

Sovereign Wealth Fund Investments: From Firm-level Preferences to Natural Endowments*

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Abstract

Sovereign wealth funds are a major force in international capital markets, but the determinants of their allocation of capital are not well understood. I study equity investments of sovereign wealth funds during the period 2006-2009 as a function of the fund's objectives and characteristics. Using a comprehensive dataset of equity holdings, I explore investment preferences of SWFs at the firm-level, looking at differences by the fund's source of proceeds (commodity/non-commodity), investment guidelines (OECD/non-OECD) and investment destination (domestic/foreign). I find significant differences in the allocation of SWF equity investments depending on these factors. Although most SWFs are attracted to large firms, with proven profitability and international activities, differences remain on the fund's investment preferences and their effect on firm value. However, SWF equity allocation is not fully explained by firm-level determinants. Other factors related to diversification and natural endowments (e.g. arable land, forest areas, fuel exports), studied in a gravity model framework, partially explain the shift of SWF equity investments towards commodity and natural resource sectors. The effect is preponderant when analyzing commodity-related investments and controlling for other determinants.

JEL classification: G11, G15, G20, G23.

Keywords: Sovereign Wealth Funds, asset allocation, international capital markets, gravity model, diversification, natural resource endowments.

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1 Introduction

Sovereign Wealth Funds (SWFs) are a subject of significant policy interest. With a large scope for investment, they have become major providers of international liquidity and have defined a new form of public investment. Following a decade-long trend, a new generation of countries in Africa, Latin America and Asia have considered setting up or expanding sovereign wealth institutions in the future.¹ As managers of national wealth, their strategic asset allocation is one of the principal drivers of a country's financial capital.

Sovereign wealth institutions have several characteristics in common: they are government owned investment vehicles with long-term horizon and non-standard liabilities. They have, in general, less liquidity constraints and a higher tolerance for risk than central banks managing international reserves. The allocation of capital of sovereign funds is intrinsically associated with their origin, organizational structure and national objectives, which can explain fundamental differences in their investments. The origin of revenues sets a clear separation in their approach to asset allocation, with commodity-based funds having different incentives and risks to foreign exchange funds. Other factors, related to information asymmetries or specific domestic policies through public investment, can exacerbate these differences.

In this paper, I ask how equity portfolio allocations of sovereign wealth funds are affected by firm determinants and access to natural resources. In particular, I am interested in the shift of sovereign wealth fund holdings to a new investment space. My aim is to broaden existing knowledge of SWF allocations, while providing new insight into the role of commodity and natural endowments in the process of public investment. I present an empirical analysis based on a unique fund and firm-level dataset for a group of 22 sovereign wealth institutions. The main results are the following: First, there are significant differences on the investment preferences of SWF depending on the three studied dimensions (source of proceeds, OECD effect, home/foreign bias effect). Second, the recent shifts in asset allocation and the investment pattern in SWFs can be partially explained by the need to ensure their access to commodities and natural resources.

Evidence on the allocation strategy of sovereign funds is scarce. Recent studies have mainly relied on aggregate data or fund deals, and not from actual equity holdings. Furthermore, allocation differences within funds have not been previously studied. To fill this gap, I stress three potential dimensions explaining the differences in allocation: First,

¹The creation of sovereign wealth institutions is not exclusive to one region: Algeria, Angola, Ghana, Nigeria, Tunisia (in Africa), Brazil and Colombia (in Latin America), and India, Indonesia, Iran, Malaysia and Mongolia (in Asia) have set the institutional framework and introduced legislation in this direction.

I consider the source of proceeds as a crucial determinant of the SWF portfolio allocation. The contrast between commodity and non-commodity funds have seldom been tested empirically, even if theoretical approaches have been proposed in this direction (Engel and Valdes 2000, Scherer 2009). Second, I assess the peer-effect of investment guidelines by considering OECD and non-OECD funds. Research on other institutional investors stresses the role of information asymmetries for explaining cross-border investment flows (Ferreira and Matos (2008) in the case of institutional investors and Di Giovanni (2005) regarding M&A acquisitions). Third, I examine the contrast between domestic and foreign equity holdings. Evidence at the fund level for private investors has evoked disparities in investment preferences in addition to the familiar home bias effect.

Two reasons can be attributed to the interest of SWFs for strategic-sector investments. First, the economic rebalancing resulting from the rise of emerging economies significantly diverted SWFs' financial interests and, like other institutional investors, they have re-directed their investments.² Second, a number of SWFs have set, publicly and often implicitly, a strategy to guarantee access to natural resources. The strategy is justified on the grounds of the increasing scarcity of exhaustible resources and the volatility of commodity prices, which has been often associated with the role of speculation on commodity markets and the limited hedging capacity of commodity producers. A significant share in the equity portfolio rebalancing of SWFs is related to the access to natural resources, particularly agricultural land, water and energy. The asset demand from sovereign funds has not exclusively focused on hard commodity industries. Current SWF portfolios involve agriculture, water and food-related industries, which have sometimes been acquired through joint investments.³

Equity portfolios at the firm-level can reveal investment preferences (and differences) between sovereign funds at various levels (e.g. risk aversion, liquidity requirements, diversification). As equity holdings of some sovereign investors show large deviations from market portfolios, various hypotheses have been proposed to explain this behaviour. Commodity funds, in particular, are perceived as hedging instruments against commodity price fluctuations (Scherer 2009, Frankel 2010). From another perspective, information asymmetries can make OECD sovereign funds more risk averse than non-OECD sovereign investors. Risk sharing and diversification (at the sector and country level) is

²The exposure to OECD financial firms was largely responsible for the estimated 18% reduction of sovereign funds' portfolio between 2007 and 2009 (Bortolotti et al. 2009). University endowment funds have been often compared to SWFs. Between 1995 and 2010, the largest academic endowment fund, Harvard Management Company (HMC), increased its portfolio in emerging economies from 5% to 11%.

³Institutions like Jeddah-based Islamic Development Bank (IDB) joined Qatar's sovereign wealth fund to finance agriculture sector projects in developing countries. The agreement between 1Malaysia Development (Malaysia) and PetroSaudi International (Saudi Arabia) to set-up a joint venture from the Middle East to Malaysia is another example.

an important dimension explicitly mentioned in some mandates (e.g. Temasek, one of Singapore’s two sovereign funds).

The micro data on equity holdings allows me to explore the determinants of SWF’s demand for public stocks on different dimensions. First, firm characteristics provide information on SWF preferences for return, liquidity, momentum, risk or transaction costs. In this respect, differences among SWF groups have not been documented. Second, fund-level information allows me to explore the effect of fund characteristics and their diversification motive, given that institutional investors tend to diversify specific risk sources (i.e. commodity, equity or exchange risk).⁴ Third, based on anecdotal evidence, I explore the relationship between SWF portfolio allocations with the country’s capacity to satisfy its demand for natural endowments. I emphasize the importance of the commodity/non-commodity distinction for explaining differences in equity allocation, and the role of these investment vehicles to secure access to commodities and natural resources.

I use data on equity holdings of sovereign wealth funds in developed and emerging economies, detailed at the fund and firm level. An important feature of these data is that they provide the participation of the fund, both as a share of the firm’s market value and as a share of the fund portfolio. In addition to firm and sector-level characteristics, I use a dataset on indicators of national wealth on access to hard/soft commodities, land and water, that I denote as proxies for natural endowments. My results show that firm size and international activities have a positive effect on SWF ownership. A one standard deviation increase in these factors rises the probability of SWF participation by 0.22 and 0.01 per cent, respectively. The impact is variable across fund groups. Other effects are associated with particular forms of ownership: foreign activity (for non-commodity funds) and low leverage (for OECD funds). In addition, natural-endowment factors affect the allocation of SWF investments at the firm level, depending on the fund category.

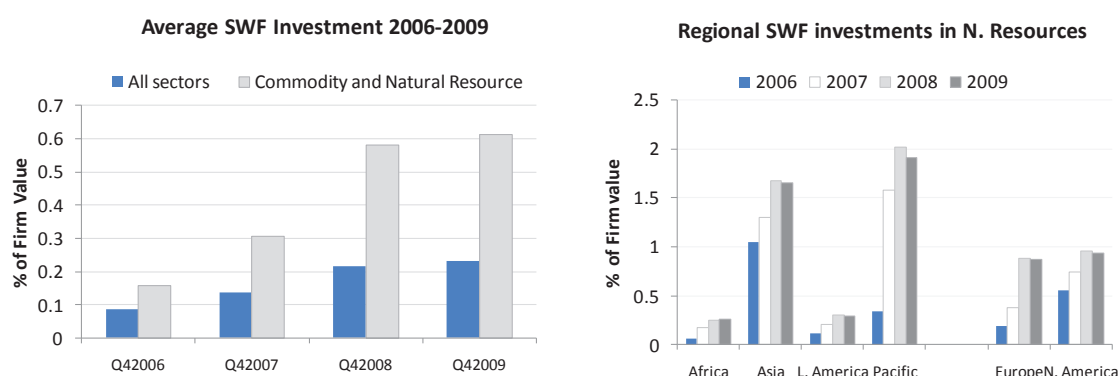
The structure of the paper is as follows: Section 1 discusses recent trends in SWFs’ demand for public equity. Section 2 discusses the theoretical model and its implication for the hypotheses. Section 3 identifies the determinants of investment for each type of fund, in the same spirit as Gompers and Metrick (*Quarterly Journal of Economics*, Vol 116, 2001) and Ferreira and Matos (*Journal of Financial Economics*, Vol. 88 (3), 2008) and Fernandez (2009). Section 4 integrates the gravity model. The final section discusses main findings and concludes.

⁴Commodity risk is obviously an important dimension for natural resource funds, while exchange rate risk is more relevant for foreign exchange funds. Covariance in cross-country market correlations and business cycles is another form of risk extensively studied (Portes and Rey 2001, 2005, Coeurdacier and Guibaud 2009).

2 Motivation

In this section I briefly discuss two key features of the data that motivate the empirical approach. The first, presented in Figure 1, is the increase of investments of sovereign wealth funds in commodity and natural resource related firms. The *Great Recession* in 2007 was a breakpoint in the way SWF portfolios were handled, and institutional investors have gradually reconsidered their investments. The effect is also noticeable at the regional level.

