unique firm-year observations (686 firms); in 694 cases (629 firms) there is only one SWF investing in the considered firm in the calendar year considered; in 78 cases (68) two SWFs invest in the firm; in 27 (23) and 9 (8) cases the number of SWFs investing in the firm in the same year is 3 and 4 respectively. Finally, 58 firms stated as listed in the SWFTD are not in Worldscope, reducing the number of potentially usable observations to 749 (628 firms).

3.3.2 Firms characteristics

The main source of firms characteristics is the Worldscope database, including more than sixty thousands (mainly) listed firms around the globe. The main characteristics considered for the analyses included in this chapter are the firm's Market Capitalization in USD millions ($Market\ Cap$) to account for the firm's size; the rate of sales growth, measured as the percentage yearly variation of firm's Net Sales (SG); the ratio of the Net Income over the Firm's Total Assets (ROA) to account for the firm's health in terms of operative performances; the ratio of Intangible over Total Asset ($INTA$), as the assets tangibility is considered a proxy for firms costs in case of distress and consequently a determinant of financial constraints (e.g. Rajan and Zingales, 1995). The ratio of Cash and Cash Equivalents over Total Assets ($CHTA$) is used to proxy for firms potential financial constraints. Different proxies for firms leverage are also proposed: following Kotter and Lel (2011), the first one is the ratio between the Firm Total Debt (i.e. Short and Long term Debt) and its Market Capitalization ($Leverage_{KL}$); the ratio of Total Debt over the Total Enterprise Value, computed as Market Capitalization plus Total Debt Book Value ($Leverage_{Debt}$), which is the most traditionally used leverage measure (e.g. Rajan and Zingales (1995), Fama and French (2002) and Faulkender and Petersen (2006) among others); following Welch (2011), I also consider a proxy which takes into account more properly non-financial liabilities by substituting the Firm's total Liabilities to its Total Debt ($Leverage_{Liabilities}$). Finally, I use the Firm's Interest Coverage Ratio, compute as the ratio of Ebitda over Interest Expenses (IC); some authors have argued that IC could be a better suited proxy for Leverage for fast growing companies, as the market value of its assets has a strong growth component (Berens and Cuny, 1995). Moreover, IC concurs with $INTA$ and $CHTA$ to account for firms financial constraints and need for liquidity (e.g. Lamont et al., 2001; Whited and Wu, 2006). All ratios are computed using values in local currencies, in order to avoid time variations to be influenced by exchange rates fluctuations.

Before using the Worldscope database, I perform a screening process to insure data reliability, in the spirit of Faccio et al. (2001). In the period under analysis (1995-2010) there are initially 67,523 firms, corresponding to 1,044,890 yearly observations. First of all, duplicated observations are eliminated or merged in case they identify the same firm in non overlapping periods; duplicates firm include both purely duplicated as well as firms listed in more than one market and ADRs. Then, observations where either the name, the country or the sector (identified by the SIC code) of the firm or the year of the single observation is missing. After these controls, there are 62,648 firms (1,002,368 observations) left. Finally, some controls on data reliability are performed: all observations where a) Liabilities are negative, b) Total Debt is negative, c) Interest Expenses are negative and d) the difference between Total Asset and the sum of Equity and Liabilities Book Values is higher than 5% are treated as missing. After those checks, there are 462,246 observations on 60,731 firms left, of which 395,715 in the period 1995-2009[6]. Table 3.3 reports descriptive statistics for the aforementioned variables, which have all been winsorized at 1% and 99% thresholds in order to further reduce outliers and scarcely reliable data caveats.

Table 3.3: Worldscope descriptive statistics

This table presents descriptive statistics for the Worldscope database in the period 1995-2009.

Variable	N	Mean	St.Dev	Min	Median	Max
$Target_{dummy}$	395,715	0	0.05	0	0	1
$Event_{dummy}$	395,715	0	0.04	0	0	1
$Market\,Cap$	346,279	2.14	87.16	0	0.08	26,730.71
$Leverage_{1iabilities}$	346,278	0.43	0.29	0	0.41	0.97
$Leverage_{KL}$	336,997	0.97	2.29	0	0.25	16.58
$Leverage_{debt}$	336,997	0.27	0.27	0	0.2	1
$CHTA$	361,418	0.18	0.22	0	0.1	0.98
ROA	390,049	-0.11	0.64	-5.07	0.02	0.35
$INTA$	352,283	0.07	0.15	0	0.01	0.73
SG	313,586	0.26	0.94	-0.99	0.08	7.08
IC	340,546	60.32	260.91	0	5.22	2,169

The Table also report two dummy variables identifying SWFs portfolio firms, obtained after merging the Worldscope dataset with the SWFTD dataset. In particular, $Target_{dummy}$ equals 1 for all SWFs portfolio companies (i.e. from the year of the first SWF investment onwards) and 0 otherwise; $Event_{dummy}$ equals 1 only for those firm-year observations characterized by a SWF investment.

Firms equity price series come from Datastream; following Bortolotti et al. (2010) and Dewenter et al. (2010), I also use different proxies for the market return for different hosting countries. Whenever possible the index used is the main Equity index of the local main exchange; for countries without a reference index accessible via Datastream, I either used the index of the closest market in geographical and/or political terms (e.g. the Greek Athex Composite for Cyprus) or, when no close substitute was available, the S&P 500 Composite. In Table 3.4 are reported all the indexes used to proxy the market portfolio return.

3.4 Event study on Equity returns

This section is devoted to the analysis of market reaction surrounding SWFs investments. As stated in section 3.1 and section 3.2, all previous studies on SWFs investments have found statistically significant abnormal positive returns surrounding the events; since they all used hand-collected, proprietary databases (thus not

[6]Using Worldscope data up to 2009 allows to use the 1 year lag for the study of 1996-2010 SWFs activity

Table 3.4: Market portfolio proxies

Country	Index	Country	Index
Australia	ASX	Liberia	DJTM SOUTH AFRICA
Austria	ATX	Luxembourg	LUXEMBOURG SE
Bermuda	S&P 500	Malaysia	DJTM MALAYSIA
Brazil	BRAZIL BOVESPA	Mexico	S&P 500
Canada	S&P/TSX 60	Netherlands	AEX Index
Cayman Isl.	S&P 500	New Zealand	DJTM NZ
China	SHANGAI SE (A Share)	Norway	DJTM Norway
Colombia	COLOMBIA IGCB	Oman	S&P/IFCG M UAE
Cyprus	ATHEX	Papua New Guinea	DJTM NZ
Egypt	FTSE W EGYPT	Qatar	MSCI Qatar
France	SBF 120	Russia	FTSE W RUSSIA
Germany	DAX 30	Singapore	DJTM Singapore
Greece	ATHEX	South Africa	DJTM South Africa
Hong Kong	HANG SENG	South Korea	DJTM South Korea
India	INDIA BSE 100	Spain	MADRID SE
Indonesia	JAKARTA SE	Sweden	OMXS30
Ireland	ISEQ	Switzerland	SWISS MARKET DS
Isle of Man	FTSE 100	Taiwan	DJTM TAIWAN
Italy	S&P MIB	Thailand	BANGKOK SET
Japan	NIKKEI 125	UAE	S&P/IFCG D UAE
Jersey	FTSE 100	UK	FTSE 100
Jordan	AMMAN SE	USA	S&P 500
Kuwait	KUWAIT KIC	Vietnam	FTSE Vietnam AS

exactly replicable), it is important to verify whether using a commercial standard dataset brings to similar results.

Returns $r_{i,t}$ in day t for the share interested by the Event i are defined as the natural logarithm of the price ratio (cfr. Equation 3.1).

$$r_{i.t} = \ln(P_{t,i}) - \ln(P_{t-1,i}) \tag{3.1}$$

The Event Study is performed using a standard approach in the literature: for each event, I define a window preceding the event (*estimation window*) where I estimate the coefficient of a market model used to predict the Expected Return $E(r_{i,t})$ of the shares of the firm interested by the Event i in day t. As expressed in Equation 3.2, the market model used is the CAPM (Sharpe, 1964); however, following Bortolotti et al. (2010), I proxy the market portfolio returns using a different index for each market to account for not perfectly integrated global markets. The list of indexes used for each market can be found in Table 3.4.

$$E(r_{i,t}) = \hat{\alpha}_i + \hat{\beta}_i r^M_{i,t} \tag{3.2}$$

The difference between the realized return and the return predicted by the model for each day t for each Event i is the Abnormal Return ($AR_{t,i}$). I then define an out-of-sample *Event window* of trading days surrounding the Event i (E_i). The unweighted sum of $AR_{t,i}$ for each $t \in E_i$ are the Cumulated Abnormal Returns (CAR_i) associated with Event i (see Equation 3.3).

$$CAR_i = \Sigma AR_i \tag{3.3}$$

The significance of CAR is than tested using different definitions for the time windows of interest to check for the robustness of the results.

Table 3.5: Event Study on Market Returns

In this table are reported the results for the Event Study on market share returns around SWFs investments. In rows are reported the different estimation windows used; columns identify the event windows. CAR is the mean cumulated abnormal return in percentage points in the event window considered; N is the number of usable observations; t-statistics are reported in round brackets. *,** and *** denote 10%, 5% and 1% levels of significance respectively.

		[-5;+1]		[-5;+5]		[-1;+1]		[-3;+1]	
[-360;-14]	*CAR*	0.480	**	0.598	**	0.285	*	0.422	**
		(2.05)		(2.05)		(1.64)		(2.02)	
	N	580		581		571		576	
[-240;-14]	*CAR*	0.530	**	0.675	**	0.324	*	0.457	**
		(2.24)		(2.29)		(1.86)		(2.18)	
	N	579		579		571		576	
[-120;-14]	*CAR*	0.478	*	0.596	**	0.284	*	0.446	**
		(1.96)		(1.99)		(1.65)		(2.07)	
	N	578		580		571		576	

In Table 3.5 are reported the results of the Event study for the whole usable sample of investments. The average mean CAR ranges between 0.32% and 0.598% depending on the estimation and event windows considered. These values are coherent with those verified by existing literature, and are always statistically significant at least at 10% confidence levels. It is thus verified that investments in listed companies included in the SWFTD are characterized by significant abnormal positive short-term returns surrounding the event.

3.5 SWF target selection

The study presented in chapter 2 was devoted to assess the Strategic Asset Allocation of SWFs in terms of asset classes; in this section, I take a complementary perspective and investigate which are the drivers of SWFs target choices for direct investments at a micro level. To the best of my knowledge, the paper by Kotter and Lel (2011) is so far the only one studying the relationship between the likelihood of a SWF investment in a certain firm and the characteristics of the latter. Following them, I proxy the SWFs investable universe using the Worldscope database.

The first analyses, reported in Table 3.6, aim at replicating Kotter and Lel (2011) results to verify the coherence of the SWFTD database with the proprietary dataset used in their work. In Column (1) are the original results of Kotter and Lel basic model, as reported in their paper. Column (2) replicates the same analysis using the SWFTD transactions during the period 1996-2010. Estimation results on my sample are highly coherent with theirs, in terms of coefficients sign, magnitude and significance. In particular, it is confirmed that SWFs tend to target bigger, more levered firms and apparently experiencing worse operative performances than comparables. However, their model specification presents two caveats; the first is the unconventional measure they use to define firms leverage. In model (3) I use a more traditionally accepted definition of leverage ($Leverage_{Debt}$) which has been largely used in studies on firms capital structure (e.g. Rajan and Zingales (1995), Fama and French (2002) and Faulkender and Petersen (2006) among others). Results on the impact of Leverage and Firm's dimension on the likelihood of being invested by a SWF is largely unaffected, but the asset liquidity and tangibility is no longer significant. An other aspect to be noticed is that ROA coefficient Z statistic, while still well above the customary levels for significance, is strongly reduced (from -4.33 to -2.63). In model (4), following Welch (2011), I use a definition for leverage which includes non-financial liabilities; again, only results on firms dimension and capital structure are confirmed both in sign ans significance, while the Z-stat for ROA is further reduced.

A second, and more serious caveat of Kotter and Lel specification is the dependent variable they use; $Target_{dummy}$ in fact results in models estimations capturing *both* the impact of firms characteristics on SWFs target selection *and* the evolution of SWFs portfolio companies characteristics after the investment[7]. Thus, in order to isolate SWFs target selection from the evolution experienced by these firms, I estimate new logistic models, using $Event_{dummy}$ as the dependent variable. The most relevant difference when using this dependent variable is that, as models in Columns (5) and (6) show, firms invested by SWFs seems to exhibit *better* operative performances than non-invested firms the year before the event, as indicated by ROA

[7]Kotter and Lel (2011) specification is conceptually valid if the SWF allocation decision is considered as "renewed" year by year (i.e. to not divest is like to actively decide to keep the firm in the portfolio). However, in this way they neglect the strong long-terminism exhibit by SWFs which makes divestments relatively unlikely.

Table 3.6: SWFs Target selection

In this table are reported the results of the SWFs target selection done using a multivariate logit model. Models (1) - (4) use Kotter and Lel dependent variable $Target_{dummy}$, which equals 1 from the year a firm receive an investment by a SWF on. Models (5) and (6) use $Event_{dummy}$, which equals 1 only for firm-year characterized by a SWF investment. $Leverage_{KL}$is the ratio between the book value of total debt and the market capitalization of the firm. ROA is the Net Income over Total Assets. $LNMC$ is the natural logarithm of $Market\ Cap$; $CHTA$ is Cash and Cash equivalent on the book value of Total Assets. SG is the yearly percentage variation of Total Revenues. $INTA$ is the ratio of Intangible Assets on Total Assets. $Leverage_{liabilities}$ is the ratio of Total liabilities (both financial and non financial) over the sum of $Market\ Cap$ and Total Liabilities, while $Leverage_{debt}$ use Total Debt instead of Total Liabilities. $LNIC$ is the natural logarithm of the Interest Coverage ratio.All continuous variables are winsored at 1% and 99% and lagged one year. Model (1) reports the results of the basic model of Kotter and Lel (2011) as reported by the two authors in their paper. Model (2) provide the results of the same estimation performed using my database. Model (3) and (4) are estimated using alternative definition of Leverage. Z statistics, computed using robust standard errors clustered by firm, are reported in parenthesis. *, ** and *** identify a 10%, 5% and 1% significance level respectively.