Figure 1: Evolution of SWF Investments in Commodity and Natural Resource Firms



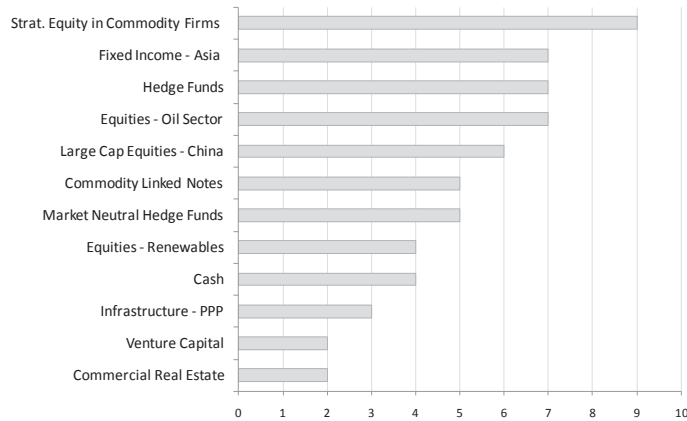
Source: Author's calculation, based on Factset/Lionshares and Thomson Financial, 2010.

A second feature is the demand of sovereign wealth funds for specific asset classes, as illustrated in figure 2. The demand for public and private equity in commodity firms, and other forms of institutional participation has increased considerably over the last decade.

There is empirical evidence of this shift, with concrete actions taken by some SWFs. Temasek and GIC (from Singapore) decided to re-orient their investments towards emerging economies. Well-established sovereign funds, such as ADIA (Abu Dhabi), withdrew considerable parts of their OECD portfolio to favour new investments in emerging economies.⁵ China's sovereign fund, China Investment Corporation (CIC) extended its activities to Central and South East Asia, more recently in energy-related firms (e.g. Kazakhstan Gas company Astana).

⁵Temasek's acquisition in Olam International, a Singapore-based agricultural commodities supplier, is another example. Another example is the decision of East Timor fund in 2009 to diversify from U.S. Treasuries and invest in emerging government bonds.

Figure 2: Estimated Demand Sovereign Wealth Fund Assets – Q4 2009



Source: Sovereign Wealth Institute.

Note: Indicator measure to track SWFs' quarterly demand for assets, including public and private equity, fixed income, real estate and alternatives.

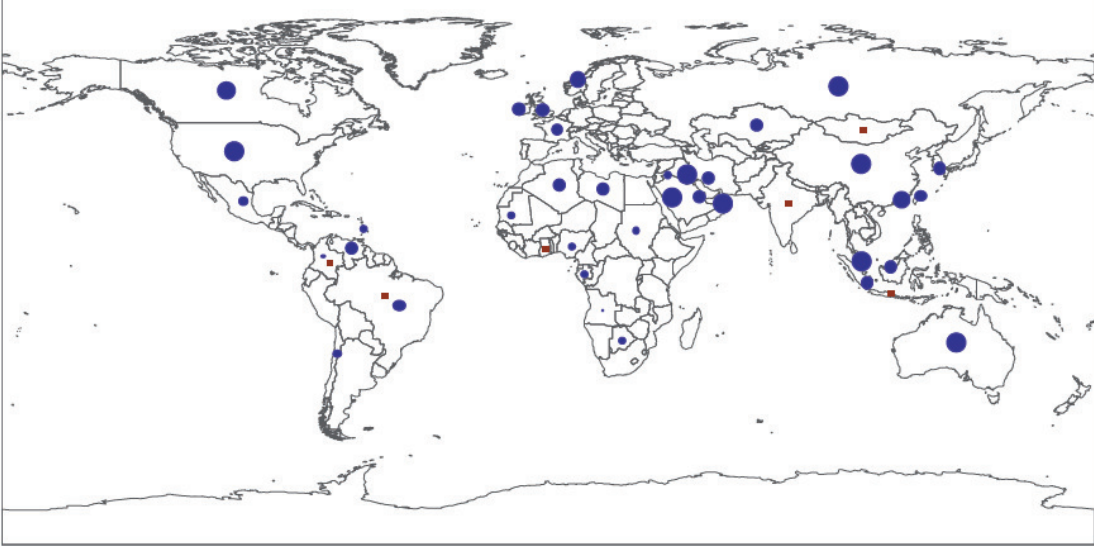
Source: UNCTAD 2009, OECD 2010.

Their pursuit for resources is also exposed in their acquisitions in Indonesia (PT Bumi Resources, the country's largest coal producer), Russia (Noble Oil group, commodity supplier), Mongolia (Iron Mining International, mining producer) or Canada (Teck Resources Ltd, Canada's largest diversified mining company).⁶ In the same line, Japan's SWF has foreseen almost a third of its investments toward emerging economies with a mandate to target natural resource, energy and food production sectors. These movements denote SWFs' strategy of commodity acquisitions, as the shortage of resources is perceived as a constraint for long-term economic growth.

The following section integrates relevant aspects of the literature on asset allocation of sovereign investors and the contribution on this study to the understanding of SWF investments.

⁶Their interest for joint ventures with private equity firms to target innovation-related firms has also been stressed. Recipients of CIC's three major investments in 2009 include SouthGobi Energy Resources (Mongolia), Nobel Oil Group (Russia) and JSC KazMunaiGas Exploration Production (Kazakhstan). Other investment arms (Petrochemical Corp, Petrochina) have rebalanced equity portfolios towards oil-related industries

Figure 3: Major locaions of SWF investments



2.1 Related Literature

This paper relates to a diverse and relatively recent literature on sovereign wealth and institutional investors. The literature on asset allocation for sovereign wealth funds has grown significantly, with complementary macroeconomic and financial perspectives. It draws on the literature of reserves management models (Portes et al. 2006, Jeanne and Rancière 2008) to models of portfolio choice (Campbell et al. 2004), risk management (Claessens and Kreuser, 2009) and contingency claims (Alfaro and Kanczuk 2005, Rozanov 2005). The link between investment strategies of commodity-based funds and the macroeconomic stance has also been studied (Engel and Valdes, 2000, Reisen 2008, Brown et al., 2010), stressing the macro-financial linkages of the fund's strategic asset allocation and optimal fiscal and monetary strategies.

The literature more related to this work is based on data at the fund and firm-level of institutional equity portfolios. Following the analysis of other institutional investors, SWF investment activities have been compared to pension, mutual or hedge funds, which have been studied thoroughly in the past.⁷ Recently, other SWF specificities

⁷Previous studies on these funds include Del Guercio and Hawkins (1999), Woitdke (2002), Hartzell and Starks (2003), Aggarwal, Klapper, and Wysocki (2005), Khorana, Servaes, and Tufano (2005), and Brav, Jiang, Thomas, and Partnoy (2008). See Bortolotti et al. (2009) for a review on institutional investment.

have been studied in this perspective. Bortolotti et al. (2009) assess the financial impact of SWFs' demand on stock markets, stressing existing similarities between SWFs and other investment vehicles (i.e. pension, buy-out funds and mutual funds). They find a significantly positive mean abnormal return upon SWF acquisitions of equity stakes in publicly traded companies. In the same line, Sun and Hesse (2009) find that the announcement effect of SWF investments is positive and SWF share purchases are positively associated with abnormal returns.

Chhaochharia and Laeven (2008) find that SWFs invest to diversify away from industries at home but do so in countries with cultural closeness, suggesting that investment rules are not entirely driven by Sharpe-ratio criteria. They find that long-term performance of firms with SWF participation tends to be less profitable. Similarly, Chhaochharia and Laeven (2009) show that institutional investors invest in countries with common cultural traits. This finding stresses the importance of informational factors. Bernstein, Lerner and Schoar (2009) examine SWFs' equity investment strategies and their relationship to the funds' organisational structure. They find that SWFs where politicians are involved are more likely to invest at home than those where external managers participate. At the same time, SWFs with external managers tend to invest in industries with lower Price-to-Earnings levels.

In a similar vein, Fernandes (2009) analyses the determinants of SWF holdings, finding that large, profitable firms, with low leverage ratios and high visibility tend to be preferred by SWFs; firms with higher SWF ownership have higher valuations and better operating performance. Fernandes and Bris (2009) find a stabilising effect of SWF participation on firms, and a reduction in their cost of capital. The work of Ferreira and Matos (2008) is related to this approach, for a broad group of investors. They explore the determinants of institutional investments in firms, using a data set of holdings at the stock-investor level. Exploring stock preferences of three investor types (U.S., non-U.S. foreign, and domestic) they find that institutional investors, regardless their geographic origin, prefer to invest in large and widely held firms, in countries with strong disclosure standards. Also, foreign and domestic institutional investors diverge in their stock preferences. Foreign institutional investors tend to invest in firms with high visibility (i.e. in the MSCI World Index or with many analysts), and with low dividend-paying stocks. On the contrary, domestic institutional investors tend to overlook these characteristics when allocating their investments.⁸

⁸In the same line of Brickley et al. (1988), Almazan et al. (2005), Ferreira and Matos (2008) analyse the investment behaviour of different types of institutional investors, classified by their "independence" level. Whereas independent institutions (mutual fund managers and investment advisers) tend to be "pressure-resistant", grey institutions (bank, trusts, insurance companies, and others) tend to be more "pressure-sensitive" or loyal to corporate management. They find that both types of institutions share a preference for large, widely held and visible stocks.

Finally, this study is linked to the literature on the determinants of international portfolios. From the work on cross-border equity flows (Portes and Rey 2001, 2005), models of cross-border M&A activity (Di Giovanni 2005), models of portfolio diversification (Coeurdacier et al. 2007, 2009; Bekaert and Wang, 2009) and international financial flows (Papaioannou 2006), this work relates to the literature of portfolio analysis at the microeconomic level. In this perspective, Hau and Rey (2008a) study the distribution of home bias for a group of mutual funds, finding a positive correlation between the size of the funds, the number of foreign countries and the number of sectors. Hau and Rey (2008b) derive a theoretical model to analyse a group of equity funds and study the rebalancing behaviour at the fund and stock level.

Although previous studies explore the determinants SWF portfolios, they do not fully integrate some of the particularities of SWFs as institutional investors, like being government-owned, depending on an underlying asset, or having other investment requirements. Moreover, portfolio differences within different types of sovereign fund remain unexplored, a gap this paper intends to fill. In contrast with other approaches, the statistical power obtained through a data-intensive approach for studying SWFs (with nearly 7000 holdings in 54 countries for a total group of 32.000 firms from 2006 to 2009) allows to draw robust conclusions on their investment preferences.

2.2 Defining an investment benchmark for SWFs

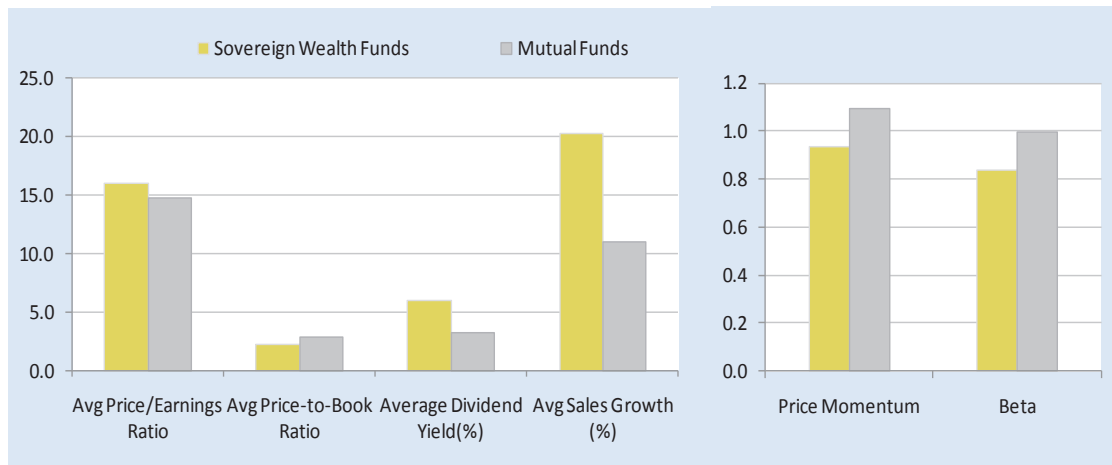
Despite increasing disclosure, little is known about sovereign wealth funds' benchmarks for investment. Contrary to the management of reserves, which has investment restrictions in terms of liquidity and risk, the investment horizon of SWFs is substantially broader, including public and private debt securities, equity, private equity, alternatives, real estate and derivative instruments. A number of sovereign funds have benchmarks for their investments, but the variance of portfolio benchmarks is large. Even if some SWFs have the mandate to target higher/riskier returns than central banks, they remain public sector institutions and are unlikely to act as hedge funds or other institutional investors engaged in speculative trading and using extensive leverage.

To what extent are SWF portfolio allocations different from other institutional investors? I compare portfolio allocations between sovereign funds and mutual funds.⁹ Despite being subject to special sets of regulatory, accounting, and tax rules, mutual funds provide a reasonable point of reference and allow to compare the profile of firms where

⁹The sample of sovereign wealth funds is the same described before. For the mutual fund group, I collect data on the 25 largest mutual funds worldwide. I restrict the comparison to a the last quarter of 2008, where holdings information is most complete. Average indicators are unweighted. See Avendano et al. (2009) for a complete description.

sovereign funds invest with other market participants.

Figure 4: Average portfolio characteristics for SWFs and Mutual funds



Source: Author calculation, based on FactSet and Thomson Financial databases, 2009.

Figure 4 provides a comparison of portfolio characteristics between the two types of institutional investor. Sovereign funds have a relatively lower beta (0.83 in average) in comparison to mutual funds (1.0 in average). The average price-to-earnings ratio is slightly higher for the SWF group. A higher P/E ratio is associated with a higher price for each unit of net income, so the stock is more expensive. In contrast, the average price-to-book ratio is lower for SWFs, denoting that investors expect more value from the asset. It is remarkable the substantially higher average dividend yield for sovereign funds; although a high yield is desirable for some investors, it can also be associated with lower dividends in the future. The higher average sales growth in the SWF group could be interpreted in the same way as the dividend yield. These indicators portray a more modest contrast in the profile of the firms where SWFs and mutual funds invest.

Sovereign wealth funds' equity allocations are more diversified, by destination, industry and sector, than other institutional investors. A regional comparison of SWF and mutual fund equity portfolios shows that the first group tends to be more diversified. A simple concentration index (Herfindahl-Hirschman) by region illustrates this pattern (a value of 0.12 for SWFs and 0.19 for mutual funds).¹⁰ The gap in sector concentration (0.10 for SWFs vs 0.30 for mutual funds) and industry concentration (0.04 for SWFs vs. 0.33

¹⁰ A low HH index (close to zero) indicates a high degree of diversification of investment destinations, whereas a value close to 1 denotes higher concentration.

for mutual funds) is even more pronounced.¹¹

2.3 Sovereign Wealth Funds and Investment Strategies

As observed, the determinants of SWF ownership can contrast with those of other institutional investors. Being *publicly-owned* institutions, their investment rationale can involve additional considerations to those of private institutional investors. Furthermore, there are considerable differences, within sovereign funds, in their approach to equity investment.

Gompers and Metrick (2001) present a simple framework to contrast the determinants of institutional ownership. In this perspective, individual and institutional investors hold fractions of a firm. Institutions' demand for stocks tends to be different from individual investors, as they act as agents for other investors. As institutions (investment advisors, mutual funds, banks) have investment discretion, individuals can only imperfectly monitor the investment choices of the institution. The agency problem in the case of the sovereign wealth fund is similar. Fund-owners, in this case, citizens, cannot exercise complete discretion over the choice of an investment agent. Being this control imperfect, different incentives can result in different demand patterns of SWFs with respect to individual or other types of institutions.

To study the variance of SWF ownership on firm-level preferences, I examine first how their equity portfolios are determined by firm characteristics. I consider measures of firm performance (sales, return on assets, return on equity), legal environment (dividend yield, stock volatility), capital structure (leverage), liquidity (cash holdings, turnover), coverage (e.g. foreign sales, EMBI), and country-level characteristics considered in the literature (e.g., market capitalisation, anti-self-dealing). Each indicator provides information, explained below, on the fund preferences. I stress the importance of three main explaining factors:

- A possible cause for differences among different types of investors is the legal environment, as stressed by Del Guercio (1996).¹² To analyze this factor, and in line with previous literature, I study the interaction between SWF ownership and firm-based information on dividend yield and stock price volatility. Under

¹¹See Annex 12.9 for a full list of Factset sectors and industries.

¹²Del Guercio (1996) studies the relationship between prudence and stock ownership, suggesting that different types of institutions are affected by prudence restrictions to varying degrees. In general, banks are associated with "prudent man" considerations, but nonbank institutions also consider these characteristics.

the hypothesis of prudence considerations, SWF ownership should be positively related to dividend yield, and negatively to stock volatility.

- Another source of cross-sectional variance in institutional ownership is related to liquidity constraints and transaction costs. Sovereign wealth institutions, because of their size, are likely to demand large stocks with large market capitalisations. In addition, if SWFs tended to trade more than other investors, they should be sensitive to transaction costs related to illiquid stocks with higher bid-ask spreads. To assess the effect of these factors, I use firm size and share turnover. If funds are looking for liquid stocks more than other shareholders, these factors should be positively related to SWF ownership.
- A third factor identified in the literature of institutional investment, which can influence SWF ownership, are historical stock returns. In general, small stocks, stocks with high book-to-market ratios and stocks with momentum (return over the previous year) are associated with higher institutional ownership. I test these hypotheses for SWFs looking at the relationship of SWF ownership with firm size, book-to-market ratio and momentum.

If historical or institutional factors have been scrutinized in the study of public investment, differences *within* different types of SWF ownership have not been explored. To address this issue, I study three forms of ownership by sovereign wealth institutions:

- The first one is associated with the fund's source of proceeds. Previous literature has highlighted the caveats when addressing the investment problem between commodity and non-commodity funds. Scherer (2009) studies the problem of allocation for commodity funds, stressing the fact that the country's wealth can be seen as a combination of financial wealth and non-tradable resource wealth. The allocation problem takes into account the correlation of the fund portfolio with both financial and resource wealth, in order to avoid welfare losses. In the case of foreign exchange funds, the optimal asset allocation seeks to diversify other risks, in particular exchange risk.
- The second dimension deals with standard information effects in capital markets. The informational asymmetries in financial markets between developed and emerging economies have been studied in depth. In the context of sovereign wealth funds, the question remains open.
- The third dimension regards at the location of equity holdings. Previous research shows that other institutional investors tend to target different types of firms when addressing domestic or foreign assets (Gompers and Metrick 2001, Ferreira and

Matos 2008). The heterogeneity on the distribution of home bias has been highlighted by Hau and Rey (2008), sustaining that managers face heterogeneous institutional constraints that determine the degree of home bias of their portfolios.¹³ One remaining question consists in assessing, not only the degree of home bias of sovereign wealth funds with respect to other investors, but also the determinants of SWF ownership in publicly traded firms at the domestic level.

To illustrate the relevance of these dimensions, I calculate average values of selected firm characteristics for each form of SWF ownership.¹⁴ Summary statistics and t-tests for differences between means are displayed in table 1. Differences in the investment preferences between SWF groups are more pronounced when looking at average firm characteristics. Firms targeted by commodity and non-commodity funds differ in size, firm profitability, cash holdings and foreign sales. OECD and non-OECD funds target firms with statistically different firm size, leverage, return over equity and turnover. Domestic and foreign investment also target different types of holdings, with differences in firm size, firm profitability, and turnover.

Descriptive statistics suggest that sovereign wealth managers target different types of firms, and the three mentioned dimensions affect considerably the type of equity investment. To link these three conjectures to the current literature on micro-level studies of institutional funds, I consider two main propositions to study:

2.3.1 Proposition 1.

The variability of SWFs' portfolio preferences is explained by three main factors: source of proceeds, investment guidelines and investment location.

As explained before, intrinsic characteristics to the sovereign fund are, *a priori*, relevant for explaining portfolio allocation differences: i) Considering the source of proceeds, commodity funds have an incentive to diversify away from their underlying asset, whereas foreign exchange funds seek to secure commodity inflows for boosting their exports. ii) Regarding investment guidelines, due to market frictions (informational, geographical, legal) OECD and non-OECD funds presumably follow different portfolio allocations. iii) Moreover, as part of specific industrial policies, sovereign funds value equity investments differently in domestic and foreign markets, with specific policy-driven allocations (e.g. strategic investment in R&D sectors).