	$Target_{dummy}$								$Event_{dummy}$			
	(1)		(2)		(3)		(4)		(5)		(6)	
ROA	-1.344	***	-0.497	***	-0.411	***	-0.373	**	1.116	*	2.396	***
	(-8.87)		(-4.33)		(-2.63)		(-2.04)		(1.89)		(2.89)	
$LNMC$	0.812	***	0.897	***	0.923	***	0.936	***	0.886	***	0.895	***
	(16.55)		(17.25)		(17.14)		(17.35)		(27.65)		(26.83)	
$Leverage_{KL}$	0.040	***	0.135	***	-		-		-		-	
	(4.20)		(5.04)									
$CHTA$	-1.604	**	-0.702	*	0.060		0.250		0.486		0.495	
	(-2.33)		(-1.65)		(0.14)		(0.59)		(1.24)		(1.21)	
SG	-0.049		-0.167		-0.166		-0.145		-0.068		-0.159	*
	(-0.88)		(-1.6)		(-1.53)		(-1.42)		(-0.78)		(-1.91)	
$INTA$	-1.066	*	0.228		0.194		0.252		0.903	***	0.761	**
	(-1.70)		(0.51)		(0.42)		(0.54)		(2.76)		(2.24)	
$Leverage_{Debt}$	-		-		2.027	***	-		-		-	
					(6.15)							
$Leverage_{Liabilities}$	-		-		-		2.326	***	1.616	***	1.359	***
							(7.23)		(5.49)		(4.28)	
$LNIC$	-		-		-		-		-		-0.168	***
											(-2.97)	
Region fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Sector fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Year fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
N	406,880		203,619		203,619		207,807		223,512		203,072	
R2	0.379		0.4079		0.4137		0.4167		0.3888		0.391	

having a significantly positive coefficient. Also, firms targeted by SWFs are characterized by an higher level of Intangible Assets and by a lower Interest Coverage Ratio. All in all, the results of models (1) - (6) shows two things: first of all, coherently with Kotter and Lel results, SWFs direct investments target especially bigger and more levered firms. In my analyses I check how their results are influenced by the use of a non conventional definition of leverage and of a not perfectly appropriate dependent variable on their results. While the definition of leverage used does not appear to strongly influence the results, the change in the dependent variable drives to some conclusions which are quite in contrast with theirs. First of all, firms invested by SWFs do not have worse operative performance than others; while they do appear to have a slower growth in terms of net revenues, their Return on Assets appear to be significantly better, ceteris paribus, than non targeted firms. Second, coefficients associated with Interest Coverage and Intangible assets become strongly coherent with those estimated for the firms capital structure, giving further evidence that SWFs target particularly firms more likely to be financially constrained and thus, *ceteris paribus,* can have more short-term credit problems. Interestingly, descriptive statistics on firms targeted by SFWs provided by Bortolotti et al. (2010) show some similar features: doing a Wilcoxon sign rank test, they find that firms interested by SWFs investments are not only bigger and more levered, but also exhibit significantly higher operative performances and a lower quick ratio than their industry median firm. My analyses prove this tendency is confirmed even when controlling simultaneously for several factors using a multivariate model.

It is worth stressing that the different results obtained on ROA coefficients changing the dependent variables are consistent with SWFs portfolio firms experiencing worse operative performances *after* being targeted. While previous literature results are controversial with this respect, as illustrated in section 3.2, this is not the first piece of empirical evidence suggesting that SWFs portfolio firms might underperform similar peers with this respect.

3.6 Concluding remarks

The research conducted on SWFs from a Corporate Finance perspective so far has mainly focused on the impact of this Funds on firms financial performances and on their target selections. The analyses presented in this Chapter are devoted to either confirm or cast in doubt some of their results. First of all, the empirical evidence on short-term market returns is no different from what it has been verified in other studies: firms targeted by SWFs experience statistically significant short-term Cumulated Abnormal Returns in the aftermath of investments announcement; the order of magnitude of average CARs is around 0.5%, a piece of empirical evidence both economically significant and in line with previous results.

The study of SWFs target selection results to be more problematic. Kotter and Lel (2011) use a model specification likely to capture not only the determinants of the interest of SWFs for a particular firm, but also how these firm-specific characteristics evolve in time after being invested by these Funds. I try to both replicate and cast in doubt their results and I find further evidence of Sovereign Wealth Funds appetite for bigger and more levered firms; estimated coefficients for other proxies of firms financial constraints and cost of distress, such as their asset intangibility and interest coverage, also confirm that targeted firms are those more likely to face financial problems. However, changing the model specification completely change the results for operative performances; targeted firms seems to exhibit better, not worse, operative performances prior to acquisition respectively to otherwise comparable peers, even though their sales growth appears to be slower. It is worth noticing that firms characterized by an higher level of leverage, and more generally by an higher level of financial constraints and risk of default measured in several ways, are also those found by Kotter and Lel to experience higher short-term CARs when invested by SWFs. The two main theoretical frameworks used in previous literature to justify a potentially positive (or negative) impact on targeted firms, i.e. agency theory and a networking theory, don't seem appropriate to explain why firms more likely to face financial problems are those more likely targeted by SWFs and experiencing higher abnormal returns when receiving an investment by SWFs. In the next chapter, I present an alternative theoretical framework better suited to explain this piece of empirical evidence, and propose and implement a better empirical strategy to test its validity.

4 SWFs Investments and Credit Risk

4.1 Introduction

While most of SWF assets are invested through external investment managers or in index-replication strategies[1], as seen in the previous chapter part of the investments are carried out directly by SWFs in high-profile deals. Analyses on target selection have shown that SWFs seems to have a particular appetite for big firms characterized by an high leverage and potentially exposed to capital shortage and high cost of distress issues. This statistical evidence is highly coherent with factual evidence: in several cases direct SWF investments seem to have been targeting financially troubled companies. Possibly, the most well-known example is the $69 billion injection made, during the most turbulent phase of the financial crisis, by some SWFs into US and European banks.[2] These investments alleviated market concerns about the stability of these companies but, at the same time, fueled a vast debate about the potential political interference by foreign governments in the western financial system (Gieve, 2008; Keller, 2008; Martin, 2008). There are, however, several other examples of active interventions of SWFs in troubled companies. In August 2009, CIC (the Chinese SWF) and QIA (the Qatari SWF) underwrote, together with other investors (namely Morgan Stanley and Simon Glick), a $1.3 billion equity issue in Songbird Estates (a real estate owning the majority of London's Canary Wharf), which would have otherwise been unable to pay back a Citigroup loan.[3] In the same period, QIA was also involved in a $10 billion transaction to refinance Porsche after the failed attempt to take over Volkswagen.[4] A few months later, CIC conducted a nifty deal buying $900 million in Apax unfunded commitments.[5]

The rationale for these investments may be found in the peculiar characteristics of SWFs. SWFs are typically characterized by the lack of explicit liabilities, especially in the short term. This favors the pursuit of long-term investment strategies (Beck and Fidora, 2008). SWFs are also often shielded from sudden withdrawals from their own government. Moreover, as a result of government transfers of funds, SWFs often

[1] ADIA, the largest SWF, has about 80% of its assets managed by external investors, and about 60% invested in index replication strategies (ADIA, 2010)
[2] "The invasion of the sovereign-wealth funds". *The Economist.* January 17, 2008
[3] "China aids Canary Wharf owner". *The Financial Times.* August 31, 2009.
[4] "My other car firm's a Porsche". *The Economist.* August, 20 2009.
[5] "Apax 'coup' sees CIC invest €685m". *The Financial Times.* February 3, 2010.

have fresh liquidity to invest.[6] These features put SWFs to a relative advantage in pursuing investments which yield returns in the long term and require substantial cash outlays in the short run (Kotter and Lel, 2011). More generally, Ang et al. (2009) claim that SWF characteristics suggest that they should get exposure to risk factors such as liquidity risk, which earn risk premiums over the long-run. At a more anecdotal level, this strategy is very effectively illustrated by Dr. Hussain Al-Abdulla (a QIA Executive Board Member) to the US Ambassador Joseph E. LeBaron in an alleged conversation reported in a Wiki-leaked cable:

> "In 2010 the QIA will also focus on business acquisition. It will seek to acquire businesses with good management and good products, but which have cash flow problems. "We are not interested in distressed assets or distressed debt. We are interested in distressed sellers", Al-Abdulla said".[7]

As shown in section 3.2, so far the literature has mainly focused on the impact of SWF investments from the perspective of shareholders, looking at stock abnormal returns (Bortolotti et al., 2010; Kotter and Lel, 2011; Dewenter et al., 2010), firm value (Dewenter et al., 2010; Fernandes, 2009; Sojli and Tham, 2010), accounting performance (Bortolotti et al., 2010), and degree of internationalization (Sojli and Tham, 2010). In this chapter I take a complementary perspective: I analyze the impact of SWF investments on the credit risk of target companies. I argue that SWFs could reduce firm's credit risk by implicitly guarantying its viability. This certification effect relates to SWFs idiosyncratic characteristics. With respect to other investors, SWFs have superior financial capacity and potential incentives to support financially distressed companies.

I measure credit risk by looking at target firm's Credit Default Swap (CDS) spread, and I use event study analysis to evaluate its evolution in the aftermath of a SWF investment. Using the SWF Transaction Database (SWFTD), I build a sample of 371 direct SWF investments for which essential information is available. For each investment event I build an adjusted measure of CDS spread decrease (ADS) using different event windows and CDS maturities. The decrease in target company's CDS spread is adjusted by comparing it against a matched sample of companies with similar pre-investment CDS spread. My findings point out that after a SWF investment target company's credit risk decreases significantly; this result is confirmed when only secondary deals are considered (i.e. no fresh capital is injected in the firm). This supports the idea that the effect on credit risk is not only the mere reflection of an increase in financial resources but is due to a certification effect. Interestingly, ADS is higher for companies which have a higher pre-investment credit risk.

[6] At the end of 2008, for instance, 87.4% of CIC's global portfolio (which accounted for slightly more than half the $200 billion endowment of the fund) was invested in cash funds (CIC, 2009).

[7] The cable may be found at `http://www.wikileaks.org/cable/2009/11/09DOHA691.html`. See also: Ashby Monk's post: "Qatar Investment Authority Wikileaked" on July 12, 2011, available at this link: `http://wp.me/ppGNt-2tW`.

Moreover, I identify some SWF, firm and deal characteristics that are likely to influence the magnitude of the expected credit risk reduction. Some interesting results emerge from the multivariate analysis. Most significant decreases in CDS spread are associated with large SWFs targeting smaller companies, especially those which exhibit immediate liquidity problems ("distressed sellers") but not structural problems ("distressed assets"). A higher ADS is found when the SWF is protected from discretionary withdrawals from the Government and when it is given an explicit mandate to pursue direct investments. All these results are consistent with the hypothesis that SWFs benefit portfolio companies by providing a certification to their creditors. In turns, the certification hypothesis provide a rational underpinning for the SWFs appetite for financially distressed firms addressed in section 3.5.

The rest of this chapter is organized as follows: in section 4.2 I discuss a new theoretical framework to justify the empirical evidence presented so far. In section 4.3 I discuss the research methodology and sample used for the study on credit risk. Results are reported in section 4.4. Finally, in section 4.5 I draw my concluding remarks.

4.2 The SWF certification hypothesis

While the analysis persented in the previous chapter shows that SWF seem to have a particular appetite for companies more at risk of financial distress, the literature surveyed in section 3.2 is of little help to understand when and how SWFs could provide a benefit for firm's creditors. As I mentioned in section 4.1, there are a few well-known cases of SWFs bailing out distressed companies in the past few years. In these cases SWFs have clearly played a stabilization role by injecting financial resources in troubled companies. Their impact can however be more subtle and extend well beyond the short-term. I provide here two anecdotal examples. In February 2009 Unicredit, one of the largest Italian banks, approved a $4 billion convertible bond issue to re-establish its core tier ratios. Cariverona, one of the largest shareholders in Unicredit, declared to be unable to underwrite pro-rata the issue. Libya's Central Bank, which owned a 4.6% stake in Unicredit, then agreed to compensate by buying as much as 25% of the issue.[8] In January 2010 the Libyan government subscribed pro-rata a $5.7 billion equity issue and increased its stake with open market operations, becoming the largest shareholder in the bank. Thanks to the support from the Libyan Government, Unicredit was able to waive Italian State aid.[9] A similar case occurred between QIA and Credit Suisse. In February 2008 QIA acquired a 2% stake in Credit Suisse through an open market transaction.[10] A few months later, Credit Suisse avoided state aids by raising $8.75 billion of new

[8] "Libya sets sights on majority stake in UniCredit". *The Financial Times.* February 10, 2009.
[9] "Unicredit to raise $5.7bn with rights issue". *The Financial Times.* January 7, 2010.
[10] "Qatar fund buys Credit Suisse stake". *The Financial Times.* February 18, 2008

capital, the bulk of which was subscribed by QIA itself.[11]

In both cases SWFs, which were already shareholders of the company, provided "bridge financing" to face a liquidity shock. To the extent to which this behavior is perceived as sustainable or systematic, we should expect that SWFs provide a "certification effect" on the outstanding debt of their portfolio companies. More generally, Kotter and Lel (2011) argue that: "SWFs can benefit the firm by certifying its long-term economic viability through capital injections in times of elevated uncertainty". Consistently with this argument, they find that SWFs tend to invest in large, highly levered, companies.[12] By investing in firms which are closer to financial distress, SWFs exploit their comparative advantage and may gain extra returns from liquidity risk (Ang et al., 2009). Sudarsanam et al. (2011) make a similar argument for private equity, and find that the level of distress is positively correlated to short-term abnormal returns after private equity investments.

The certification argument has already been indirectly investigated in few recent studies on firms owned by their domestic governments. Iannotta et al. (2009) find that government-owned banks have higher issuer ratings than private ones. Borisova and Megginson (2011), studying partial privatizations, show that the higher the stake maintained in the firm by the State, the lower its cost of debt. Understanding the extent to which this phenomenon is also determined by SWFs is an interesting and non trivial research question.

It is worth pointing out that credit risk reduction is not a common feature among institutional investors. Cremers et al. (2007) find that institutional blockholders are associated with higher bond yields, especially when the firm is exposed to takeovers. Klein and Zur (2011) observe that hedge funds have a positive impact on stock returns, but that this comes to the expense of creditors, who experience instead negative abnormal returns. Institutional blockholders are thus more likely to exacerbate credit risk, due to risk-shifting, rather than to provide a certification effect. An implicit guarantee of firms viability by its shareholders is, instead, largely accepted in the literature on parent-subsidiary relationships (i.e. when the relevant blockholder is an other firm). Gopalan et al. (2007), studying Indian groups, show that firms are willing to financially support affiliates in order to avoid their defaults; Cremers et al. (2012) find similar results studying a banking group. Boot et al. (1993) document and provide a theoretical justification for the common practice of non-binding guarantee contracts between affiliates when the parent company is not legally hold responsible for the subsidiary liabilities.

The relevance of firms linkage on credit risk goes thus beyond the existence of

[11] "No thanks, we'll raise £5bn and go it alone, says Credit Suisse". *The Evening Standard.* October 16, 2008

[12] Bortolotti et al. (2010) suggest that evidence indicating that SWFs invest in more distressed firms could be due, instead, to a different selection mechanism: when investing in troubled firms, SWFs find weaker political contention. Investments in distressed companies would then be the result of a strategic disadvantage (the liability of foreignness) rather than of a strategic advantage (the absence of short-termism).

covenants or legally binding guarantees. In the S&P Corporate Rating Criteria guideline, Samson (2006, p. 85) notes that:

> "Economic incentive is the most important factor on which to base judgments about the degree of linkage that exists between a parent and subsidiary. This matters more than covenants, support agreements, management assertions, or legal opinions".

The incentive and financial possibility of SWFs to provide financial resources to troubled portfolio companies could then matter more than any explicit contract or covenant.

Firms linkages play such a relevant role in determining credit risk that the parent company's rating often represents a factor included in the estimation of subsidiary's credit risk. Among the elements influencing the strength of the linkage - and thus the likelihood of the parent firm supporting the subsidiary in case of need - S&P highlight: (a) the track record of parent company in similar circumstances; (b) the financial capacity for providing support; (c) the strategic importance of the venture; and (d) the nature of potential risk (Samson, 2006). SWFs rank pretty high in most of these dimensions. As already noted, SWFs have set their track record by showing a considerable propensity to contribute to distressed firms bail-outs. They also have a remarkable financial capacity: SWFs are larger than most private investors and often have substantial liquidity to invest and a long time-horizon.

Not all SWFs are however the same with this respect, as already introduced in chapter 1. First, SWFs vary substantially in size. The largest SWF in our sample (ADIA) is almost 50 times larger than the smallest (Mubadala). Other things being equal, larger funds should be able to face larger liquidity calls from portfolio companies: the larger the fund, the smaller the loss of diversification and the need of portfolio re-balancing after a new capital investment.

Second, SWFs exhibit different levels of protection from discretionary withdrawals from the Government. The Australian government has stipulated that "money may not be withdrawn from the Future Fund until 2020" (Future Fund, 2010). Article 9 of the Korean Investment Corporation Act, instead, allows the Steering Committee to increase or decrease discretionary the KIC capital (KIC, 2009). SWFs better shielded against the risk of Government withdrawals should be more able to support portfolio companies and maintain illiquid investments. Stronger certification should be associated to funds protected from discretionary Government withdrawals.

Third, while most SWFs are financed by pure equity, some of them are levered. Leverage clearly limits the certification potential of a SWF. Debt service constitutes a short-term liability, thus reducing the ability of the SWF to focus on long-term results and neglect short-term returns. Moreover, a SWF could decide to leverage to compensate the reluctance or the impossibility of the Government to provide it with additional funding. There is some factual evidence that this could actually be the case: Temasek Holdings, which started issuing bonds by mid-2005, is barred from receiving further transfers from the Government.[13] GIC, the other Singaporean SWF, has a preferential access to country's excess reserves and is thus not leveraged. Interestingly, Temasek sold its stake in Merrill Lynch/Bank of America after just one year, while GIC kept its stake in similarly struggling UBS.[14]

So far I have discussed the general propensity and capability of SWFs to support distressed firms; however, the strategic importance of the firm for the fund must also be considered. Bortolotti et al. (2010) underlines how SWFs could be reluctant to leave one of its portfolio firms going bankrupt, as this could entail a political cost for its Government. Taking a positive view, some Governments could use their SWFs to bail-out troubled western firms in order to achieve a "political goodwill" that the size of their economies would not otherwise allow (e.g. Drezner, 2008).[15] We could thus expect that, ceteris paribus, SWFs from smaller, non western countries should be more keen to support their portfolio firms, since their political return would be higher.

The strategic importance of an investment will also be, on average, higher for SWFs whose primary goal is to make direct and strategic investments, such as United Arab Emirates' IPIC (IPIC, 2009), than for SWFs which invest mainly in index replicating strategies, such as Norway's GPF (NBIM, 2010). I thus expect the certification effect to be stronger for investments made by SWFs whose mandate explicitly mentions direct and strategic investments.

The willingness and the ability to take risk of the SWF are also likely to influence its certification potential. Some SWFs are not totally separated from the Central Bank. This is the case for instance of SAMA (Saudi Arabia) and SAFE (China). In these cases the safety-first objectives of the Central Bank could be inherited by the SWF, and we could expect a higher risk aversion of the SWF, and thus a less pronounced certification effect. Moreover, SWF's ability to face a sudden call for liquidity could be hampered if it is due to a systemic, rather than idiosyncratic, shock. A systemic shock would affect all portfolio companies at the same time and increase the likelihood of a withdrawal from the Government. We should then expect a lower certification role for SWFs in periods of high market turbulence.

The source of risk is also particularly important. SWFs are of little help for firms with structural, medium-term issues ("distressed assets"). SWFs rarely engage existing management and, when this happens, there is no evidence of a positive effect on firm performance (Bortolotti et al., 2010; Dewenter et al., 2010). On the contrary, SWFs can provide a strong support to firms experiencing severe short-term capital shortage ("distressed sellers"). I thus expect that firms whose short-term credit risk is high (relative to medium-term credit risk) are those which could benefit more

[13] "Temasek says it is not a sovereign wealth fund". The Straits Times (Singapore), March 22, 2008.

[14] Temasek has not been totally neglected by the Government, and received a S$ 10 billions lump sum in 2007 to make up for its losses.

[15] See also: "Analysis - Qatar SWF's hefty appetite draws global players". *Reuters.* March 3, 2011.

from SWF's certification. Firms with a good short-term outlook but potentially struggling in the medium-term should instead benefit less from SWF investments.

Overall, I argue that *SWFs are expected to bring a significant reduction in the perceived credit risk of invested companies*. This effect will be stronger for: (a) financially more capable SWFs, measured by their size, protection from Government withdrawals, and the absence of leverage; (b) strategic investments, measured by active investment policy and small, non western country of origin; (c) idiosyncratic and contingent rather than systemic or structural sources of risk, captured by the low degree of market turbulence and the difference between short-term and medium-term credit risk.

4.3 Data and methodology

In this section I first describe my methodology to measure firm's credit risk and its changes after SWF investments (subsection 4.3.1). Then I describe the sample construction process and the variables included in my analysis (subsection 4.3.2). Finally, I provide relevant descriptive statistics (subsection 4.3.3).

4.3.1 Measuring credit risk

In order to measure credit risk I focus on CDS spreads. CDSs are derivative contracts in which a counterpart (the protection buyer) gets insured against a firm defaulting on its liabilities by paying a percentage over an underlying nominal notional (the spread) to a protection seller. Traditionally, the literature on credit risk premiums has focused on bond yields (e.g. Bhojraj and Sengupta, 2003; Klock et al., 2005; Cremers et al., 2007). As the CDS market develops and gains liquidity, CDSs are becoming increasingly popular to measure credit risk.

When using bond yields, strong assumptions on the benchmark interest curve are needed to extract the expected present value of default; CDS spreads, instead, are already a direct market measure of this value. CDS spreads are attractive because "no adjustment is required: they are already credit spreads" (Hull et al., 2004, p. 2792). Moreover, the CDS market has been found to lead the bond market (Blanco et al., 2005) and to be more responsive to changes in credit conditions (Zhu, 2006). In our context, this suggests that changes in market expectations can be more easily captured by looking at CDS spreads around an investment event than bond yields.

Using CDS spreads to gauge credit risk also requires some caution. First, as underlined by Hull and White (2001), the relationship between CDS spread and credit risk can be altered by counterpart risk. Second, the ability of CDSs to predict credit risk is hampered by the fact that CDSs may reflect premiums for liquidity risk (Düllmann and Sosinska, 2007). Incidentally, Longstaff et al. (2005) argue that

CDS spreads are less affected by liquidity premiums than corporate bond spreads, since swaps are not in fixed supply and can be easily offset by entering a reverse contract. Moreover, my research setting limits the extent to which liquidity and counterpart risk may affect the results. The dependent variable of my study is the *change* in CDS spread. This means that unless SWF investments systematically alter the magnitude of CDS liquidity and counterpart risk, changes in CDS premiums will give a consistent estimate of changes in credit conditions.

The main variable is the adjusted decrease in CDS spread (ADS) after the announcement of SWF investments. My methodology to compute ADS is broadly consistent with other event studies on CDS spreads (e.g. Hull et al., 2004; Norden and Weber, 2004). The most notable peculiarity of my measure is that I compare CDS spread over different time windows (estimation vs. event) rather than between two days (i.e. a day proceeding and a day following the investment event). This gives me some additional flexibility in analyzing changes in CDS spreads and their dynamics. On the one hand, CDSs are sometimes not liquid enough to reflect immediately changes in market expectations. As a consequence, spreads may take a few days to reach their post-investment equilibrium. On the other hand, information leakage could cause premiums to lead the actual event announcement. Accordingly, I borrow from the well-established literature of abnormal returns the idea of comparing changes in the dependent variable between an estimation window set to precede the investment event enough to be reasonably unperturbed by information leakage, and a set of event windows, some of which may actually span across the investment event itself. Notably, moving from a day-to-day to a window-to-window comparison allows me to avoid using interpolation to impute missing CDS premiums, which could rely on invalid smoothness assumptions given the nature of the phenomenon we are studying.

For each event j I obtain CDS bid-ask medium spreads from Credit Market Analysis (CMA) via Datastream, which provides data for every firm with at least one recorded CDS transaction collected from a consortium of sell and buy side institutions. I collect daily spreads on 1 year and 5 years maturity CDS, which are the most commonly used. Whenever possible I use senior CDS spread, and use subordinated CDS spread only when senior CDS is unavailable.

CMA reports a veracity score indicating the quality of the data: a veracity score of 1 indicates an actual transaction, a veracity score of 2 indicates a commitment to trade, a veracity score of 3 indicates that quote is indicative. Veracity scores of 4 or higher are associated with derived, theoretical spreads. Given the purpose of my analysis, and similarly to what done in other event studies on CDS spreads (e.g. Hull et al., 2004; Pop and Pop, 2009) I only consider data associated to a veracity score of 3 or lower.

I compute the average CDS spread in a pre-investment (estimation) window (CDS_j^{Pre}) set between 24 and 15 trading days before the investment announcement ($[-24, -15]$). I then compute the average CDS spread in an event window ranging between 5 trading days before and 4 trading days after the investment announcement ($[-5, +4]$). I exclude observations for which CDS spreads with a veracity of 3 or better are available for less than half the days in each window. To control for the stability of CDS spread reduction I also compute the post-investment CDS spread for three other non-overlapping event windows: $[+5, +14]$, $[+15, +24]$, and $[+25, +34]$. For the sake of notational simplicity I will indicate, in this section, the average post-investment CDS spread in the post-event window as CDS_j^{Post}, omitting the event window to which it refers to.

The unadjusted CDS decrease across the investment event is given by:

$$DS_j = \left(CDS_j^{Pre} - CDS_j^{Post}\right). \tag{4.1}$$

It should be noted that a positive value of DS_j indicates a *decrease* in CDS spread. While this notation is opposed to what is normally used, it makes the presentation of my results more straightforward. Since several investments in my sample occur in a period of significant economic and financial turbulence (2008-2009), it is important to adjust DS_j for aggregate movements in CDS spreads across the investment event. For each investment j, I build a CDS index which includes companies with comparable pre-investment financial status. As an indicator of financial status I use the level of CDS premium rather than credit rating, which is sometimes used (e.g. Hull et al., 2004). The reason why CDS premium is preferable to rating in this context is its better timeliness. Ratings not only have to be accurate, but stable as well. They have to reflect a judgment that may provide a counterpoint to volatile market-based assessments (Cantor and Mann, 2007). In facing this trade off between accuracy and stability, ratings may diverge from the market perception of firm's financial stability in any point in time and companies with very similar rating may have substantially different CDS premiums. This is particularly true when markets are extremely turbulent.[16]

I identify all companies in the CMA dataset having a CDS with the same maturity and same seniority as the one used to compute DS_j, and for which at least half days in the pre and post-event windows include non-missing spreads with veracity score of 3 or lower. I then select, within this sample, the 10 companies whose CDS spread in the pre-event windows is closest to (i.e. has minimum absolute deviation from) CDS_j^{PRE}. I compute the average CDS spread for the 10 companies in the pre-event window (I_j^{PRE}) and in the post-event window (I_j^{POST}).

The decrease in CDS spread for the index across the investment event will be given by:

$$IDS_j = \left(I_j^{Pre} - I_j^{Post}\right). \tag{4.2}$$

[16]For instance, looking at data on 1 year maturity CDS for US firms rated BBB by S&P on September 29, 2009, we see spreads roughly ranged between 14 to 944 bps; on the same day of 2006 , the wedge was almost one order of magnitude smaller (5-188bps).

Combining equations (Equation 4.1) and (Equation 4.2) I obtain the definition of the adjusted decrease in CDS spread for the j-th investment (ADS_j) :

$$ADS_j = DS_j - IDS_j. \tag{4.3}$$

ADS_j, defined in equation (Equation 4.3), measures the CDS spread decrease, adjusted for variations in CDS spreads for companies with similar credit risk in the same period, and is the dependent variable of this study.

4.3.2 Sample and sample construction

In Table 4.1 are reported the definitions and data sources for the dependent and independent variables included in this part of the work.

Again, the list of SWF investments used derives from the Sovereign Wealth Funds Transaction Database (SWFTD). The SWFTD, provided by the SWF Institute, is one of the most comprehensive commercial datasets on SWF investment activity, with 1,853 recorded transactions in listed equity and 22 in convertible securities between June 1984 and mid-December 2010.[17] For every recorded transaction the SWFTD reports the announcement and effective date and some characteristics of the deal. Since CMA data via Datastream are only available since January 2003, I only consider investments occurred after that date. This period includes the majority of recorded investments in listed equity and convertible securities (1,253 transactions, or 66.8% of all transactions in the SWFTD). From this initial sample I exclude 10 investments made by the FSI, the investment arm of the French government, which is not a SWF according to the definition proposed in chapter 1 .[18] I am then left with 1,243 investments in 772 firms. In 39 cases (corresponding to 89 observations) SWFs invested in a syndicate; in these cases I attribute the investment to the lead SWF in the syndicate (i.e. the one with the highest amount invested or equity interest acquired).[19] The target population of investment events is then constituted by 1,193 investment events in 772 firms. CMA data are available for only 239 of these firms, reducing the number of events to 499.

Finally, I collect CDS spread time series from CMA, information on SWF characteristics from the SWF Institute and firm characteristics from Worldscope and exclude investment events for which the information set is incomplete.[20] The final sample

[17] This chapter analyses are based on version 2.3 of the SWFTD, released on December 2010.

[18] The FSI only invests within its national borders while IWG (2008) specify that SWFs have an investment strategy which includes foreign equities. For a discussion on the nature of the FSI see also Balding (2008).

[19] Results are qualitatively similar if all syndicated deals are removed from the sample.

[20] As explained above, I consider CDS spread to have a sufficient liquidity when at least in half the trading days in the estimation and event window they have a spread priced with veracity of 3 or better.