¹³Furthermore, they highlight the fact that if such constraints exist and are binding, they are certainly not exogenous and are likely to come from an agency problem between investors and fund managers.

¹⁴Firms are considered to “belong” to a group if SWF participation in the firm is above 1% of firm market value. Means are calculated as the non-weighted average of firms within each group.

Table 1: Means for Firm Characteristics for Sovereign Wealth Fund Groups

	Commodity	Non-Comm.	p-value (diff. among means)	OECD	Non-OECD	p-value (diff. among means)	Domestic	Foreign	p-value (diff. among means)
Position	5.45E+07	1.28E+08	0.60	5.11E+07	1.14E+09	0.85	3.31E+09	5.17E+07	0.00
Outstanding Shares	0.98	1.63	0.00	0.88	11.82	0.00	23.63	0.93	0.00
SWF dummy	0.16	0.19	0.00	0.15	0.79	0.00	0.81	0.15	0.00
Size	7.56	8.09	0.00	7.49	8.25	0.00	6.91	7.49	0.00
Leverage	0.24	0.24	0.00	0.24	0.29	0.00	0.27	0.24	0.79
Inv. Opport.	17.18	15.39	0.11	17.13	18.28	0.09	18.05	17.19	0.93
ROE	3.85	4.51	0.15	3.77	6.81	0.13	6.68	3.78	0.88
R&D	405.42	6.35	0.36	373.60	447.93	0.45	1.07	386.57	0.91
CAPEX	7.79	5.99	0.34	7.64	7.64	0.32	8.90	7.65	0.92
Cash Holdings	634.12	1089.54	0.42	618.04	998.48	0.43	353.00	620.53	1.00
ADR	0.01	0.02	0.01	0.01	0.07	0.00	0.03	0.01	0.29
Foreign Sales	31.11	35.62	0.00	31.19	42.06	0.00	26.65	31.21	0.94
Turnover	0.01	0.00	0.65	0.00	0.00	0.63	0.00	0.00	0.92
Book Value	1.20	0.91	0.00	1.19	0.37	0.00	0.47	1.19	0.00
Cash Holding (FM)	634.12	1089.54	0.42	618.04	998.48	0.43	353.00	620.53	1.00
GDP firm country	4.63E+12	5.25E+12	0.00	4.62E+12	1.42E+12	0.00	2.97E+11	4.60E+12	0.00
Mkt Cap firm country	149.26	152.48	0.84	149.92	152.81	0.60	114.75	150.42	0.00
Commodity Ownership	0.66	0.55	0.00	0.56	2.88	0.00	3.20	0.58	0.00
Non-Commodity Ownership	0.32	1.09	0.00	0.32	8.94	0.00	20.43	0.35	0.00
OECD ownership	0.59	0.58	0.00	0.56	0.70	0.00	1.12	0.56	0.00
Non-OECD ownership	0.40	1.05	0.00	0.31	11.12	0.00	22.51	0.38	0.00
Domestic ownership	0.25	0.68	0.00	0.21	6.70	0.00	22.68	0.20	0.00
Non-domestic ownership	0.73	0.95	0.00	0.67	5.12	0.00	0.95	0.74	0.00

2.3.2 Proposition 2.

The theoretical model proposed by Scherer (2009) suggests that commodity funds tend to diversify away their commodity risk by investing in non-commodity-dependent firms. By the same token, non-commodity funds want to assure their access to natural endowments by investing in commodity-related sectors. However, diversification and provision objectives are not substitutes: it is also the case that some commodity funds (e.g. an oil fund) increase their position in other commodity sectors (e.g. water, food), to guarantee their access to these resources. A number of oil-based sovereign funds (e.g. Abu Dhabi) have systematically invested in agriculture and water-related sectors, so as other non-commodity funds.

I extend the analysis of SWF ownership by exploring the role of natural resources in portfolio allocation. Despite its importance, the role of natural resource endowments on institutional investment remains practically unexplored. Alvarez and Fuentes (2006) explore the link between natural resource endowments and specialisation, finding that mining countries are less likely than forestry and agriculture-dependent countries to shift their specialisation pattern toward manufacturing goods. Poelhekke and van der Ploeg (2010) explore the role of sub-soil assets as a determinant of FDI, finding a positive effect

of sub-soil endowments on resource FDI and a negative effect on non-resource sectors. More generally, they find a form of resource curse, this is, an aggregate negative effect on FDI, as a result of resource abundance.¹⁵ Importantly, since the institutional framework is not relevant to explain non-resource investment, then the detrimental effect to FDI comes from natural resource abundance. I integrate the conjecture of natural resource endowments in the context of SWF's demand for equity, using firm (and therefore sector) level data.

The motivation for studying this additional investment motive, natural endowments, relies also on the literature on capital flows between industrialised and developing countries. In his seminal work, Lucas (1990) argued that, from a new classical growth model perspective, the law of diminishing returns implies that the marginal product of capital should be higher in the countries where capital is scarce, and capital should flow in this direction until the marginal product of capital is equalized. To explain why this is not the case, Alfaro et al. (2006) synthesize two main explanations: fundamentals and capital market imperfections. Fundamentals refer to divergent technological structure, missing factors of production, government policies and the institutional stance. The differences in fundamentals can be then understood in several ways: there can be factors that affect capital returns and have not been considered. Notably, in developing countries, land and natural resources are overlooked. Also, government policies (e.g. tax on returns, inflation persistence) or the institutional stance, can also affect investment decisions and affect economic performance. The second explanation, focused on capital market imperfections, puts sovereign risk and asymmetric information as two major factors. Information asymmetries, in particular, affect the way capital is transferred, stressing the role of information, market size and trading costs in cross-border equity flows. Political risk and institutional quality also affect the level of capital flows to developing countries, as stressed Alfaro et al. (2006).

Caselli's (2006) study on the marginal product of capital highlighted a key issue. He presents a model where capital is more expensive (relative to output) in developing countries. When correcting for the higher relative cost of capital in poor countries, cross-country differences in marginal product of capital are wiped-out. Thus, the higher cost of *installing* capital in poor countries could explain why capital flows do not go in the expected direction. Caselli presents first a one-factor model, estimating the marginal product of capital to be twice as big in developed economies. The results of this *naive* model would corroborate the validity of the international credit-friction argument. Next, he includes a new factor, representing land or natural resources, and separates natural

¹⁵Poelhekke and van der Ploeg (2010) also explore the spillover effects of each type of investment, finding that surrounding FDI (i.e. *spatial lag*) is not relevant to resource FDI but is positively related to non-resource FDI.

from reproducible capital in his estimation. When including this factor, which is often more important in emerging economies, there is a significant reduction in the gap between rich and poor country capital returns. Caselli's (2006) main result is that the marginal product of capital is essentially equalized: the return from investment in capital is no higher in poor than in rich countries.¹⁶

Caselli's findings are informative on the importance of considering differences in natural resource endowments when analyzing cross-border capital flows. Although the approach proposed here is different, in the sense that not only capital productivity but other micro-determinants are studied, it does take into account Caselli's critique and integrates it in the discussion of institutional investments. This point is further discussed after the empirical estimation.

2.3.3 Data description

For studying SWF portfolio variance, I combine firm, fund and country-level data on equity holdings for a group of sovereign wealth funds, to identify the main determinants of the portfolio allocation. Equity holdings data are obtained from Factset/Lionshares database, a major information source for institutional ownership. Disclosed information on holdings comes from different sources: for equities traded in the U.S., holdings data comes from mandatory quarterly 13F filings of the Securities Exchange Commission (SEC).¹⁷ For equities traded outside the U.S., information comes from national regulatory agencies or stock exchange announcements, local and offshore mutual funds, mutual fund industry directories and annual reports.

I restrict the analysis to available holdings for a group of 22 sovereign wealth funds between 2006 and 2009.¹⁸ I consider all types of stock holdings: ordinary shares, preferred shares, American Depositary Receipts (ADRs), Global Depositary Receipts (GDR) and dual listings. Data covers a set of nearly 14,000 individual holdings in 65 different countries and almost 8,000 firms. Data in the sample adds up to nearly 450 USD billion. Managed assets by SWFs before the global financial crisis were estimated in 2-2.3 USD trillion (IMF 2009). This amount would correspond to nearly 25% of the total assets managed by these institutions. By some estimates, approximately 40 to 50 per cent of SWFs portfolios are invested in public equity.

¹⁶Lower capital ratios in developing countries are attributable to lower endowments of complementary factors and lower prices of output goods relative to capital. Indeed, developing-country investors need to have higher marginal product of capital to be compensated by higher cost of capital (relative to output).

¹⁷See Gompers and Metrick (2001) for a more detailed description of the filing procedure of 13 filings.

¹⁸The sample includes 12 commodity and 10 non-commodity funds. Most OECD funds in the same are non-commodity related. See Annex 12.3.

3 Empirical Strategy and Determinants of SWF Ownership

3.1 SWF ownership variables and data structure

The original dataset provides information (for each fund and firm) on the position (in USD thousands), the position change (quarterly and annual), the percentage of SWF participation in the firm (as share of outstanding shares), the percentage of the holding (as share of the SWF portfolio), country, region, sector, capitalisation group and fund performance (Year-to-Date). Following the literature on institutional investment and firm preferences, I define two variables of institutional ownership for the analysis:

First, I define a *SWF Ownership* variable for each firm as:

$$Own_i = \sum_{j=1}^N \frac{Pos_j}{MkCap_i} \quad \forall i \quad (1)$$

where N is the number of funds in the sample and Own_i represents the total share of SWF holdings in firm i as a percentage of market capitalisation.