Table 4.1: Variables definition and Data sources

Variable	Description	Data Source
ADS_{1y}	Adjusted 1 year maturity CDS spread reduction (basis points), see Equation 4.3.	CMA
ADS_{5y}	Adjusted 5 year maturity CDS spread reduction (basis points), see Equation 4.3.	CMA
DS_{1y}	Reduction in 1 year maturity CDS spread (basis points) for target companies, see Equation 4.1.	CMA
DS_{5y}	Reduction in 5 year maturity CDS spread (basis points) for target companies, see Equation 4.1.	CMA
IDS_{1y}	Reduction in 1 year maturity CDS spread for an index of matched companies (basis points), see Equation 4.2.	CMA
IDS_{5y}	Reduction in 5 year maturity CDS spread for an index of matched companies (basis points), see Equation 4.2.	CMA
CDS_{1y}^{PRE}	Average CDS premium in the estimation window for 1 year maturity CDSs (bps).	CMA
CDS_{5y}^{PRE}	Average CDS premium in the estimation window for 5 year maturity CDSs (bps).	CMA
$Size_{SWF}$	Logarithm of the estimated value of SWF portfolio (USD billion).	SWF Institute (2010)
$Size_{Firm}$	Logarithm of enterprise value (market capitalization and book value of liabilities of target firm) (USD billion) lagged 1 year.	Worldscope
Q	Tobin's Q ratio measured as the ratio between enterprise value (market cap. and book value of liabilities) and book value of assets, lagged 1 year.	Worldscope
$Leverage$	Ratio between book value of liabilities and enterprise value (market capitalization and book value of liabilities), lagged 1 year.	Worldscope
Vix	Closing value of CBOE Volatility Index in the investment announcement date.	CBOE
LM	Linaburg-Maduell transparency index.	SWF Institute (2010)
$Slope$	Difference between $CDS_{5y}^{PRE}$and CDS_{1y}^{PRE}}.	CMA
$Finance$	Dummy=1 for investments in financial companies.	Worldscope
Oil	Dummy=1 for oil-related SWF.	SWF Institute (2010)
$Shield$	Dummy=1 if SWF is protected from Government withdrawals.	chapter 1
$Direct$	Dummy=1 if SWF pursues a direct strategic investment (vs. index-replicating) strategy.	chapter 1
$Debt$	Dummy=1 if the SWF is leveraged.	Various Sources
$First$	Dummy=1 for first investment by a SWF in a company.	SWFTD
$Western$	Dummy=1 if the SWF belongs to a western country (Norway or Australia).	SWFTD
$Domestic$	Dummy=1 when the invested firm and the SWF belong to the same country.	SWFTD
$Conv$	Dummy=1 if investment in convertible securities.	SWFTD
$Injection$	Dummy=1 if the SWF provides the firm with new capital.	SWFTD
CBE	Dummy=1 if SWF is a Central Bank Entity.	SWF Institute (2010), SWFTD
GDP	SWF country GDP lagged 1 year.	World Bank Database

is composed by 371 investments in 191 firms, made by 16 SWFs from 12 countries. The size of the sample is comparable to that in other studies on SWF investments (Dewenter et al., 2010; Kotter and Lel, 2011). The distribution of the sample by SWF is illustrated in Table 4.2.

Table 4.2: Sample descriptive statistics

This table describes the distribution and key characteristics of SWFs included in the analysis. *Country*, *Origin* and *Assets* (in $ billion) are obtained from SWF Institute, 2010. The definition of *LM*, *Direct*, *Shield* and *Debt* is reported in Table 4.1. *Events* is the number of investment events in our sample where the SWF in involved.

SWF	Country	Assets	Origin	*LM*	Direct	Shield	Debt	Events
KIA	Kuwait	202.8	Oil	6	0	0	0	70
GIC	Singapore	247.5	Non-oil	6	0	1	0	65
GPF	Norway	512	Oil	10	0	1	0	63
KIC	South Korea	37	Non-oil	9	1	0	0	58
CIC	China	332.4	Non-oil	7	1	0	0	38
SAFE	China	347.1	Non-oil	2	0	0	0	29
ADIA	UAE	627	Oil	3	0	0	0	25
Temasek	Singapore	133	Non-oil	10	1	1	1	6
QIA	Qatar	85	Oil	5	1	1	0	4
BIA	Brunei	30	Oil	1	0	0	0	3
IPIC	UAE	14	Oil	1	1	1	1	2
Khazanah Na.	Malaysia	25	Non-oil	4	1	0	1	2
Mubadala	UAE	13.3	Oil	10	1	1	1	2
SAMA	Saudi Arabia	439.1	Oil	2	0	0	0	2
Future Fund	Australia	67.2	Non-oil	9	1	1	0	1
LIA	Libya	70	Oil	2	1	0	0	1
Total								371

Overall, the 16 SWFs included in this sample manage $3,182 billion, which is 77.5% of the total assets managed by SWFs.[21]

4.3.2.1 SWF characteristics

I consider several SWF-related variables that are likely to affect the impact on credit risk, as discussed in section 4.2. The first variable is the SWF size, measured in

[21] According to SWF Institute rankings at the end of December 2010 SWFs manage overall $4,156.80 billion (SWF Institute, 2010).

terms of the logarithm of its estimated portfolio holdings ($Size_{SWF}$) as reported by the SWF Institute (SWF Institute, 2010). The largest SWF included (and world's largest) is ADIA, which has assets estimated at $627 billion, and is involved in 25 investment events. The two largest non-commodity SWFs in my sample are SAFE and CIC, both from China, which are involved in, respectively, 29 and 38 investment events. The smallest SWF included is Mubadala, which has $13 billion in assets and is involved in only 2 investment events.

In order to assess the financial capability of a SWF, I also use different dummy variables. *Direct* is equal to one if the SWF has a mandate to make direct, strategic deals and 0 when the SWF mainly invest in passive, index-replicating strategies. *Shield* is equal to 1 if there is a rule explicitly limiting the amount of discretionary withdrawals from the SWF by the Government. I built these two variables by combining all available public official information, as explained in chapter 1. Out of the 16 SWFs in the sample, 9 are given an explicit mandate to pursue direct investments and 7 are shielded from government withdrawals. Some 114 investments are performed by SWFs with explicit mandate to pursue direct investments, and 144 by SWFs sheltered from discretionary Government withdrawals. I thus create a dummy equal to 1 when the SWF is levered (*Debt*). Despite 4 out of 16 SWFs are levered, their investments account for less than 4% of our sample, thus clearly limiting the reliability of our results to this respect.

I create a dummy equal to 1 when the SWF comes from a "western" country, namely Norway or Australia ($Western$) and 0 otherwise: if SWFs can also have political incentives to support their portfolio companies, these are likely to be lower for countries which already have a mature economy and well-established relationships with other developed economies. Political incentives are instead likely to be higher for countries whose economies are small compared to their SWF. Country size is captured by GDP, as reported by the World Bank (GDP). I also create a dummy equal to 1 when the SWF is a CB-related Entity, namely SAFE or SAMA, (CBE), as it is expected to have an higher risk aversion and thus to be less likely to further invest in a distressed firm.

Finally, I add to my analysis other SWF characteristics which are found to be relevant in other studies. Following Bortolotti et al. (2010) and Kotter and Lel (2011) I control for SWF transparency using the Linaburg-Maduell Transparency Index (LM). The index ranges from 0 to 10 based on the adoption of best practices on information transparency. I control for the origin of the SWF by including in the regressions a dummy equal to 1 if the fund is constituted from oil revenues and 0 otherwise (Oil).

4.3.2.2 Firm and deal characteristics

Table 4.3 shows the distribution of observations by sector and country of invested firms. The highest investment activity is in the Financials sector, with 86 investment events (i.e. 23.2% of our sample). The importance of this sector in SWF portfolios is confirmed by several other studies. In the sample used by Bortolotti et al. (2010), for example, the fraction of financial companies is even higher: 136 out of 376 observations, or 36.1%. Beck and Fidora (2008) suggest that the appetite of commodity SWFs for Financials could be driven by their low correlation with oil returns. Given their relevance in the sample and the amount of capital injections by SWFs in the struggling banking system in the last years, we use a dummy to control for the invested firm being a financial institution ($Finance$).

Table 4.3: Distribution of investments by sector and country

Sector	Events	Region	Events
Financials	86	United Kingdom	192
Consumer Discretionary	64	United States	103
Industrials	46	Europe (ex UK)	45
Materials	38	Asia	16
Energy	35	Other	15
Consumer Staples	32		
Healthcare	18		
Information Technology	18		
Telecommunications	18		
Utilities	16		
Total	371		371

The majority of the investments in my sample is concentrated in two countries: the UK (192 investments, 51.8% of our sample) and the US (103 investments, 27.8% of our sample). This is partly because these two countries possess large and highly developed stock markets (e.g Demirgüç-Kunt and Levine, 1996) which attract SWF investments (Chhaochharia and Laeven, 2009). Moreover, our sample only includes companies for which CDSs are traded, which increases further the portion of US and UK investment events compared to the initial sample (in the SWFTD they represent 64% of SWF investments in the period considered).

To control for firm size ($Size_{Firm}$), I use the logarithm of its enterprise value, computed as firm's market capitalization plus book value of liabilities (source: Worldscope). The larger the firm, the harder it would be for the SWF to support it in case of need; I thus expect this variable to have a negative impact on ADS.

SWF certification should be larger the less a company is financially sound. Following the discussion above, the pre-investment level of CDS spread (CDS^{PRE}) can be used as a measure of credit risk. I also include two other firm-specific characteristics which may be related to credit risk: firm $Leverage$ (the ratio between total book liabilities at book value and enterprise value), which relevance among firm-specific characteristics in determining credit spreads has been assessed in several studies (see, for example, Collin-Dufresne et al., 2001), and Tobin's Q (the ratio between enterprise value and book value of assets). As customary, to reduce endogeneity, I use 1 year lags for $Size_{Firm}$, $Leverage$ and Q.

As assessed in section 4.2, the more the source of financial instability is idiosyncratic, the more SWFs should be able to cover firm's liquidity needs. If firm's instability is due to market-wide, systemic uncertainty, the capability of a SWF to stabilize any portfolio company could be hampered. Controlling for turbulence is particularly important in our sample, since the period I analyze here is characterized by very different market conditions. Accordingly, I include, as a control, the CBOE Volatility Index (Vix), which is proportional to aggregate market volatility (e.g. Fleming et al., 1995).

Finally, I control for some firms and deal characteristics that are likely to mitigate the impact of SWFs investments on credit risk. First, since some companies receive more than one investment by SWFs in the period, I introduce a dummy equal to 1 when the investment occurs in a company which is not SWF-backed and 0 otherwise ($First$); I include a dummy equal to 1 if the firm and the SWF belong to the same country ($Domestic$). I control for the type of deal by identifying investments where the SWF provides fresh money to the firm ($Injection$), and when the SWF buys convertible securities rather than equity ($Conv$).

4.3.3 Descriptive statistics

The summary statistics for dependent and control variables are summarized in Table 4.4.

The average unadjusted reduction in 1 year maturity CDS spread between the estimation window ($[-25, -14]$), and the event window ($[-5, +4]$), DS, defined in equation (Equation 4.1), is 9.99 bps. A simple t-test rejects the null hypothesis that the sample mean of DS is 0 at the 10% confidence level (p-value 0.057). The reduction in CDS spread in the index of comparable companies (IDS, defined in equation (Equation 4.2)), using the same windows as for DS is instead, on average, 2.23 bps, which is (unsurprisingly) not statistically different from zero at customary confidence levels (p-value 0.487). The adjusted reduction in CDS spread (ADS, defined in equation (Equation 4.3)), which is the difference between DS and IDS, is equal to 7.76 bps. As expected, DS and IDS are strongly correlated (Pearson correlation, reported in Table 4.5, is 0.79). As a result, the adjustment process reduces the standard deviation of ADS much more than it decreases its mean. Accordingly, the null hypothesis that the distribution of ADS has a zero mean can be rejected for a larger set of confidence thresholds (p-value 0.020). I will analyze more thoughtfully the robustness and stability of this result in subsection 4.4.1 and limit myselves here to highlighting that this descriptive evidence confirms that the

Table 4.4: Descriptive statistics

Variable	Mean	St. Dev.	Median	Min	Max
ADS_{1y}	7.76	64.09	1.79	-499.51	750.17
ADS_{5y}	3.34	53.75	2.43	-455.75	392.50
DS_{1y}	9.99	100.93	2.92	-1046.33	768.04
DS_{5y}	7.36	100.88	3.64	-1292.54	659.69
IDS_{1y}	2.23	61.81	1.38	-717.26	245.75
IDS_{5y}	4.02	62.60	1.54	-913.37	313.10
CDS_{1y}^{PRE}	141.55	255.10	65.51	0.88	3020.19
CDS_{5y}^{PRE}	180.74	246.75	105.25	2.73	2516.20
$Size_{SWF}$	5.34	0.93	5.51	2.59	6.44
$Size_{Firm}$	4.11	1.66	3.90	0.23	8.42
Q	1.60	1.24	1.14	0.73	10.57
$Leverage$	0.58	0.25	0.58	0.00	1.00
Vix	26.87	10.41	25.12	11.01	69.95
LM	6.71	2.54	6	1	10
$Slope$	39.19	73.33	30.03	-503.99	501.23
$Finance$	0.23	0.42	0	0	1
Oil	0.46	0.50	0	0	1
$Shield$	0.39	0.49	0	0	1
$Direct$	0.31	0.46	0	0	1
$Debt$	0.03	0.18	0	0	1
$First$	0.46	0.50	0	0	1
$Western$	0.17	0.38	0	0	1
$Domestic$	0.01	0.10	0	0	1
$Conv$	0.02	0.14	0	0	1
$Injection$	0.06	0.25	0	0	1
CBE	0.08	0.27	0	0	1
GDP	1,156.15	1,586.82	336.73	11.47	4,985.46

adjustment process seems to be effective in filtering common underlying factors of CDS spreads variation.

Pre-investment mean (median) 1 year CDS spread is 141.55 bps (65.51 bps). Mean (median) $Size_{SWF}$ is 5.342 (5.511), which correspond to a SWF with $284.4 billion ($247.5 billion) in assets. Mean (median) $Size_{Firm}$ is 4.113 (3.899), which corresponds to an enterprise value of $60.9 billion ($49.4. billion).

Mean (median) LM-index is 6.71 (6.00). Companies in my sample have an average leverage of 0.58 and Tobin's Q of 1.6. Slightly less than half of the observations (46%) refer to a first SWF investment, opposed to a follow-up investment by the same or a different SWF. Some of the dummies are related to rare events, so I must be careful in interpreting their effect in the analysis of determinants of changes in CDS spread. Only 1% of the investments are in firms located in the same country as the SWF; 6% of investments are capital injections, and the 33% of them (2% of the total sample) are performed buying convertibles bonds instead of equity.

Table 4.5 reports Pearson correlation among variables. As expected, data on 1 and 5 years CDS are strongly correlated: for example, the correlation between CDS_{1y}^{PRE} and CDS_{5y}^{PRE} is 0.96, which makes it non trivial to jointly assess short and medium-term risk. Following Han and Zhou (2011), I control for the term structure of risk by using the CDS spreads curve slope, computed as the difference between CDS_{5y}^{PRE} and CDS_{1y}^{PRE} (*Slope*); its correlation with CDS_{1y}^{PRE} is -0.26. Finally, it is worth pointing out that larger SWFs do not seem on average to target more distressed firms (the correlation between $Size_{SWF}$ and CDS_{1y}^{PRE} is -0.02), and that SWFs with a mandate for direct investments seem to invest on average in more levered firms (correlation is 0.32).

4.4 Empirical Results

In this section I analyze the statistical significance of the adjusted CDS spread and try to identify its determinants. In subsection 4.4.1 I study ADS using event-study methodology. In subsection 4.4.2 I analyze the determinants of ADS using multivariate analysis.

4.4.1 Event study on adjusted decrease of CDS spreads

To investigate the magnitude and stability of the impact on SWFs investment announcements on adjusted CDS spread reduction, I perform an event study analysis on ADS (as defined in subsection 4.3.2 and (Equation 4.3)). I use, as estimation window, the period between 24 and 15 trading days before the event ($[-24, -15]$). I consider four non overlapping event windows of 10 trading days each: $[-5, +4]$, $[+5, +14]$, $[+15, +24]$, and $[+25, +34]$. I repeat the analysis using both 1 year and 5 year maturity CDS spreads. To reduce the impact of outliers, I winsorize ADS using a 1% threshold for each tail (Dixon, 1960).[22] Results are reported in Table 4.6.

[22] I repeat the analysis on non-winsorized data and find very similar results. In particular, as it has been shown in the previous section, ADS on 1 year maturity is still significant at least at 10% confidence level.

Table 4.6: CDS spreads adjusted decrease for different event windows

Univariate analysis on the adjusted decrease in CDS spread (*ADS*, defined in Equation (Equation 4.3), measured in basis points and winsorized at the 1% threshold for each tail) between the estimation window ($[-25, -14]$) and different event windows for both 1 year and 5 year maturity. Panel A includes all observations in our final dataset described in section section 4.3; Panel B excludes capital injections. Panel C exclude investments made by the Norwegian GPF. *,** and ***indicate significance at the 10%, 5% and 1% level for the rejection of the null hypothesis of zero mean (t-test) or median (Wilcoxon signed-ranks test).

Panel A: Full Sample

		$[-5, +4]$	$[+5, +14]$	$[+15, +24]$	$[+25, +34]$
1 year maturity	Mean	7.019***	8.265***	6.933***	6.464**
	St. dev.	1.740	2.207	2.552	3.052
	Median	1.791***	2.154***	1.946***	1.574***
	Percent positive	63.61	61.62	60.99	59.50
5 years maturity	Mean	2.833	5.512**	3.359	3.013
.	St. dev.	2.130	2.134	3.046	2.906
	Median	2.434***	2.137***	2.404***	2.774***
	Percent positive	60.65	59.19	56.32	58.13
	N	371	370	364	363

Panel B: Excluding capital injections

		$[-5, +4]$	$[+5, +14]$	$[+15, +24]$	$[+25, +34]$
1 year maturity	Mean	6.644***	6.271***	5.588**	5.803*
	St. dev.	1.774	2.175	2.493	2.971
	Median	1.559***	1.924***	1.656***	1.489***
	Percent positive	63.40	60.40	60.00	58.70
5 years maturity	Mean	2.463	4.260**	2.212	1.858
	St. dev.	2.067	2.100	2.993	2.860
	Median	2.034***	1.677***	1.933**	2.323*
	Percent positive	59.65	57.80	54.71	56.43
	N	347	346	340	339

Panel C: Excluding investments by the Government Pension Fund - Global

		$[-5, +4]$	$[+5, +14]$	$[+15, +24]$	$[+25, +34]$
1 year maturity	Mean	7.985***	9.430***	7.290**	6.798*
	St. dev.	2.047	2.555	2.879	3.509
	Median	2.469***	2.814***	2.030***	2.209***
	Percent positive	63.64%	60.26%	59.54%	58.41%
5 years maturity	Mean	3.106	5.558**	3.003	2.975
	St. dev.	2.511	2.488	3.567	3.392
	Median	2.813***	1.665***	1.994**	2.579*
	Percent positive	59.74%	56.68%	53.95%	56.44%
	N	308	307	304	303

Panel A of Table 4.6 confirms that mean 1 year maturity $ADS_{[-5,+4]}$ is positive and significant at 1% level. ADS is positive and significant also for windows up to 24 trading days after the event (at the 10% significance level). Moving farther away from the announcement date, the magnitude of average 1 year maturity ADS remains remarkably stable (in the $[+25, +34]$ event window, mean 1 year ADS is 6.464 bps, which is only slightly below the 7.019 bps in the $[-5, +4]$ event window). The statistical significance of ADS slightly declines as a result of an increase in standard deviation, which reflects the dispersion of CDS spreads as new events alter market expectations about firm financial stability. Interestingly, very similar patterns are found by studies on cumulative abnormal returns, albeit CDS premiums appear to have a more stable evolution (see, for instance, Bortolotti et al., 2010). Our results are even more robust when, instead of a parametric t-test on the mean, we use a non-parametric Wilcoxon signed-rank test on the median 1 year ADS.

Results for the 5 year maturity ADS are generally weaker than those on 1 year maturity. Mean ADS is always lower for 5 years than for 1 year maturity and is statistically significant only in the $[+5, +14]$ window. Median 5-years ADS is always positive and statistically significant, albeit with a lower p-value than the 1 year maturity. The disparity between 1 year and 5 years ADS confirms that the certification effect by SWFs is stronger against immediate distress due to short-run financial constraints, but is weaker on longer-term credit risk.

As stated in section 4.1, SWFs have gained newspapers headlines in the last few years mainly by performing big capital injections in financially troubled companies; it could then be argued that my results are simply driven by an increase of firms liquid assets, and that the source of this liquidity (i.e. SWFs) is irrelevant. In order to assess this potential criticism, I repeat the event study analysis excluding from the sample all those investments where the SWF injected new capital in the firm. Results, shown in Panel B of Table 4.6, are coherent with those obtained for the full sample: in the $[-5, +4]$ event window I still obtain a positive ADS with a 1% significance level for 1 year maturity CDS; the size of the decrease is clearly smaller than for the full sample but is still significant at the 10% level up to $[+25, +34]$. Wilcoxon signed-rank tests on ADS median values are still significant at 1% level for all the event windows considered. Significance for 5 years maturity CDS follows a similar path in Panel B as it does in Panel A. Overall, these results support our hypothesis that perceived credit risk reduction around SWFs investments is not only due to effective capital injections (which, incidentally, represent less than 6.5% of my final sample, as shown in Table 4.4). Finally, in Panel C I report the results obtained by excluding investments made by the Government Pension Fund-Global (GPF), the Norwegian SWF. Both Bortolotti et al. (2010) and Dewenter et al. (2010) suggest that the GPF could be incomparable to other SWFs. Excluding the GPF from our sample does not however seem to alter results substantially.

Before moving to a multivariate analysis, I present in Table 4.7 a simple one-way comparison of $ADS_{[-5,+4]}$ across different quartiles of CDS^{Pre}. [23]

Table 4.7: Abnormal spread decrease across CDS^{Pre} quartiles

Univariate analysis on the adjusted decrease in CDS spread (ADS, defined in Equation (Equation 4.3), measured in basis points) between the estimation window ($[-25, -14]$) and the $[-5, +4]$ event window for the 1 and 5 year maturity CDS. The sample is split by quartiles of CDS^{PRE} (of the respective maturity) in columns 1-4, . *,** and ***indicate significance at the 10%, 5% and 1% level for the rejection of the null hypothesis of zero mean (t-test) or median (Wilcoxon signed-ranks test).

		Quartile CDS^{PRE}			
		1 (low)	2	3	4 (high)
1 year maturity	Mean	0.227	2.557***	7.996***	17.407**
	St. dev.	0.381	0.892	1.700	6.620
	Median	0.113	1.947***	4.692***	13.603**
	Percent positive	54.84	67.74	68.82	63.04
5 years maturity	Mean	0.226	3.851***	6.342***	0.893
	St. dev.	0.508	0.959	1.735	8.358
	Median	0.243	3.768***	5.521***	7.236
	Percent positive	53.76	69.89	64.52	54.35
	N	93	93	93	92

The mean and median ADS increase monotonically moving from low to high pre-investment levels of CDS spread. Corresponding to the lowest quartile of CDS^{Pre}, 1 and 5 years maturity ADSs are positive but not significantly different from zero in both mean and median. Magnitude and significance increase when moving from the first to the second and third quartile. For 5 years maturity, mean and median ADS are positive but not significantly different from zero in the first quartile and highly significant in the second and third quartile, as for their 1 year maturity counterparts. In the fourth quartile, mean ADS is not significantly different from zero *and* is lower than that for the second and third quartile. For both maturities, standard deviations increase substantially when moving from the third to the fourth quartile. While mean 1 year (5 years) ADS goes from 7.996 bps (6.342 bps) to 17.407 bps (0.893 bps), standard deviation increases from 1.700 bps (1.735 bps) to 6.620 bps (8.368 bps). This suggests the use of heteroskedasticity consistent estimates in the parametric analysis.

Overall, these results support the view that, on average, SWFs reduce significantly the credit risk of portfolio companies. The phenomenon is particularly important for short-run credit risk (captured by 1 year maturity CDS) and for companies whose pre-investment level of credit risk is high. All in all, if we consider high short-term credit risk identifying distressed sellers and medium-term credit risk indentifying

[23] Again, I repeat the analysis also on non-winsorized data and find very similar results.

distressed assets, it seems confirmed that SWFs are perceived as beneficial especially for firms potentially needing new capital injections but (relatively) well-managed. I study, in the next section, which other factors moderate this relationship.

4.4.2 Analysis of determinants

To study the factors that moderate the certification effect of SWFs, I perform a multivariate analysis on 1 year *ADS* computed in the $[-5, +4]$ event window. To take into account sectoral differences in capital structure and growth prospects, I center *Leverage* and Tobin's Q on their sectoral means. I also center all other continuous variables to their sample mean, which allows to give a more immediate interpretation to the constant parameter, which represents the expected *ADS* corresponding to an average SWF in an average company, with all dummies set to zero. Following evidence of increasing dispersion of *ADS* for high levels of pre-investment CDS spread, reported in Table Table 4.7, I compute robust standard errors using, as customary, the correction for heteroskedasticity proposed by White (1980). To reduce the impact of outliers, I winsorize all continuous variables using a 1% threshold for each tail (Dixon, 1960).[24] I estimate different models, including different sets of covariates. Results are reported in Table 4.8.

[24] I repeat the analysis reported in Table 4.8 and Table 4.9 using non-winsorized data and find qualitatively similar results.

Table 4.8: Analysis of abnormal 1 year CDS spread decrease

The dependent variable is the 1 year maturity CDS spread adjusted decrease (ADS, defined in Equation 4.3 and expressed in basis points) between a $[-25, -14]$ estimation window and a $[-5, +4]$ event window. All independent variables are as defined in Table 4.1, but, except for dummies, are normalized around their mean. *Leverage* and Q are normalized by subtracting their sector-specific mean. All continuous variables are winsorized at the 1% threshold in each tail. Regression are estimated using OLS. Standard errors, reported in round brackets, are adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, ** and *** indicate significance levels at the 10%, 5% and 1% confidence.

Model	(1)	(2)	(3)	(4)	(5)	(6)
$Size_{SWF}$	5.305***	5.082***	5.104***	5.211***	4.739**	5.327***
	(1.973)	(1.878)	(1.905)	(1.903)	(1.898)	(2.039)
$Size_{Firm}$	-2.382**	-1.87*	-1.835*	-2.277*	-1.785*	-1.812*
	(1.039)	(0.961)	(0.962)	(1.155)	(0.951)	(0.936)
LM	-0.482	-0.028	-0.055	-0.007	-0.219	-1.073
	(0.489)	(0.517)	(0.588)	(0.52)	(0.519)	(0.678)
Oil	-8.252**	-7.196*	-7.103*	-7.101*	-6.418*	-8.715**
	(4.015)	(3.732)	(3.972)	(3.716)	(3.634)	(4.328)
$Leverage$	29.107**	9.991	9.881	10.548	8.266	9.96
	(14.691)	(12.326)	(12.315)	(12.228)	(12.396)	(12.587)
Q	-0.289	-1.617	-1.625	-1.582	-1.628	-1.287
	(1.579)	(1.6)	(1.614)	(1.592)	(1.619)	(1.544)
$Injection$	7.392	4.803	4.717	4.778	3.108	
	(4.613)	(4.917)	(5.152)	(4.964)	(5.223)	
CDS_{1y}^{PRE}		0.055**	0.055**	0.054**	0.065**	0.064**
		(0.024)	(0.025)	(0.025)	(0.026)	(0.025)
$First$			0.494			
			(4.522)			
$Financials$				2.610		
				(4.65)		
Vix					-0.405	-0.430
					(0.305)	(0.298)
CBE						-14.673**
						(5.906)
$Cons.$	10.36***	10.51***	10.24***	9.85***	10.37***	12.84***
	(2.88)	(2.691)	(3.796)	(2.931)	(2.668)	(3.19)
N obs.	371	371	371	371	370	370
R^2	0.06	0.146	0.146	0.147	0.158	0.167
Adj. R^2	0.042	0.127	0.125	0.126	0.137	0.146

Column (1) in Table 4.8 reports the simplest model, which includes basic information on SWF (size, transparency, and origin) and target company (size, leverage, and Tobin's Q). Results show that an investment in an "average" company by an "average" SWF with non-commodity origin has an expected ADS of 10.36 bps (significant at the 1% level). $Leverage$ is positive and significant at the 5% level. Besides statistical significance, leverage has an economically sizable effect on ADS. Other things being equal, a 1 standard deviation increase in $Leverage$ determines an increase in expected ADS by 7.3 bps.

In model (2) I introduce CDS_{1y}^{PRE} as a more direct measure of firm pre-investment credit risk. It is interesting to highlight that CDS_{1y}^{Pre} seems to be a sufficient statistic for the pre-investment credit risk of target companies, since $Leverage$ is no longer significant once the variable is introduced. The average CDS spread in the estimation window is highly significant both statistically and economically: a 1 standard deviation increase in CDS_{1y}^{PRE} brings a 14.0 bps higher decrease in spread.

In model (3) I augment model (2) by including a dummy variable which distinguishes between first and follow-up investments in the same company. The coefficient associated to the dummy is small (0.494 bps) and not statistically significant. This indicates that follow-up SWF investments have the same impact on firm credit risk than first investments. This result is somewhat puzzling. If SWFs had an enduring certification impact on firm's credit risk, follow up investments would add little effect. A possible interpretation for this result is that the certification impact is significant only for a limited time after SWF investment, after which new SWF investments will provide additional "commitment" to the firm.

In model (4) I control whether the certification impact of SWFs for financial companies is different. Given the attention which SWFs gained after their intervention in support of the US and European financial system at the end of 2007, it is interesting to assess whether SWFs have any special impact on the credit risk of financial companies. Results from model (4) show that the dummy associated to financial companies is positive but not significant. This suggests that certification and stabilization are hardly a phenomenon limited to the extensively debated investments in distressed western banks occurred from 2007. Financial firms do not seem to constitute a special class of targets to this respect.

In model (5), I include market-wide turbulence, measured by Vix. The associated coefficient is negative, as expected, but not statistically significant (albeit close to significance). In model (6) I check for differences among CB-related SWF and the others; consistently with my prediction CBE coefficient is negative and significant. An investment carried out by a CB-related SWF produces, other things being equal, a reduction in CDS spread which is 14.67 bps smaller than what would be produced by an independent SWF.

The parameters corresponding to $Size_{SWF}$ is positive and significant in all specifications. This suggests that, consistently with the certification hypothesis, the impact of SWF investments on CDS spread is stronger for large SWFs. On the contrary, $Size_{Firm}$ has a negative coefficient in all model specifications, consistently with the idea that the larger the firm the less a SWF may provide certification for its liabilities.

Contrarily to what found by Kotter and Lel (2011) for stock returns, transparency has a very small and non statistically significant impact on ADS. This suggests that the determinants of stock returns and credit risk may be different, which confirms the importance of analyzing the phenomenon from both perspectives. The parameter associated to capital injections is positive, as expected, but not statistically significant, possibly because of the limited number of observations.

I test for the relevance of the others SWFs characteristics which could mitigate the certification effect in Models (7) to (9) presented in Table 4.9.