Second, I define a *SWF dummy*:

$$SWF \text{ dummy}_i = \begin{cases} 1 & \text{if } \sum_{j=1}^N \frac{Pos_j}{MkCap_i} \geq 1\% \\ 0 & \text{else} \end{cases} \quad \forall i \quad (2)$$

The dummy variable takes value 1 when SWF participation in the firm is above 1%.¹⁹

Sovereign funds in the sample are classified by their source of proceeds (commodity/non-commodity), investment guidelines (OECD/non-OECD). Equity holdings are identified as domestic or foreign. I define ownership variables according to these criteria. For commodity funds, I calculate total holdings (as a share of market capitalization) held by this category of funds, and compute similar ownership variables for the other categories.²⁰

I define two datasets for the analysis of SWF ownership: one with total SWF holdings per firm, and one with bilateral (firm-fund) holdings. The first dataset uses the *firm* as unit of analysis, and covers all companies in the Worldscope universe available through

¹⁹This corresponds to the same dummy variable defined by Fernandez (2009).

²⁰To have a measure of domestic ownership, I estimate the share of holdings for all SWF domiciled in the country. Bernstein et al. (2009) define a dummy variable for domestic investments.

Thomson One Analytics.²¹ Firm level information is extracted from Thomson Datastream and Worldscope.²² The final sample includes nearly 32,000 firms, from which 7661 firms have SWF portfolio allocations. The second dataset uses the *bilateral holding* as unit of analysis, with the objective of analysing SWFs' demand for stocks in a gravity model framework. Additional to fund (origin) and firm (destination) characteristics, information at the country level is included. Descriptive statistics for the firm and fund level characteristics considered are summarized in table 2.

The average holding in the firms where SWF have any participation is about 0.96% of the outstanding shares, which is coherent with other findings in the literature (Fernandes 2009).²³ In the sample, commodity funds tend to own a larger share than non-commodity funds (0.58% vs 0.38%). Also, OECD-based SWFs tend to have a higher participation (0.52% vs 0.44% for non-OECD funds). Finally, a large part of the average 0.96% of holdings is controlled by foreign sovereign wealth institutions (0.69% vs. 0.27% for domestic funds).²⁴

I examine first which firm and country-level factors determine the participation of SWFs.

To estimate the determinants of ownership, I run a baseline equation considering different firm level determinants:

$$\begin{aligned} Own_{i,t} = & \delta_0 + \delta_1 Size_{i,t} + \delta_2 Lev_{i,t} + \delta_3 Invop_{i,t} + \delta_4 ROE_{i,t} + \delta_5 DY_{i,t} \\ & + \delta_6 R\&D_{i,t} + \delta_7 Capex_{i,t} + \delta_8 Cash_{i,t} + \nu_i + \epsilon_{i,t} \end{aligned} \quad (3)$$

where Own_i is the SWF ownership variable, $Size_{i,t}$ is the size of firm i at time t defined as the logarithm of USD total assets, $Lev_{i,t}$ is the ratio of total debt to total assets, $Invop_{i,t}$

²¹Contrary to Ferreira and Matos (2008), I include all financial firms (SIC codes 6) in the sample. The reason for including financial firms is that some funds have significant holdings in financial institutions for financing other sectors (e.g. CIC in the China Construction Bank). For robustness tests, financial firms are excluded.

²²Firm-level data includes information on a large set of firm and sector variables: total assets, return on assets, market capitalization, return on equity, capital expenditure, sales growth, total debt, cash holdings, international sales, share turnover, R&D expenditure, dividend yield, net income, EBITDA, total liabilities, cash holdings, SIC sector and industry, ADRs, book-to-market value. These are introduced in different stages in the empirical analysis.

²³When considering the whole set of Datastream/Worldscope firms, the average SWF participation by firm is 0.23%.

²⁴Two funds in the sample, Norges Bank Investment Management and New Zealand Superannuation fund, have a highly diversified portfolio with respect to the other funds. However, the dataset structure prevents from a bias from over-represented funds. As the resulting ownership shares for these diversified funds are small, they do not affect the main results. When analysing bilateral observations, there can be indeed a biased result. Further robustness checks are performed to address the issue.

Table 2: Descriptive Statistics - Firm and Ownership Characteristics

Variable	Obs	Mean	Std. Dev	Min	Max	Source
Firm Variables						
Tota Assets	29542	4.7E+07	8.1E+09	0.0	1.4E+12	Worldscope
Return on Assets	29032	-104.19	6969.98	-322.00	38.25	Worldscope
Sales	29543	2.4E+04	3.9E+06	0.0	2.7E+04	Worldscope
Capital Expenditure (% total assets)	28075	6.26	9.85	0.00	99.97	Worldscope
Sales growth (3 year)	26427	19.09	112.32	-100.00	235.40	Worldscope
Dividend yield	30165	11.63	382.62	0.00	20.12	Worldscope
Total Debt	29502	1464.41	19651.16	0.00	889349.80	Worldscope
Cash and Short term investments	27691	372.26	28776.23	-0.01	4779903.00	Worldscope
Volume	29879	1.15	13.95	0.00	2022.38	Datastream
Market value	29833	1.4E+07	9.8E+08	0.0	9.8E+10	Datastream
Size	31338	5.02	2.53	-4.61	15.07	Thomson Financial
Leverage	29364	0.46	6.79	0.00	543.00	Thomson Financial
Investment opportunities	26400	16.82	54.63	-100.00	973.10	Thomson Financial
Return on equity	28528	-1.97	24.77	-199.75	99.56	Thomson Financial
R&D investment	10747	8.45	30.92	0.00	390.32	Thomson Financial
Cash and short term investments	27623	144.98	574.17	-0.01	9632.14	Thomson Financial
ADR	31473	0.02	0.13	0.00	1.00	Thomson Financial
Foreign Sales (% total)	14716	25.42	32.22	0.00	100.00	Thomson Financial
Turnover	29624	0.01	0.72	0.00	120.00	
Book-to Market equity ratio (Ferreira et al.)	23473	1.35	1.98	-12.61	4.61	Authors' calculation
Cash and short term inv. to total assets (Ferreira et al.)	23473	1.35	1.98	-12.61	4.61	Authors' calculation
Equity Holding Variables						
Position	31731	5.0E+07	2.2E+09	0.0	1.5E+11	Factset/Lionshares
Market value	31731	7.4E+07	1.9E+09	0.0	1.3E+11	Factset/Lionshares
Portfolio	31731	0.20	2.93	0.00	100.00	
Outstanding shares (% total)	31727	0.21	1.95	0.00	86.60	Factset/Lionshares
SWF dummy	31731	0.04	0.19	0.00	1.00	Authors' calculation
Commodity ownership	31731	0.14	0.87	0.00	60.03	Authors' calculation
Non-commodity ownership	31727	0.07	1.73	0.00	86.81	Authors' calculation
OECD ownership	31731	0.13	0.42	0.00	15.59	Authors' calculation
Non-OECD ownership	31727	0.09	1.90	0.00	86.81	Authors' calculation
Domestic invest.	31729	0.06	1.64	0.00	86.81	Authors' calculation
Foreign invest.	31729	0.16	1.04	0.00	85.76	Authors' calculation
Country-level variables						
GDP (firm's country)	31382	3.67E+12	4.31E+12	4.65E+09	1.15E+13	WDI
Market capitalization (firm's country)	31597	149.45	88.74	0.00	561.17	WDI
Financial sophistication index	11410	5.72	0.73	3.40	6.70	World Economic Forum
Anti self-dealing index	11390	0.54	0.25	0.09	1.00	Djankov et al. (2008)

(investment opportunities) is the three-year geometric average of annual growth rate in net sales in USD, $ROE_{i,t}$ is the return over equity, $DY_{i,t}$ is the dividend yield, $R\&D_{i,t}$ is the ratio of Research and Development spendings to total assets, $Capex_{i,t}$ is the ratio of total capital expenditures to total assets, and $Cash_{i,t}$ is the ratio of cash and short term investments to total assets.

In a later stage, I introduce other firm-level control variables employed by Ferreira and Matos (2008) and Fernandes (2009): $BM_{i,t}$ is the log of book-to-market equity ratio, $RET_{i,t}$ is the annual geometric stock rate of return, $Turnover_{i,t}$ is the annual share volume divided by adjusted shares outstanding, $ADR_{i,t}$ is a dummy indicator when the firm is cross-listed on a U.S. exchange, $FSales_{i,t}$ are the international annual net sales as a proportion of net sales. Country variables considered at this stage are $Antiself_t$ which is the antiself index as defined by Djankov et al. (2008), GDP_t is the output in

USD dollars and $MCap_t$ is the total market capitalisation as a percentage of GDP.²⁵

3.2 Baseline Regression

I estimate different configurations for the baseline equation, as shown in table 3. Regressions (i) to (iii) take into account different firm characteristics, whereas Regression (iv) includes two control variables at the national level (GDP and market capitalisation over GDP). Only results with the SWF ownership variable are reported.²⁶ Robust standard errors are calculated for all regressions.

A first result from the baseline regression shows that SWFs have a preference for large firms. This is consistent with Falkenstein (1996) and Gompers and Metrick (2001) in the case of institutional investors. An increase of one standard deviation in size is associated with an increase of 0.29% in SWF ownership. SWFs in this sample do not have a preference for firms with proven profitability. Fernandes (2009) finds a positive effect for this variable, and links the result to the “prudent man” rules that investors tend to follow (Del Guercio 1996).

In contrast to Fernandes’ results, capital expenditure is a negative and significant variable explaining equity allocations, which suggests SWFs are not prone to invest in firms incurring in fixed asset purchases. Cash holdings are negatively related to SWF ownership (in particular with the dummy ownership variable), whereas firms cross-listed on a U.S. exchange are neutral to sovereign wealth investors (Ferreira and Matos (2008) find a positive ADR effect). The technological variable, captured by R&D investment, is not relevant for explaining SWF ownership, which, as suggested by Fernandes (2009), there is not innovation “through the backdoor” in SWF portfolio allocations.

Foreign sales, which reflects the capacity of the firm to access international markets, is a relevant factor for sovereign funds, stressing the importance of firm visibility. This effect is more robust in the dummy variable configuration. GDP and market capitalisation have both a negative effect on SWF ownership, and *a priori* suggests that, sovereign funds, as other institutional investors, tend to favour investment opportunities in less developed economies.

Regressions (v) to (vii) in table 3 display the results when considering fixed country effects, with similar results to the previous specification: sovereign funds prefer large,

²⁵The anti-self dealing index estimated by Djankov et al. (2008) measures the ex-ante and ex-post effectiveness of regulation and enforcement against self-dealing.

²⁶Results for the SWF dummy variable are included in the Annex, but the main results using the two definitions of ownership are similar.

Table 3: Baseline Model. Dependent Variable: Outstanding Shares

	Baseline				Country Fixed Effects		
	O/S all (i)	O/S all (ii)	O/S all (iii)	O/S all (iv)	O/S all (v)	O/S all (vi)	O/S all (vii)
Size	0.1217*** [0.012]	0.1166*** [0.014]	0.1121*** [0.014]	0.1150*** [0.015]	0.1336*** [0.012]	0.1407*** [0.017]	0.1375*** [0.017]
Leverage	0.0142** [0.006]	0.0213** [0.009]	0.0189*** [0.007]	0.0193** [0.008]	0.0123 [0.028]	0.0162 [0.031]	0.0142 [0.031]
R&D	0.0624*** [0.020]	0.0598** [0.029]	0.0608** [0.029]	0.0689** [0.031]	0.0435 [0.074]	0.0773 [0.098]	0.0708 [0.097]
Capital Expend.	-0.085 [0.158]	-0.3765* [0.221]	-0.4609*** [0.163]	-0.5780*** [0.198]	0.0356 [0.287]	-0.1492 [0.410]	-0.2266 [0.413]
Foreign Sales		0.0014 [0.001]	0.0015** [0.001]	0.0008 [0.001]		-0.001 [0.001]	-0.0007 [0.001]
GDP (firm)				-0.0013** [0.001]			
Mkap/GDP (firm)				0.0006 [0.001]			
Observations	9459	5732	5523	5523	9459	5732	5523
R-squared	0.017	0.016	0.086	0.087	0.017	0.014	0.084
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

liquid firms, with solid cash positions, preferably not-cross listed and internationally visible. Results do not diverge when using the two ownership definitions described above (percentage of outstanding shares and dummy variable).

Using the ownership variables previously described, I analyse if the sovereign wealth funds' objectives and characteristics have an effect in the investment preferences among different SWF groups.

3.3 Commodity vs. Non-commodity fund Ownership

Portfolio preferences of commodity and non-commodity funds diverge in different on different factors, as highlighted in table 4.

Both groups value positively large and leveraged firms. However, differences exist be-

Table 4: Commodity vs. non-Commodity funds

	Commodity (v)	Non Commodity (vi)	Commodity (vii)	Non Commodity (viii)	Commodity (xi)	Non Commodity (xii)	Commodity (xiii)	Non Commodity (xiv)
Size	0.0897*** [0.005]	0.0224* [0.013]	0.0887*** [0.004]	0.0263* [0.015]	0.0980*** [0.004]	0.0405** [0.016]	0.0961*** [0.004]	0.0384** [0.016]
Leverage	0.0121** [0.005]	0.0067** [0.003]	0.0120** [0.005]	0.0073* [0.004]	0.0096 [0.008]	0.0063 [0.030]	0.0092 [0.008]	0.0047 [0.030]
Dividend Yield	0.0085 [0.009]	0.0066 [0.006]	0.0087 [0.010]	0.0028 [0.005]	0.0037 [0.002]	-0.0036 [0.009]	0.0049** [0.002]	0.0007 [0.009]
R&D	0.0666** [0.027]	-0.0059 [0.012]	0.0648** [0.027]	0.0041 [0.014]	0.0398* [0.024]	0.0242 [0.095]	0.0361 [0.024]	0.025 [0.094]
Capital Expend.	-0.2786*** [0.071]	-0.1824 [0.146]	-0.2696*** [0.076]	-0.3084* [0.183]	-0.1026 [0.101]	-0.103 [0.395]	-0.1279 [0.104]	-0.1567 [0.397]
ADR	-0.3716*** [0.056]	31.0126 [22.040]	-0.3628*** [0.067]	30.9181 [22.001]	-0.2682*** [0.042]	0.2558 [0.165]	-0.1234 [0.372]	30.5326*** [1.413]
Foreign Sales	0.0017*** [0.000]	-0.0001 [0.001]	0.0018*** [0.000]	-0.001 [0.001]	0.0007*** [0.000]	-0.0017* [0.001]	0.0008*** [0.000]	-0.0014 [0.001]
Turnover	1.5849* [0.839]	-3.5642** [1.396]	1.5280* [0.813]	-1.8996** [0.756]			2.2299*** [0.839]	-2.0125 [3.220]
GDP (firm)			0.0001 [0.000]	-0.0014** [0.001]				
Mkap/GDP (firm)			-0.0002 [0.000]	0.0007 [0.001]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.085	0.082	0.085	0.083	0.0805	0.08	0.0821	0.0808
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

tween each type of ownership. Commodity-funds' ownership is negatively affected by cross-listing (ADR), but is more prone to occur in internationally visible firms.²⁷ Non-commodity funds can be more interested in internationally-oriented firms as a matter of risk diversification: firms more internationally integrated tend to be more resilient to external shocks. This result contrasts with Scherer (2009), where commodity funds tend to diversify their commodity risk by investing in sectors uncorrelated or negatively correlated to the underlying commodity. In addition, non-commodity funds investment preferences are more dependent on turnover, whereas external conditions (GDP and market capitalisation) do not have a significant effect on either group. This suggests that funds are not necessarily sensitive to macroeconomic factors, regardless their source of

²⁷The dividend yield has a negative effect on ownership for one specification. The dividend yield shows how much a company pays out in dividends each year relative to its share price. This result is puzzling; although a high yield can be desirable for some investors, it can also be associated with lower dividends in the future.

proceeds. The country-effect specification stresses the negative effect of leverage on commodity-fund ownership. Other results remain unchanged.

3.4 OECD vs. non-OECD Ownership

SWF ownership is presumably different for developed and emerging-based funds, as explained above. To estimate these differences, I regress OECD and non-OECD ownership on the variables identified in equation (3). I estimate a model with random effects to isolate the country effect in the results.

Table 5: OECD vs non-OECD funds

	OECD	Non-OECD	OECD	Non-OECD	OECD	Non-OECD	OECD	Non-OECD
	(v)	(vi)	(vii)	(viii)	(xi)	(xii)	(xiii)	(xiv)
Size	0.0924*** [0.004]	0.0197 [0.013]	0.0913*** [0.004]	0.0238 [0.015]	0.0998*** [0.004]	0.0408** [0.016]	0.0979*** [0.004]	0.0395** [0.017]
Leverage	0.0114** [0.005]	0.0075* [0.004]	0.0112** [0.005]	0.0081* [0.004]	0.0116* [0.007]	0.0045 [0.031]	0.0112* [0.007]	0.003 [0.030]
Dividend Yield	0.0069 [0.009]	0.0083 [0.006]	0.0075 [0.009]	0.004 [0.005]	0.0049** [0.002]	-0.0056 [0.009]	0.0063*** [0.002]	-0.0011 [0.009]
R&D	0.0530** [0.023]	0.0078 [0.018]	0.0504** [0.023]	0.0185 [0.020]	0.0419** [0.021]	0.0358 [0.096]	0.0377* [0.021]	0.0336 [0.094]
Capital Expend.	-0.2911*** [0.070]	-0.1698 [0.147]	-0.2667*** [0.074]	-0.3113* [0.183]	-0.1234 [0.089]	-0.0405 [0.401]	-0.1552* [0.091]	-0.0901 [0.403]
Cash	0.0009 [0.001]	0.0008 [0.001]	0.0008 [0.001]	0.0011 [0.001]	-0.0014* [0.001]	-0.0009 [0.004]	0 [0.001]	0.0008 [0.004]
Foreign Sales	0.0014*** [0.000]	0.0001 [0.001]	0.0016*** [0.000]	-0.0008 [0.001]	0.0009*** [0.000]	-0.0019* [0.001]	0.0010*** [0.000]	-0.0016* [0.001]
Turnover	2.3043*** [0.784]	-4.2836*** [1.457]	2.0159** [0.783]	-2.3875*** [0.810]			2.2953*** [0.735]	-2.0874 [3.268]
GDP (firm)			0.0002 [0.000]	-0.0016*** [0.001]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.188	0.077	0.189	0.078	0.1767	0.093	0.186	0.0753
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

The notion that portfolio allocation differences between *industrialised* and *emerging* investors extends to public investment has been invoked elsewhere. OECD funds not only face different informational barriers, but also need to follow specific investment guidelines. Results on the determinants of OECD and non-OECD fund ownership are

displayed in table 5. Again, some of the firm determinants are relevant for both groups, in particular size. Firm leverage explains investment preferences for the OECD ownership variable only, whereas the firm Return of Equity is positive only for the dummy definition of non-OECD fund ownership. This could suggest that profitability is not a relevant factor for OECD-based funds. The effect of cross-listing is significant (and detrimental) for OECD ownership, whereas participation in foreign markets affects positively the investment preferences of this group. Firm turnover is positively associated with OECD ownership, but negatively to non-OECD participation, suggesting that OECD funds favour firms with high turnover ratios. Results are consistent through different specifications, including country effects.

3.5 Domestic vs. Foreign Ownership

Hau and Rey (2008) point out a large heterogeneity on the distribution of home bias across mutual funds. Looking at aggregate measures, they find that equity mutual funds, in particular, tend to be less home biased than other investors. Regarding sovereign wealth funds, this question has been less explored. Chhaochharia and Laeven (2008) find a negative association between industrial closeness and foreign bias, suggesting that SWFs tend to diversify into different industries than those found at home when investing abroad. An important number of SWFs have mandates for investing in strategic domestic sectors, while others have forbidden this practice, to avoid distorting effects on the exchange rate or affect financial stability. Bernstein, Lerner and Schoar (2009) find that SWFs are more more likely to invest at home when domestic equity prices are higher, and invest abroad when foreign prices are higher. Funds see the industry P/E ratios of their home investments drop in the year after the investment, while they increase in the year after their investments abroad.

I study these two forms of SWF ownership to identify the determinants of allocation at the fund level. Table 6 summarises the results for domestic and foreign SWF ownership.²⁸ Firm size is an important factor explaining foreign, and to a less extent, domestic SWF allocations; whereas foreign sovereign wealth funds prefer larger firms, this is not a relevant factor for domestic funds.²⁹ Low-leveraged firms are preferred by domestic investors, in contrast to foreign ones. Also, firm profitability explains domestic ownership. Foreign sovereign funds' allocations decrease with cash holdings and increase with international visibility. Ferreira and Matos (2008) results, who consider different

²⁸ A larger part of equity holdings in the sample correspond to foreign investments. Only about 102 firms have domestic investments from local SWFs.