Table 4.9: Analysis of abnormal 1 year CDS spread decrease: additional evidence

The dependent variable is the 1 year maturity CDS spread adjusted decrease (ADS, defined in Equation (Equation 4.3) and expressed in basis points) between a $[-25, -14]$ estimation window and a $[-5, +4]$ event window. All independent variables are as defined in Table 4.1), but, except for dummies, are normalized around their mean. All continuous variables are winsorized at the 1% threshold in each tail. Regression are estimated using OLS. Standard errors, reported in round brackets, are adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, ** and *** indicate significance levels at the 10%, 5% and 1% confidence.

Model	(7)	(8)	(9)
$Size_{SWF}$	6.152***	6.432*	6.854***
	(2.226)	(3.285)	(2.212)
$Size_{Firm}$	-1.932**	-1.962*	-2.634***
	(0.938)	(1.131)	(0.984)
CDS_{1y}^{PRE}	0.068***	0.071***	0.067***
	(0.026)	(0.027)	(0.025)
$First$	-2.147	-1.79	-3.395
	(5.157)	(5.647)	(4.971)
Vix	-0.422	-0.456	-0.423
	(0.313)	(0.339)	(0.311)
$Shield$	10.295*	9.91	8.932
	(5.996)	(6.91)	(5.768)
$Direct$	12.424**	12.954**	14.247***
	(4.881)	(6.301)	(4.732)
$Debt$	-24.762**	-25.373**	-20.564**
	(10.788)	(11.15)	(8.906)
$Conv$	7.535*	7.487	11.738*
	(4.233)	(4.588)	(6.323)
$Western$	-12.413**	-12.505**	-11.401*
	(6.203)	(6.331)	(5.91)
$Domestic$	17.190*	17.409*	13.119
	(9.952)	(10.197)	(8.044)
GDP		-0.000	
		(0.001)	
$Slope$			-0.067*
			(0.036)
$Cons.$	3.431	3.231	3.656
	(2.451)	(3.165)	(2.486)
N obs.	370	333	370
R^2	0.168	0.166	0.180
Adj. R^2	0.142	0.134	0.153

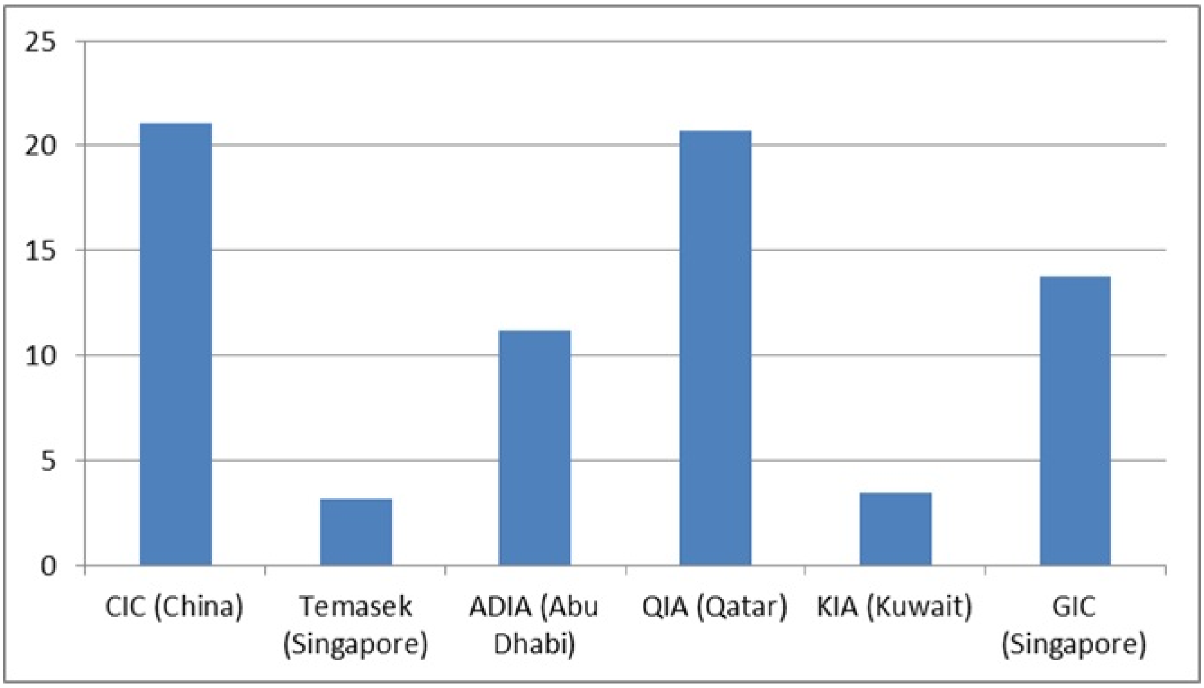
The strongest evidence regards SWFs typically performing direct investments: the coefficient of *Direct* is positive and both statistically and economically relevant.

Other things being equal, those SWFs bring an additional reduction in CDS spread between 12.247 and 12.954 bps (depending on the model). I also find that leveraged SWFs, as expected, have a significantly smaller impact on ADS. A levered SWF determines a reduction in CDS spread which is between 20.564 bps and 25.373 bps smaller than an unlevered SWF. The small number of investments made by levered SWFs, however, calls to some caution in interpreting this result. Protection from discretionary withdrawals from the Government has the predicted sign, but is significant (at the 10% level) only in one of the three models. The variable *Shield* exhibits the expected sign but is statistically significant (at 10%) only in model (7). One possible interpretation of this result is that markets generally perceive SWF as very unlikely to incur in sudden withdrawals, thus limiting the need for an explicit rule in this sense.

Finally, in model (9) I control for the effect of the medium-term credit risk using the slope of the risk term structure curve, as suggested by Han and Zhou (2011). As expected, the estimated coefficient is negative and statistically significant (at 10% level). It seems thus confirmed my hypothesis that, keeping constant the level of short-term financial distress, SWFs can be of little help for firms expected to face significant medium-term structural problems. Some considerations are due on the use of *Slope* as a measure for structural versus financial problems. Theoretical models (e.g Merton, 1974 and Longstaff and Schwartz, 1995) predict particularly distressed firms to exhibit a downward sloping credit yield curve; thus, it could be argued that the negative impact the model predict could be generally driven by the firm credit risk rather its “source” (i.e. financial or structural), as it decreases (up to become negative) with the general credit risk of the issue. While this argument can certainly holds, resulting in a potential limitation of this last analysis that I stress upfront, three arguments can be used in favour of my interpretation of the *Slope* coefficient: first of all, including in the model the 1 year CDS spread I already control for the firm credit risk; second, some empirical studies (e.g. Helwege and Turner, 1999) cast in doubt that the level of credit risk can alone explain the curve shape for non-investment grade issues, a result consistent with practioners experience (cfr. Fabozzi, 1994). Finally, the results from the multivariate analysis are coherent with those of the univariate analysis reported in Table 4.7, which are less likely to be affected by this issue. Nonetheless, I recognize the less-than-perfect nature of this variable to distinguish between “distressed assets” and “distressed sellers”, a caveat which should be addressed in future studies.

Given the statistical and economic significance of SWFs characteristics on ADS, it is interesting to assess the predicted credit risk reduction for some SWFs. In Figure 4.1 I show the predicted impact for some of the main SWFs using model (9) estimations and the sample average for firms characteristics. While the predicted impact of a fund with limited financial capacity like Temasek is almost neglectable, a fund like the Qatar Investment Authority, which explicitely pursue an investment strategy of “exploiting” distressed sellers, have an estimated impact of more than 20 bps, corresponding to a 15% abnormal reduction for the average sample firm 1 year CDS spread.

Figure 4.1: Predicted impact form the main SWFs



Expected *ADS* (computed using model (9) coefficients estimation) for some SWFs if investing in the average sample firm.

4.4.3 Robustness Checks

I perform a number of additional robustness checks. First, I repeat the event study analysis including observations which were dropped from the initial sample because of missing data on SWF and firm characteristics and obtain qualitatively similar results for 1 year maturity *ADS*.[25] For 5 years maturity *ADS*, the $[-5, +4]$ event window becomes significant at 5% level. Second, I repeat the analysis using only the balanced set of 363 observations available in the $[+25, +34]$ window, obtaining virtually identical results. Results are reported in Table 4.10.

[25] The only exception is that in the $[+15, +24]$ and $[+25, +34]$ event windows *ADS* is significant only at 5% and 10% level respectively.

Table 4.10: Additional robustness checks for the abnormal CDS spread decrease

This table presents the same analysis of Table Table 4.6 using a different sampling process. In *Panel A* estimates include observations which are instead excluded in Table Table 4.6 because information on some control variables used in further analysis is not available. *In Panel B* estimates are made on a balanced dataset, which includes only observations available for all event windows. Analyses are performed after winsorizing *ADS* at 1% level for each tail.

Panel A: All observations available for the event study

		[−5, +4]	[+5, +14]	[+15, +24]	[+25, +34]
1 year maturity	Mean	6.142***	7.287***	6.147**	5.359*
	St. dev.	1.594	2.060	2.540	3.083
	Median	1.719***	2.234***	1.981***	1.574***
	Percent positive	63.69	61.35	60.67	58.96
5 years maturity	Mean	3.457**	4.359**	2.486	2.396
	St. dev.	1.697	1.921	3.142	2.913
	Median	2.033***	1.944***	2.225***	2.569**
	Percent positive	59.45	58.60	56.04	58.40
	N	402	401	389	387

Panel B: Balanced set of observations

		[−5, +4]	[+5, +14]	[+15, +24]	[+25, +34]
1 year maturity	Mean	7.255***	8.549***	7.063***	6.464**
	St. dev.	1.755	2.253	2.572	3.052
	Median	1.877***	2.587***	1.988***	1.574***
	Percent positive	64.19	62.16	61.50	59.50
5 years maturity	Mean	3.022	5.692***	3.459	3.013
	St. dev.	2.175	2.179	3.071	2.906
	Median	2.623***	2.174***	2.564***	2.774**
	Percent positive	61.43	59.67	56.79	58.13
	N	363	363	363	363

I perform several tests to confirm the robustness of my analysis of determinants as well. First of all, I repeat all models estimations using the 5 years maturity *ADS* as the dependent variables (results are reported in Table 4.11 and Table 4.12). Unsurprisingly, results are somehow weaker (coherently with results of the event study), but still qualitatively similar. The most relevant difference is that *Leverage* is now significant at the 5% level in all models, while CDS^{PRE} is no longer significant. This suggests that, when looking at the medium-term, *Leverage* is the driver of credit risk which is most closely associated to a certification from SWFs.

Table 4.11: Determinants of Abnormal 5 years CDS Spread Decrease

This table presents the same analysis as Table Table 4.8, using 5 years *ADS* as the dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
$Size_{SWF}$	6.906***	6.974***	6.940***	7.565***	5.976***	6.464***
	(2.324)	(2.342)	(2.424)	(2.422)	(2.169)	(2.449)
$Size_{Firm}$	-2.154*	-2.311*	-2.365*	-4.186*	-2.056*	-2.066*
	(1.295)	(1.362)	(1.384)	(2.342)	(1.228)	(1.218)
LM	0.180	0.041	0.082	0.142	-0.506	-1.292
	(0.603)	(0.615)	(0.844)	(0.614)	(0.712)	(0.878)
Oil	-11.448**	-11.772**	-11.919**	-11.334**	-9.709**	-11.792**
	(4.849)	(4.971)	(5.322)	(4.967)	(4.731)	(5.685)
$Leverage$	32.432**	38.297**	38.471**	40.857**	33.229**	34.919**
	(14.338)	(19.405)	(19.006)	(20.011)	(16.351)	(16.698)
Q	0.486	0.893	0.906	1.050	0.825	1.154
	(1.512)	(1.539)	(1.535)	(1.628)	(1.548)	(1.555)
$Injection$	7.615	8.409	8.545	8.290	3.807	
	(10.122)	(9.401)	(9.987)	(9.341)	(9.197)	
CDS_{1y}^{PRE}		-0.017	-0.017	-0.021	0.011	0.010
		(0.035)	(0.035)	(0.037)	(0.028)	(0.028)
$First$			-0.780			
			(6.917)			
$Financials$				12.013		
				(8.873)		
Vix					-1.106**	-1.132**
					(0.526)	(0.522)
CBE						-13.473
						(9.229)
$Cons.$	7.630**	7.585**	8.007	4.580	7.186**	9.512**
	(3.303)	(3.362)	(5.756)	(4.729)	(3.326)	(4.011)
N obs.	371	371	371	371	370	370
R^2	0.048	0.053	0.053	0.063	0.114	0.118
$Adj.\ R^2$	0.029	0.032	0.030	0.040	0.092	0.096

Table 4.12: Determinants of Abnormal 5 years CDS Spread Decrease: additional evidence

This table presents the same analysis as Table Table 4.9, using 5 years ADS as the dependent variable.

	(7)	(8)	(9)
$Size_{SWF}$	7.845***	7.785*	8.554***
	(2.538)	(3.980)	(2.596)
$Size_{Firm}$	-2.355*	-2.532	-3.064*
	(1.347)	(1.607)	(1.601)
CDS_{1y}^{PRE}	0.024	0.026	0.022
	(0.026)	(0.027)	(0.026)
$First$	-6.565	-6.109	-7.825
	(7.120)	(7.803)	(6.495)
Vix	-1.143**	-1.208**	-1.144**
	(0.546)	(0.582)	(0.541)
$Shield$	4.997	6.503	3.619
	(6.735)	(7.739)	(7.264)
$Direct$	18.041***	18.018**	19.884***
	(6.784)	(8.839)	(6.273)
$Debt$	-34.609*	-35.177*	-30.367*
	(18.550)	(19.129)	(15.411)
$Conv$	22.610**	23.633**	26.858**
	(8.841)	(9.301)	(11.672)
$Western$	-7.984	-8.128	-6.960
	(6.524)	(7.084)	(6.564)
$Domestic$	26.671	27.435	22.557
	(25.695)	(26.430)	(23.279)
GDP		0.000	
		(0.002)	
$Slope$			-0.067
			(0.077)
$Cons.$	0.373	-0.787	0.600
	(3.837)	(4.930)	(3.754)
N obs.	370	333	370
R^2	0.117	0.120	0.125
Adj. R^2	0.090	0.088	0.096

For all regressions, I compute the Variance Inflation Factor to check for potential collinearity problems; values are well below the customary critical threshold of 5 both at covariates and model level. Finally, I control for the possible endogeneity of CDS^{Pre}, as its inclusion in the computation of ADS in Equation (Equation 4.3) could in principle engender a correlation between the variable and the error term of the estimate. I thus instrument CDS^{Pre} using Leverage and Tobin's Q. I estimate a full model, including all other covariates in models (2)-(9), using 2SLS. Results are qualitatively similar to those presented in Tables Table 4.8 and Table 4.9 and are reported in Table 4.13.

Table 4.13: Determinats of abnormal 1 year CDS spread decrease 2SLS

This table present results obtained instrumenting CDS_{1y}^{PRE} using *Leverage* and Q, and including all the other regressors in Models (2)-(9), reported in Table Table 4.8 and Table 4.9.