²⁹ The effect on domestic SWF ownership is less robust for both definitions of ownership: outstanding shares and dummy variable.

institutional investors (e.g. mutual funds, investment advisers, bank trusts, insurance companies), also observe the same antagonism between domestic and foreign institutions. Determinants of allocation like return, coverage (MSCI index) and cross-listing (ADR) have opposite effects on domestic and foreign ownership. In fact, foreign institutions favour positive return performance and domestic institutions are neutral. This is consistent with the notion that foreign institutions represent *hot money chasing hot markets* (Tesar and Werner 1995, Bohn and Tesar 1996, Grinblatt and Keloharju 2000).

Table 6: Domestic vs Foreign Ownership

	Domestic (v)	Foreign (vi)	Domestic (vii)	Foreign (viii)	Domestic (xi)	Foreign (xii)	Domestic (xiii)	Foreign (xiv)
Size	0.0196 [0.012]	0.0925*** [0.006]	0.0239* [0.013]	0.0912*** [0.007]	0.0382*** [0.015]	0.1030*** [0.008]	0.0366** [0.015]	0.1010*** [0.008]
ROE	0.0004 [0.000]	0.0006 [0.001]	0.0001 [0.000]	0.0006 [0.001]	-0.0003 [0.001]	-0.0003 [0.001]	-0.0001 [0.001]	-0.0002 [0.001]
Dividend Yield	0.0083 [0.006]	0.0068 [0.009]	0.0053 [0.005]	0.0061 [0.010]	-0.0029 [0.008]	0.0035 [0.004]	0.0016 [0.008]	0.0048 [0.005]
R&D	0.0028 [0.010]	0.0580** [0.028]	0.0127 [0.011]	0.0562** [0.029]	0.0346 [0.086]	0.0379 [0.047]	0.0331 [0.084]	0.0343 [0.048]
Capital Expend.	-0.1219 [0.146]	-0.3391*** [0.073]	-0.2279 [0.180]	-0.3501*** [0.082]	0.0129 [0.360]	-0.1784 [0.196]	-0.0405 [0.358]	-0.203 [0.204]
Foreign Sales	-0.0002 [0.001]	0.0018*** [0.000]	-0.001 [0.001]	0.0018*** [0.000]	-0.0018** [0.001]	0.0007 [0.000]	-0.0015* [0.001]	0.0007 [0.000]
Turnover	-2.9679** [1.285]	0.9885 [0.980]	-1.6542** [0.740]	1.2827 [0.828]			-1.5678 [2.906]	1.8434 [1.656]
GDP (firm)			-0.0011** [0.000]	-0.0002 [0.000]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.098	0.041	0.1	0.042	0.04	0.0398	0.0975	0.0398
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

4 SWF Ownership and Firm Value

The aggregate impact on the firm of institutional investors, and in particular sovereign investors, has been documented in recent years. Fernandes (2009), Chhaochharia and Laeven (2009), Dewenter et al. (2009), Fotak et al. (2009), and Kotter and Lel (2010) analyze the impact of SWF investments in firms looking at abnormal returns upon announcement of SWF acquisitions. Most studies find a positive impact on abnormal returns upon SWF (and other institutional) investments. However, differences across different fund groups has been less explored. I examine in this section the impact of SWF portfolio allocations on firms looking at the three fund categorizations previously described: source of proceeds (commodity/non-commodity), guidelines (OECD/non-OECD) and location of investment (foreign/domestic).

To investigate the relationship between sovereign funds' ownership and firm value, a proper measure for the latter is needed. I follow Ferreira and Matos (2008) and use the traditional Tobin's Q measure defined as the book value of total assets plus market value of equity minus the book value of equity divided by total assets. I regress this variable on the ownership variables and the group of firm covariates identified in the first section. I consider the two measures of ownership (dummy variable and percentage of outstanding shares). Previous studies suggest that institutional ownership is related to higher firm valuation (Gompers and Metrick 2001, Ferreira and Matos 2008). Results (see Table 8 show that SWF ownership tends to increase firm valuation in most specifications. After using other definitions of SWF ownership (percentage of outstanding shares) and controlling for other factors, the effect on firm value is still increasing to SWF investment.

Results for specific SWF groups reveal the heterogeneity of the *SWF ownership* effect. The effect of commodity SWFs is positively related to firm value, but non-significant in non-commodity funds. OECD-owned sovereign funds are increasing to Tobin's Q, and therefore to firm valuation, in contrast with non-OECD funds. Finally, results do not suggest the existence of a premium of foreign or domestic SWF investments on firms.

A concern regarding the effect on firm value is the possible self-selection effect. SWFs can be attracted to firms with high Tobin's Q, generating a selection bias in the estimation of the firm value effect. To correct for possible self-selection in SWF towards higher-Tobin firms, I implement a Heckman's two-step estimation procedure. Results are presented in table 9. Other indicators of firm performance (e.g. operational performance) are also positively related to SWF participation (Fernandes 2009).

I use two instruments in the selection equation, namely the number of analysts for each firm and the fact that the firm's country is landlocked. These variables are a measure of

Table 7: Effect of SWF Investments on Firm Value. Dependent Variable: Tobin Q

	(i) Q Tobin (SWF dummy)	(ii) Q Tobin (SWF dummy)	(iii) Q Tobin O/S	(iv) Q Tobin O/S
SWF ownership	1.4413*** [0.240]	1.3043*** [0.231]	0.0456** [0.019]	0.0398 [0.026]
Size	-0.1200** [0.049]	-0.1118*** [0.032]	-0.0929* [0.048]	-0.0859*** [0.032]
Dividend Yield	-0.008 [0.009]	-0.0332* [0.018]	-0.0075 [0.009]	-0.0310* [0.018]
Cash Holdings	0.0205*** [0.006]	0.0228*** [0.008]	0.0226*** [0.006]	0.0245*** [0.008]
ADR	-0.664 [0.517]	-1.1057 [2.812]	-1.5197 [1.142]	-1.8117 [2.931]
Foreign Sales	0.0035 [0.002]	0.0001 [0.002]	0.0044** [0.002]	0.0011 [0.002]
Share Turnover	10.9007** [4.414]	22.0452*** [6.144]	10.9144** [4.358]	21.2909*** [6.159]
Observations	5418	5418	5418	5418
Controls	Yes	Yes	Yes	Yes
Country fixed effects	No	Yes	No	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: Probit estimates for columns (i) and (ii) and OLS estimates for (iii) and (iv). Dependent variable is the Tobin Q of the firm, measured as the book value of total assets plus market value of equity minus the book value of equity divided by total assets. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

transaction costs for institutional investors when acquiring shares in the firm. Results on table 9 are robust to the correction, confirming the positive effect of SWF ownership on firm value. Extending the correction to the results in table 8 corroborates the effect of OECD-based and commodity funds.³⁰

³⁰The Heckman correction reported in table 9 is based on bilateral data. Results for different types of fund available upon request.

Table 8: Effect of SWF holdings by Type of Fund. Dependent Variable: Tobin Q

	Commodity	Non Commodity	OECD	Non-OECD	Domestic	Foreign
Commodity / OECD / Domestic	0.7458*** [0.117]		0.7913*** [0.120]		0.0004 [0.030]	
Non-Commodity / Non-OECD / Foreign		0.0026 [0.027]		0.0021 [0.027]		0.1623*** [0.053]
Size	-0.1495*** [0.034]	-0.0814** [0.032]	-0.1372*** [0.034]	-0.0627** [0.032]	-0.0814** [0.032]	-0.0967*** [0.032]
Dividend Yield	-0.0355** [0.018]	-0.0305* [0.018]	-0.0416** [0.018]	-0.0368** [0.018]	-0.0305* [0.018]	-0.0315* [0.018]
Cash Holdings	0.0238*** [0.008]	0.0246*** [0.008]	0.0225*** [0.008]	0.0231*** [0.008]	0.0246*** [0.008]	0.0244*** [0.008]
ADR	-0.3196 [2.808]	-0.6725 [2.939]	-0.4224 [2.810]	-0.795 [2.942]	-0.6048 [2.970]	-0.5259 [2.816]
Share Turnover	19.6603*** [6.142]	21.2395*** [6.161]			21.2312*** [6.161]	21.0149*** [6.155]
Observations	5418	5418	5422	5422	5418	5418
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the Tobin Q of the firm, measured as the book value of total assets plus market value of equity minus the book value of equity divided by total assets. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

5 Firm determinants and Gravity Model

The previous analysis focused on the main factors explaining SWF ownership at the firm level. As my definition of ownership *aggregates* the participation of SWFs in listed firms, this approach has not considered characteristics of the investing fund or other bilateral factors. To address this issue, I use bilateral observations (from fund i to firm j as unit of analysis), which permits to include firm, fund, sector and national determinants both from the country holding the equity (sovereign fund) and the country where the holding is based (firm). This approach also permits to compare some results with the empirical literature on assets trade.³¹

Before introducing the gravity equation, I test the specification in equation (3).³² Results

³¹In the previous section the unit of analysis was each firm in the Worldscope dataset (for a total of 32.000 firms). In this case, each observation is the (bilateral) holding between a fund and a firm. As a robustness check, and to avoid the sample bias from two over-represented funds (Norges Bank Investment Management and New Zealand Superannuation Fund), I include a sub-sample of their largest equity holdings (as a share of the fund's equity portfolio). The subsample is denoted as *Restricted sample* in the results of this section.