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Size_{SWF}$	4.417**	4.428**	4.369**	3.862*	4.579**	5.510**	6.447**	5.958**
	(1.893)	(1.943)	(1.933)	(1.979)	(2.150)	(2.327)	(3.238)	(2.371)
$Size_{Firm}$	-1.481	-1.466	-1.326	-1.402	-1.459	-1.792*	-1.704	-2.361**
	(0.989)	(1.028)	(1.413)	(0.985)	(0.968)	(0.984)	(1.201)	(1.063)
LM	0.259	0.245	0.246	-0.159	-0.920			
	(0.607)	(0.687)	(0.594)	(0.571)	(0.775)			
Oil	-7.237*	-7.195*	-7.281*	-5.947	-8.035*			
	(3.821)	(3.987)	(3.804)	(3.852)	(4.635)			
$Injection$	2.618	2.583	2.648	-0.024				
	(5.958)	(6.250)	(5.928)	(6.375)				
CDS_{1y}^{PRE}	0.095**	0.095**	0.095***	0.105**	0.105***	0.106**	0.110***	0.113***
	(0.037)	(0.037)	(0.036)	(0.041)	(0.040)	(0.041)	(0.041)	(0.041)
$First$		0.235				-3.520	-3.353	-4.930
		(4.915)				(5.719)	(6.182)	(5.441)
$Finance$			-1.026					
			(5.997)					
Vix				-0.721	-0.744*	-0.719	-0.785	-0.792*
				(0.460)	(0.438)	(0.464)	(0.484)	(0.456)
BCE					-13.370**			
					(6.691)			
$Shield$						8.570	7.953	6.974
						(5.860)	(6.756)	(5.637)
$Direct$						11.149**	13.512**	12.409***
						(4.802)	(6.358)	(4.565)
$Debt$						-27.922**	-29.567**	-25.076**
						(11.906)	(12.349)	(10.479)
$Conv$						8.979**	8.466*	12.953**
						(4.105)	(4.453)	(6.345)
$Western$						-9.819	-10.184	-8.314
						(6.648)	(6.785)	(6.378)
$Domestic$						20.682*	21.175*	18.026*
						(11.247)	(11.654)	(9.796)
GDP							-0.001	
							(0.001)	
$Slope$								-0.057
								(0.037)
Cons.	11.010***	10.883***	11.264***	10.694***	12.770***	5.039*	4.364	5.624**
	(2.635)	(3.710)	(3.063)	(2.655)	(3.228)	(2.671)	(3.432)	(2.640)
N obs.	371	371	371	370	370	370	333	370
R^2	0.095	0.096	0.096	0.118	0.125	0.134	0.129	0.128
Adj. R^2	0.081	0.078	0.079	0.101	0.108	0.107	0.096	0.098

In summary, results in Table 4.8 and Table 4.9 are quite robust and suggest that while, on average, the impact of SWFs on credit risk is positive (i.e. credit risk is reduced), the expected impact is substantially influenced by firm, SWF and deal characteristics. The highest impact is found for large, unlevered SWFs which are explicitly given a mandate to pursue direct investments. Small firms exhibiting short-term financial troubles (but with a relatively good medium-term outlook) are those for which the certification effect is most significant. All these results are highly consistent with the SWFs certification hypothesis.

4.5 Concluding remarks

In this chapter I analyze the impact of SWFs on the credit risk of target companies. I argue that SWFs reduce the credit risk of portfolio companies by implicitly guarantying a financial support in case of short-term distress. I measure credit risk by looking at target firm's CDS spread, and use event study analysis to evaluate its evolution across SWF investment. For each investment event I build an adjusted measure of CDS spread decrease (ADS) using different event windows and CDS maturities. Using the SWF Transaction Database (SWFTD), I identify a sample of 371 SWF investments for which I am able to find essential company, SWF and deal specific information.

My findings point out that after a SWF investment target company's credit risk decreases significantly. I estimate the mean (median) adjusted decrease in 1 year maturity CDS spread in a $[-5, +4]$ event window across the investment event to be 7.019 bps (1.791 bps) . The 1 year CDS spread exhibits no tendency to revert to its pre-investment value in the days following the event. The magnitude of the mean (median) decrease in 1 year CDS spread is only marginally altered and is still statistically different from zero up to a $[+25, +34]$ event window. These results are confirmed when I only consider deals which have not determined a capital injections to the target firm. This supports the idea that the effect on credit risk is not only the mere reflection of an increase in financial resources but is due to a certification effect. Results for 5 year CDS spread are weaker in both magnitude and statistical significance. The difference between 1 year and 5 year CDS spread decrease suggests that markets perceive SWFs as more effective in stabilizing companies whose credit risk derives from short-term factors (such as the shortage in financial resources), rather than medium-term issues.

Interestingly, ADS is higher for companies which have a higher pre-investment credit risk. If I divide target companies based on their pre-investment CDS spread, I find that mean (median) ADS (computed on 1 year maturity and a $[-5, +4]$ event windows) in the first quartile (i.e. lowest pre-investment CDS spread) is only 0.227 bps (0.113 bps), but is as high as 17.407 bps (13.603 bps) in the top quartile (i.e. highest pre-investment CDS spread).

This result is confirmed by a multivariate analysis on *ADS*. I find that, controlling for firm, deal, and SWF characteristics, the higher is the pre-investment level of credit risk, the higher is the decrease in credit spread following the investment event: other things being equal a 1 standard deviation increase in pre-investment CDS spread is associated to an increase in *ADS* between 13 bps and 18 bps (depending on the model). Some other interesting results emerge from the multivariate analysis. First, larger SWFs are associated to a more significant decrease in CDS spread: other things being equal, a 1 standard deviation increase in SWF size determines an increase in *ADS* between 4.7 bps and 6.4 bps. This is consistent with the idea that the larger the SWF, the more it could afford to back the firm through tough times. SWFs with an explicit mandate to pursue direct investments generate an *ADS* between 12 and 13 bps higher than SWFs pursuing mostly index-replication strategies. I also find (weak) evidence that SWFs explicitly protected from Government's withdrawals, and those that are not leveraged, have a larger impact on *ADS*. Finally, I find that firms with higher medium-term credit risk (compared to short-term credit risk) benefit less from SWFs investments, consistently with the idea that SWFs as shareholders are most effective in solving short-term financial distress rather than structural problems. Overall, our results are consistent with a SWFs certification hypothesis, according to which SWFs may support the financial viability of portfolio companies by "insuring" them against liquidity shocks. The magnitude of the certification effect is however significantly affected by the characteristics of the deal. Moreover, the effect seems to be far more significant for short-run than medium-run credit risk.

It must be stressed that the positive view which market participants seem to have on the impact of SWFs on firm's stability is not necessarily shared by market regulators. On the wake of the US Dodd-Frank Wall Street Reform and Consumer Protection Act, the Commodity Futures Trading Commission has proposed on April 28, 2011 that:

> "[..] a tight link with the health of its domestic banking system, and by extension with the broader global financial system, makes a sovereign counterparty similar to a financial entity both in the nature of the systemic risk and the risk to the safety and soundness of the covered swap entity. As a result, the Commission preliminarily believes that sovereign counterparties should be treated as financial entities for purposes of the proposed rule's margin requirements".[26]

It is then interesting to compare these findings with those of other works on the impact of institutional investors on the firm credit risk. Klein and Zur (2011) observe that abnormal positive stock returns associated with hedge fund investments come to the expense of bondholders, who experience instead significant negative abnormal returns. To this extent, SWFs seem to be quite different. While most studies in the literature find that SWF investments, like hedge fund's, are associated with positive

[26]The proposal can be found at this link: `http://federalregister.gov/a/2011-9598`

stock returns Chhaochharia and Laeven (e.g. 2008); Bortolotti et al. (e.g. 2010); Dewenter et al. (e.g. 2010); Knill et al. (e.g. 2010); Kotter and Lel (e.g. 2011), my results suggest that this does not come to the expense of creditors, since CDS spreads indicate, on average, a significant decrease in credit risk. My results are, instead, remarkably in line with studies on the impact of government investments on firm's credit risk and cost of debt (Iannotta et al. (e.g. 2009); Borisova and Megginson (e.g. 2011)). This suggests that, when seen from a creditor's perspective, SWFs, even when investing abroad, resemble more closely State-owned investment vehicles than private institutional investors like hedge funds or pension funds.

Table 4.5: Correlation matrix

In this table I provide the sample correlation among all variables included in our study. Variables are defined as inTable 4.1.

	ADS_{1y}	ADS_{5y}	DS_{1y}	DS_{5y}	IDS_{1y}	IDS_{5y}	CDS_{1y}^{PRE}
ADS_{5y}	0.73	1.00					
DS_{1y}	0.81	0.83	1.00				
DS_{5y}	0.70	0.85	0.96	1.00			
IDS_{1y}	0.29	0.60	0.79	0.84	1.00		
IDS_{5y}	0.50	0.51	0.83	0.89	0.83	1.00	
CDS_{1y}^{PRE}	0.54	0.21	0.36	0.24	0.04	0.21	1.00
CDS_{5y}^{PRE}	0.46	0.16	0.27	0.16	-0.03	0.11	0.96

	$Size_{Firm}$	$Size_{SWF}$	Q	$Leverage$	Vix	LM	$Slope$	$Finance$	Oil
$Size_{Firm}$	0.24	1.00							
Q	0.30	0.05	1.00						
$Leverage$	-0.23	0.00	-0.63	1.00					
Vix	0.00	0.01	0.02	0.00	1.00				
LM	-0.25	-0.02	0.02	0.09	-0.16	1.00			
$Slope$	-0.09	-0.20	-0.04	0.09	-0.06	0.08	1.00		
$Finance$	0.04	0.55	0.00	-0.01	-0.04	-0.05	-0.22	1.00	
Oil	0.42	0.14	0.28	-0.21	0.03	0.10	0.00	-0.04	1.00
$Shield$	0.31	0.17	0.22	-0.14	0.06	0.36	-0.12	0.04	0.16
$Direct$	-0.69	-0.22	-0.30	0.32	-0.16	0.32	0.19	-0.05	-0.48
$Debt$	-0.25	-0.08	-0.03	0.03	0.02	0.05	0.18	0.05	-0.03
$First$	-0.31	-0.29	-0.11	0.14	-0.17	0.28	-0.01	-0.12	-0.21
$Western$	0.43	0.15	0.30	-0.12	-0.09	0.58	-0.03	-0.06	0.57
$Domestic$	-0.15	-0.08	0.01	-0.08	0.00	0.00	0.00	0.01	-0.09
$Conv$	-0.05	0.15	-0.01	0.01	-0.03	0.02	0.12	0.12	-0.03
$Injection$	-0.18	0.07	-0.03	0.11	-0.06	0.02	0.19	0.07	0.01
CBE	0.17	-0.01	0.02	-0.04	0.01	-0.59	0.04	0.00	-0.22
GDP	0.12	-0.04	-0.16	0.22	-0.13	-0.26	0.17	-0.03	-0.47

	Oil	$Shield$	$Direct$	$Debt$	$First$	$Western$	$Domestic$	$Conv$	$Injection$	CBE
$Shield$	0.16	1.00								
$Direct$	-0.48	-0.43	1.00							
$Debt$	-0.03	0.16	0.27	1.00						
$First$	-0.21	-0.16	0.49	0.04	1.00					
$Western$	0.57	0.56	-0.33	-0.09	-0.03	1.00				
$Domestic$	-0.09	0.02	0.15	0.42	0.00	0.02	1.00			
$Conv$	-0.03	-0.04	0.07	0.08	-0.02	-0.07	-0.02	1.00		
$Injection$	0.01	0.11	0.26	0.51	0.10	-0.11	0.08	0.53	1.00	
CBE	-0.22	-0.28	-0.23	-0.06	-0.13	-0.15	-0.04	-0.05	-0.09	1.00
GDP	-0.47	-0.49	0.38	-0.12	0.17	-0.24	-0.06	-0.04	-0.05	0.51

5 Conclusion

This work on Sovereign Wealth Funds (SWFs) has been motivated by the surge of interest in the field by academics, regulators and practitioners seen in the last few years. There are several reasons for the particular attention devoted by market participants to these actors: first of all, they have fast increased in number and size in the last few years, due to structural trade surpluses and raise in the price of commodities that have endowed some countries with a significant amount of excess foreign reserves to invest; second, their investments activity has sharply shifted toward foreign equity, thus raising several concerns about the potential political implication of a foreign government-linked ownership of "western" companies. Several studies appeared on the aftermath of the 2007-2008 financial crisis have put a strong accent on this political risk linked to SWFs, thus often identifying them *a priori* as a negative force in financial markets; however, in this work I try to keep a more agnostic view.

First of all, in order to assess whether SWFs general investments strategy can actually justify these concerns or, instead, respond to a purely financial logic, it is necessary to define what a rational allocation for a SWF would be. In this work I focus on resource-based SWFs, that represent more than 50% of SWFs Assets Under Management (SWF Institute, 2011), and on their need for hedging their countries commodities-driven revenues. Using a Markowitz' framework, I model the commodity endowment as a non-shortable position; while parameter estimations issues and SWFs lack of transparency do not allow to know with precision what an optimal portfolio allocation for a SWF would be, I show that tackling the problem in terms of relative deviation of portfolio allocation from a neutral benchmark allows to implement some parsimonious tests robust to parameters uncertainty. I find that some factuals on SWFs investments activity, such as their appetite for Financials firms, could be explain by the scarce correlation of their financial returns with oil price. Testing the proposed methodology on the Norwegian Government Pension Fund - Global (GPF), I find its portfolio allocation to deviate from the neutral benchmark as predicted by the theory both in static and dynamic terms, coherently with its stabilization target. Unfortunately, at the time this work has been written no other oil-based SWF portfolio composition was known with the same degree of detail as GPF's; however, both private big data collection projects and SWFs increased transparency are likely to allow to perform the proposed tests for different SWFs in the near future, thus evaluating the relevance of stabilization among their targets and ultimately how financially sound their strategic asset allocation can be considered.

While the SWFs nature of Government-related entities is certainly an issue, this focus has come to the expense of other characteristics that have been often neglected or scarcely considered but that in my view are equally important to make SWFs quite a unique class of investors. Given their dimension, lack of explicit liabilities and shield from bank run-like phenomena, SWFs exhibit a potential for risk bearing and long-termism no private investor can have, thus making them the ideal countercyclical investor. Coherently with factual evidence, I find in this work that SWFs indeed have been investing intensively in firms potentially experiencing financial distress; studying their target selection at micro level I find that firms receiving direct investments by SWFs are characterized by an higher level of financial risk, as proxied by their higher leverage, lower interest coverage ratio and assets tangibility than otherwise comparable firms. Previous studies find an alleged SWFs appetite for poorly performing firms which, jointly with the risk for financial distress target firms have, could be justified by SWFs pursuing other than financial targets. I cast in doubt both this result and this potential interpretation: I show how SWFs seems instead to target firms with good operative performances, even though exhibiting a low level of growth. Moreover, I stress how their unique nature make them particularly suited for pursuing investments in illiquid and potentially underpriced assets, with expected poor returns in the medium-term but potential high returns in the long-term; shares of firms in strong need for new capital (distressed sellers) but with relatively good operative performances (not distressed assets) clearly belong to this category. Coherently, I propose a *SWFs certification hypothesis*, according to which SWFs can have financial, strategic and political reasons to provide “bridge financing” to their portfolio companies; their superior financial capacity allows them to bear the risk and avoid short-termism in a way quite no other investor can do, thus providing them with a comparative advantage with this respect. Studying Credit Default Swaps (CDS) spread in the surrounding of SWFs investments, I find that credit risk is abnormally reduced in the aftermath of the event even when there is no contingent capital injection, coherently with the hypothesis. In other words, I argue SWFs are expected to back financially their portfolio companies and thus reduce their credit risk. While I find the effect significantly lower for “western” SWF, a result suggesting political implications could matter, smaller countries SWFs do not appear to have a stronger impact as it would be expected if political goodwill seeking was the only reason for these investments. On the contrary, potential strategic and financial targets seems to moderate the phenomenon in a significant way: an higher spread reduction is associated with firms exhibiting an higher short-term credit risk (distressed sellers) rather than an high medium-term credit risk (distressed assets); SWFs with a mandate for strategic investments appear to have a stronger impact. Finally, SWFs with a higher financial capacity (bigger, protected from withdrawals, unlevered) have a stronger impact, especially when investing in smaller firms, as these would be easier to back financially. All in all, I find that not only SWFs appear to be perceived as “white knights” by the market, but that their investments in financially troubled firms are found to be more beneficial when there is room for this investment being either financially or strategically sound, rather than not. In other words, markets consider the potential for capital injections by SWFs in their portfolio companies as financially and/or strategical rational. Given the recent surge in SWFs activity, it hasn't been easy so far to study medium-term implications of SWFs investments from a micro perspective. Future research should investigate how this potential certification hypothesis affects firms realized default probability, capital structure choice, cost of capital, investment decisions etc. Equally, as many of the aforementioned SWFs characteristics are the result of global trading imbalances that could be reduced or even reversed in the future, it will be interesting to analyze how this macroeconomics change could affect the SWFs portfolio firms.

Putting these results for SWFs in a broader context, three things are worth of notice.

The first one is the implication of the financial capacity and long-termism of a government-linked shareholder for a firm; for decades, academics have been underlining the benefits of privatizations, as public ownership have moral hazard and political patronage implications which are detrimental for firms governance and ultimately for their performances (e.g. Megginson and Netter, 2001); however, until recently the "bright side" of this moral hazard issue - i.e. the benefit of an implicit insurance against default - has been neglected. With the advent of the crisis and the several public interventions for troubled firms financial support, other academics have started looking at the "certification effect" for traditional government-ownership (i.e. not involving SWFs), finding indeed an inverse relationship with firms costs of financing and credit risk (e.g. Borisova and Megginson, 2011). It could be argued that a Government act as "investor of last resort" for political, rather than purely financial, reasons; while this is surely true, it would be incorrect to liquidate as "financially irrational" these investments: for example, according to some estimations, the US Tarp program not only has served the scope of supporting the US financial system but it has also brought returns well above Treasury bonds[1] . While a more thoughtful analysis of risk-returns would of course be required, it could thus be the case that governmental liquidity injections in distressed firms during 2008 have turn out to be good investments also from a purely financial perspective - and in a relatively short time.

This lead to the second point worth of notice: if providing new capital to certain "distressed sellers" can be considered as rational (at least *ex-post*) , why very few private investors have been keen to exploit this situation? According to my view, the answer is to be found in investors characteristics. In financial literature, there is a clear dichotomy with this respect: on the one hand, traditional asset pricing - backing on the representative agent hypothesis - and capital budgeting theory have focused on the concept of a global fair value and have thus long neglected the possibility of subjective fair values for the same asset (investment) *not* averaging away. On the other hands, there are several example of financial theories and empirical evidence taking into account the possibility that the same asset (i.e. the same investment) can have in equilibrium a different value for different subjects: examples of

[1] Bank Bailout Returns 8.2% Beating Treasury Yields. Bloomberg, 20 October 2010.

this are Jensen and Meckling (1976) theory of private benefits or Faccio et al. (2011) evidence on the link between shareholders diversification and corporate risk-taking. Even two academics well-known for their support of the efficient market hypothesis such as Eugene Fama and Kenneth French have recognized in a 2007 paper that multiple fair value can coexist in equilibrium depending on different investors characteristics. Getting back to my empirical evidence on SWFs, the point here is that a shareholder with a big financial capacity, an high tolerance for risk, no short-term liabilities and a long-term view can consider as financially rational to increase her stake in a troubled firm, while another shareholder owning the same stake but with a) the latter representing a bigger amount of its portfolio, b) with no investable capital available, c) with short-term liabilities and d) with a positive (and relevant) value of her short-term consumption in her utility function could find not rational to do the same investment. Notice that this line of arguments doesn't consider the potential for the investor to somehow actively influence the value of the asset itself, one step further from managerial theories quoted above.

Finally, as seen in this work, this issue has in turn relevant implications for a firm credit risk; the existence of an investor keen to hold on through a credit crunch allow to avoid the default of a firm that can still be profitable in the long-term but wouldn't muddle through a crisis without new capital. A similar dynamic has been seen on European sovereign debt during 2011, where banks deleveraging has drawn the demand for government bonds from their traditional buyers without the latter being replaced by other sources of capital, thus increasing the risk of an endogenous default[2].

These considerations have non trivial implications for investors, policy makers and SWFs countries citizens alike: analysts should be aware of the significant market reaction driven by investors like Sovereign Wealth Funds in terms of targeted companies perceived credit risk; policy makers, while keep monitoring the potential political implication of SWFs investments, shouldn't demonize them and should recognize the benefits these actors can bring in terms of stabilization, at least at the micro level. On the contrary many financial reforms, including the US Dodd-Frank act, have taken into the account the possibility to increase the regulation for foreign government-linked investors relying on an alleged potential risk increase I find no evidence of. For what concerns SWFs countries citizens, in the first part of this work I have shown how SWFs performances shouldn't be evaluated against a neutral benchmark, as this cannot take into account the peculiar characteristics of these investors. This of course can be considered a more relevant aspects for Funds coming from highly democratic countries; however, the risk of short-termism and of focusing on returns against an inappropriate benchmark when evaluating SWFs performances could affects also countries where the power is more concentrated.

In conclusion, while I do not neglect the potential risk of political implications for SWFs, I also find evidence these entities, thanks to their financial capacity and long-

[2] The dash for cash. The Economist, 3 December 2011

termism, can play a beneficial role for their portfolio companies and for financial markets in general. On a broader perspective, these findings add to the financial literature exploring the implications of *who* holds a financial asset on the asset itself.

6 Appendix

6.1 Proofs

6.1.1 Proof of Equation 2.2

To prove Equation 2.2 I follow quite closely Appendix A in Gintschel and Scherer (2008). For notational convenience let $\mathbf{x}$ be the $N \times 1$ vector of portfolio weights for risky assets, such that $\mathbf{1}^T\mathbf{x} = \alpha$ and $\mathbf{w} = \frac{\mathbf{x}}{\alpha}$. The optimization problem is the following:

$$\min \tfrac{1}{2}\left((1-\alpha)^2 (1-\omega)^2 \mathbf{x}^T\mathbf{\Sigma}\mathbf{x} + 2\omega(1-\omega)\sigma_c^2\mathbf{x}^T\mathbf{b} + \omega^2\sigma_c^2\right) \tag{6.1}$$

$$\text{Subject to:} \quad \mu_{Tot} = (1-\omega)\left(R_f + (\mathbf{z} - R_f\mathbf{1})^T\mathbf{x}\right) + \omega r_c$$

The Lagrangian for Problem (Equation 6.1) is given by:

$$\begin{aligned}\mathcal{L} &= \frac{1}{2}\left((1-\omega)^2 \mathbf{x}^T\mathbf{\Sigma}\mathbf{x} + 2\omega(1-\omega)\sigma_c^2\mathbf{x}^T\mathbf{b} + \omega^2\sigma_c^2\right)\\ &+ \lambda\left(\mu_{Tot} - (1-\omega)\left(R_f + (\mathbf{z} - R_f\mathbf{1})^T\mathbf{x}\right) - \omega r_c\right)\end{aligned}$$

.

By setting the first order conditions on $\mathbf{x}$, we obtain:

$$\mathbf{x} = \frac{\lambda\mathbf{\Sigma}^{-1}(\mathbf{z} - R_r\mathbf{1}) - \omega\sigma_c^2\mathbf{\Sigma}^{-1}\mathbf{b}}{1-\omega} \tag{6.2}$$

Substituting Equation 6.2 in the constraint we obtain

$$\lambda = \frac{\mu_{Tot} - \omega r_c - (1-\omega)R_f + \omega\sigma_c^2(\mathbf{z} - R_f\mathbf{1})^T\mathbf{\Sigma}^{-1}\mathbf{b}}{(\mathbf{z} - R_f\mathbf{1})^T\mathbf{\Sigma}^{-1}(\mathbf{z} - R_f\mathbf{1})} \tag{6.3}$$

Substituting in Equation 6.3 $\mu = \frac{\mu - \omega r_c}{1-\omega}$, i.e. the target return for the SWF to allow overall return to reach μ_{Tot}, and then substituting Equation 6.3 in Equation 6.2 we obtain:

$$\begin{aligned} \mathbf{x} &= \left(\mu + \frac{\omega}{1-\omega}\sigma_c^2 \left(\mathbf{z} - R_f\mathbf{1}\right)^T \boldsymbol{\Sigma}^{-1}\mathbf{b} - R_f\right) \frac{\boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_r\mathbf{1}\right)}{\left(\mathbf{z} - R_f\mathbf{1}\right)^T \boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)} \\ &- \frac{\omega}{1-\omega}\sigma_c^2 \boldsymbol{\Sigma}^{-1}\mathbf{b} \end{aligned} \tag{6.4}$$

Using the following expression for the tangency portfolio and its return:

$$\mathbf{w}^* = \frac{\boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)}{\left(\mathbf{1}^T\boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)\right)}$$

$$\mu^* = R_f + \frac{\left(\mathbf{z} - R_f\mathbf{1}\right)^T \boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)}{\left(\mathbf{1}^T\boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)\right)}$$

and dividing and multiplying the first addendum in Equation 6.4 by $\left(\mathbf{1}^T\boldsymbol{\Sigma}^{-1}\left(\mathbf{z} - R_f\mathbf{1}\right)\right)$ we obtain the following:

$$\begin{aligned} \mathbf{x}(\mu) &= \frac{\mu_{SWF} + \frac{\omega}{1-\omega}\sigma_c^2 \left(\mathbf{z} - R_f\mathbf{1}\right)^T \boldsymbol{\Sigma}^{-1}\mathbf{b} - R_f}{\mu^* - R_f}\mathbf{w}^* \\ &- \frac{\omega}{1-\omega}\sigma_c^2 \boldsymbol{\Sigma}^{-1}\mathbf{b} \end{aligned} \tag{6.5}$$

The last term in Equation 6.5 is a non-normalized version of the perturbation vector. In order to normalize it we add and subtract its measure, scaled by the market portfolio, that is: $\frac{\omega}{1-\omega}\sigma_c^2\mathbf{w}^*\mathbf{1}^T\boldsymbol{\Sigma}^{-1}\mathbf{b}$, and obtain:

$$\begin{aligned} \mathbf{x}(\mu) &= \frac{\mu + \frac{\omega}{1-\omega}\sigma_c^2 \left(\left(\mathbf{z} - R_f\mathbf{1}\right)^T - \left(\mu^* - R_f\right)\mathbf{1}^T\right) \boldsymbol{\Sigma}^{-1}\mathbf{b} - R_f}{\mu^* - R_f}\mathbf{w}^* + \\ &- \frac{\omega}{1-\omega}\sigma_c^2 \left(\boldsymbol{\Sigma}^{-1}\mathbf{b} - \mathbf{w}^*\mathbf{1}^T\boldsymbol{\Sigma}^{-1}\mathbf{b}\right) = \\ &= \frac{\mu + \frac{\omega}{1-\omega}\mu_{\boldsymbol{\Delta}} - R_f}{\mu^* - R_f}\mathbf{w}^* - \frac{\omega}{1-\omega}\boldsymbol{\Delta} \end{aligned}$$

where $\boldsymbol{\Delta} = \sigma_c^2\left(\mathbf{I} - \mathbf{w}^*\mathbf{1}^T\right)\boldsymbol{\Sigma}^{-1}\mathbf{b}$ and $\mu_{\boldsymbol{\Delta}} = \mathbf{z}^T\boldsymbol{\Delta} = \sigma_c^2\left(\mathbf{z} - \mu^*\mathbf{1}\right)^T\boldsymbol{\Sigma}^{-1}\mathbf{b}$. Moving now to the notation used in subsection 2.3.1 we obtain

$$\alpha = \mathbf{1}^T \mathbf{x} = \frac{\mu + \frac{\omega}{1-\omega}\mu_{\mathbf{\Delta}} - R_f}{\mu^* - R_f} \tag{6.6}$$

and

$$\mathbf{w} = \frac{\mathbf{x}}{\alpha} = \mathbf{w}^* - \frac{\omega}{1-\omega} \frac{\mu^* - R_f}{\mu_{SWF} + \frac{\omega}{1-\omega}\mu_{\mathbf{\Delta}} - R_f} \mathbf{\Delta} \tag{6.7}$$

Equation 6.6 and Equation 6.7 yield immediately to Equation 2.2. The scalar $K(\mu, \omega) = \frac{\omega}{1-\omega} \frac{\mu^* - R_f}{\mu_{SWF} + \frac{\omega}{1-\omega}\mu_{\mathbf{\Delta}} - R_f}$ amplifies the deviation of the globally efficient portfolio from the market portfolio. Its partial derivatives with respect to μ and ω are respectively:

$$\begin{aligned} K_\mu &= -\frac{\omega}{1-\omega} \frac{\mu^* - R_f}{\left(\mu_{SWF} + \frac{\omega}{1-\omega}\mu_{\mathbf{\Delta}} - R_f\right)^2} &< 0 \\ K_\omega &= \frac{1}{(1-\omega)^2} \frac{\left(\mu^* - R_f\right)\left(\mu_{SWF} - R_f\right)}{\left(\mu_{SWF} + \frac{\omega}{1-\omega}\mu_{\mathbf{\Delta}} - R_f\right)^2} &> 0 \end{aligned}$$

6.2 Matching

6.2.1 Geographic matching

Region	Countries
Europe	Austria; Belgium; Luxemburg; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Liechtenstein; Netherlands; Poland; Portugal; Russia; Spain; Sweden; Switzerland; Turkey; United Kingdom
North America	Bermuda; Brazil; Canada; Cayman Islands; Mexico; US
Pacific	Australia; China; Egypt; Hong Kong; India; Indonesia; Israel; Japan; Malaysia; New Zealand; Papua Ny-Guinea; Philippines; Republic of Korea; Singapore; South Africa; Taiwan; Thailand; UAE

6.2.2 Sector matching

Industry	2 digits SIC Codes
Energy	12; 13; 29
Materials	08; 10; 14; 24; 26; 28; 30; 31; 32; 33; 34; 52
Industrials	15; 16; 17; 27; 35; 37; 40; 41; 42; 43; 45; 46; 47; 73; 87; 89
Cons. Discretionary	22; 23; 25; 50; 51; 53; 55; 56; 57; 58; 59; 70; 72; 75; 76; 78; 79; 81; 82; 83; 84; 86
Consumer Staples	01; 02; 07; 09; 20; 21; 54
Health Care	80
Financials	60; 61; 62; 63; 64; 65; 67
IT	36; 38; 39
Telecom	48
Utilities	44; 49

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