³²Ownership variables are defined as: i) the percentage of outstanding shares in each firm and ii) a dummy variable for holdings above 1% of the firm. Ownership is calculated for different groups: total, commodity/non-commodity, OECD/non-OECD and domestic/foreign. Notice that this definition differs

Table 9: Self-selection of firm valuation

Dependent variable:	Tobin Q (firm value)	
	Outcome	Selection
SWF ownership (% O/S)	1.2053*** [0.204]	
Firm size	0.0033 [0.024]	0.8342*** [0.160]
Leverage	-0.1081** [0.055]	-1.5621* [0.899]
Inv. Opport.	0.5837*** [0.086]	-0.674 [0.639]
ROE	0.0077*** [0.002]	-0.0067 [0.014]
Dividend Yield	-0.0372*** [0.013]	-0.1277* [0.074]
R&D	0.9078*** [0.150]	-0.2743 [0.662]
Capex	-0.9821* [0.580]	-4.2372 [2.633]
Cash holdings	0.0210*** [0.007]	-0.0405 [0.034]
Instrument		
Landlocked	-0.3722*** [0.009]	
Analysts	0.2715*** [0.004]	
Mills ratio	27.4109** [44.106]	
Observations	8872	
Standard errors in brackets		
*** p<0.01, ** p<0.05, * p<0.1		

(in Annex 12.5 to 12.7) point to the existence of strong demand for large stocks, low cash holdings and low turnover. Determinants of ownership for commodity/non-commodity funds, OECD/non-OECD funds and domestic/foreign equity holdings are similar to the previous specification.

Although firm fundamentals explain the allocation of institutional investors to some extent, the investment preferences of sovereign wealth funds can pursue other objectives. The analysis of SWF portfolio allocations has not been considered in a gravity framework. Gravity models were introduced by Tinbergen (1962), and have been extensively applied to analyze trade of goods and assets.³³ One additional advantage is that, due to its log-linear structure, coefficients in the gravity model express elasticities or ratios of percentages changes.

Gravity models at the firm level have pointed out to the effects on trade (or flows) due to firm heterogeneity. Eaton, Kortum and Kramarz (2004) show that extensive margins of trade in French firms is more important than the intensive margin.³⁴ Greenaway

from the previous section, as I am not adding up total holdings in each firm.

³³Gravity models use the gravitational force concept as an analogy to explain patterns of trade, financial or migration flows. Their main implication is that the gross flow of trade between two entities should depend inversely on the distance between them and depend proportionally on their economic size.

³⁴Extensive margins of trade defined as the variations in the number of firms that serve export markets,

et al, (2008) estimate a gravity model at the firm level looking at trade within the food industry, and consider firm size and ownership variables (for multinational-owned firms) to account for firm level gravity. Gorg et *al.* use firm-level information in a gravity specification, including employment, foreign ownership and firms' total factor productivity.

Table 10: Expected effects on gravity model

Size	+	ADR	+
Leverage	+/-	Foreign Sales	+
Inv. Opport.	+	Turnover	+/-
ROE	+	Book Value	+/-
R&D	+/-	Cash Holding (FM)	+
CAPEX	+/-	GDP firm country	+
Cash Holdings	+	Mkt Cap firm country	+

Based on the results from the previous section, I propose a gravity model integrating fund, firm and country level factors. For the following analysis, one could summarize the expected effects for the coefficients in the gravity specification as in table 10. Information for bilateral equity holdings are disaggregated at the national, sectoral and firm level, to account for transactions between funds and firms. This specification allows to combine financial and other firm characteristics with national determinants (besides distance and economy size) which have proven relevant for explaining other financial flows (e.g. M&A in Di Giovanni (2005) or bank flows in Papaioannou (2009)). From the fund side, I include fund size (as total equity holdings in USD dollars) and fund performance in the gravity specification.³⁵

Coming from the goods trade literature, gravity models have been used extensively to analyse asset holdings and asset flows. In this configuration, the unit of analysis is the holding of fund i in firm j . Portes and Rey (2005) present a model of trade in assets, based on Martin and Rey (2001), where bilateral transactions can be expressed as:

$$\log(T_{ij}) = k_1 \log(M_i M_j) + k_2 \log(\tau_{ij}) + k_3 \quad (4)$$

where M_i and M_j are measures of economic masses for countries i and j (such as market capitalisation) and τ_{ij} represents the trading costs.

and intensive margins as the variations in average export sales per firm

³⁵Notice that fund size takes into account only the size of the equity portfolio, which does not reflect the actual size of the fund. I use this measure to better reflect the allocation problem for the sovereign investor *within* public equity investments.

The gravity model to be estimated considers firm-level characteristics, used in the previous specification, and country-level variables relevant to Propositions 1 and 2. I include a set of variables relevant to explain shifts of SWFs portfolio allocations during the period under study. In particular, I test whether there is a relationship between SWF holdings and with three factors: diversification, commodity sensitivity (from Scherer’s model) and demand for natural resources. The effect should be captured in the period under study (2009, and 2006-2009), with a larger effect after the 2007 financial crisis. I integrate into the gravity equation variables related to the firm’s sector and industry classification, on the one hand, and proxies of natural resource endowments of the sending and receptor country, on the other. Based on (4), the following baseline gravity model is tested:

$$\text{Log} \left(\frac{T_{ijt}}{M_{it}M_{jt}} \right) = \beta_0 + \beta_1 \log(\text{dist}_{ij}) + \beta'_2 \mathbf{F} + \beta'_3 \mathbf{\Gamma}_{\text{orig}} + \beta'_4 \mathbf{\Gamma}_{\text{dest}} + \mathbf{T} + \lambda_j + v_{ij} \quad (5)$$

where the dependent variable is estimated as the position of fund i (in USD thousands) divided by the product of market capitalisations of the country’s SWF and the country’s firm, $\mathbf{F}$ is a matrix including firm characteristics identified in the previous section (size, leverage, cash, turnover, return on equity, foreign sales, etc.), $\mathbf{\Gamma}_{\text{orig}}$ and $\mathbf{\Gamma}_{\text{dest}}$ include a set of macroeconomic and natural endowment variables at the country level and $\mathbf{T}$ is a set of time dummies. See Annex 12.11 for a detailed description of natural endowment indicators.

Along different specifications, I introduce other control variables used in gravity models for institutional investors:

- Macroeconomic factors for sending and recipient countries: GDP, GDP per capita, trade volume, regional dummies.
- Indicators of financial development: index of sophistication of financial markets and financial deepening indicators (e.g. credit/GDP).
- Diversification indicators. With the aim to test the diversification motive, I follow Portes and Rey (2005) and integrate variables representing the covariances between returns of country equity markets (see Annex 12.1 and 12.2 in annex for a description of variables and calculations). Correlations are calculated between monthly returns on the local’s stock market indices over the period 1990-2009. Other proxies for diversification (correlation between GDP growth rates and consumption growth rates) are tested.
- Commodity sensitivity. I construct, following Scherer’s (2009) model, an indicator of commodity sensitivity, calculated as the regression of demeaned asset returns against demeaned commodity (oil, copper, etc.) returns.

- Institutional indicators. I consider a number of institutional variables used in the literature to explain SWF investments. The role of these factors in the context of sovereign wealth institutions has been discussed elsewhere (Avendano and Santiso 2009). Controls related to institutional quality (i.e. legal origin, country risk) are included, but are not central to explain SWF portfolio allocations.

To capture the effect that natural endowments are likely to play in SWF equity holdings, I use two different types of variables:

- A dummy variable for firms in commodity and natural resource industries (according to Lionshares industry classification). Based on the same classification, I build a firm-level indicator (from 0 to 1) to account for the relationship of the firm with commodity and natural-resource related industries, with different weights across industries. I consider the following industries to be commodity or natural-resource related: agricultural commodities/milling, aluminum, agricultural chemical, coal, forest products, metal fabrication, oil and gas pipelines, oil and gas production, oil refining/marketing, precious metals, pulp and paper, steel and water utilities. See Annex 12.9 for a complete description of sectors and industries in the sample.
- Proxies for natural resource dependence and natural endowments from sending and recipient countries. From World Development Indicators, I include fuel exports (as % of merchandise exports), agricultural exports, food exports and ores and metals exports. Natural endowment indicators are the share of arable land (as % of total land), the share of forest area and the share of irrigated land. See Annex 12.11 for a full description.³⁶

Table 11 presents descriptive statistics for the proxies of natural endowments and additional regressors included in the gravity equation.

The baseline gravity model (table 12) includes *distance*, firm and fund-level determinants for the whole sample and restricted sample, which includes only the largest observations (in market value) of Norway and New Zealand’s funds. Country fixed-effects are included on both specifications. As expected, *distance* is a significant (negative) factor explaining SWF holdings.³⁷ Firm size and firm leverage are also significant explanatory factors

³⁶Busby, Isham, Prichett and Woolcock (2005) use proxies for natural resource endowments based on the dependence of country exports. They estimate export concentration for “point-source” natural resources, this is, those resources extracted from a narrow geographic or economic base such as oil, minerals (e.g. copper, diamonds), and plantation crops (e.g. bananas).

³⁷The *distance* variable (from CEPII) refers to the geodesic distance calculated following the great circle formula, which uses latitudes and longitudes of the most important cities/agglomerations (in terms

Table 11: Descriptive Statistics - Proxies for Natural Endowments and Bilateral factors

Variable	Obs	Mean	Std. Dev	Min	Max	Source
Natural Resource Endowments (SWF country)						
Agricultural land (% of land area)	11478	22.47	27.67	1.16	80.81	WDI
Arable land (% of land area)	11478	4.28	3.12	0.20	19.04	WDI
Arable land (hectares per person)	11478	0.23	0.10	0.00	1.41	WDI
Cereal yield (kg per Ha)	11478	5109.31	1599.53	435.10	7400.50	WDI
Clean energy production (% of total energy use)	11478	31.02	6.16	0.68	35.42	WDI
Electric power consumption (KWh per capita)	11478	19155.37	7611.43	1405.82	25083.17	WDI
Electricity production from coal sources (% total)	11478	6.27	10.05	0.10	99.38	WDI
Energy imports, net (% of energy use)	11478	-366.35	306.74	-703.20	100.00	WDI
Food production index	11478	105.53	7.77	65.99	141.53	WDI
Forest area (% of land area)	11478	31.57	8.90	0.01	63.58	WDI
CO2 emissions (kg per 2000 US\$ of GDP)	11478	0.39	0.22	0.19	2.93	WDI
Fuel exports % merchandises	11478	44.08	31.45	0.14	96.33	WDI
Agricultural raw materials as % of exports	11478	3.58	4.74	0.00	10.88	WDI
Ores and metals as % exports	11478	6.22	1.47	0.09	16.63	WDI
Natural Resource Endowments (recipient country)						
Agricultural land (% of land area)	11478	38.66	21.27	0.00	82.04	WDI
Agricultural land (% of land area)	11478	22.47	27.67	1.16	80.81	WDI
Arable land (% of land area)	11478	17.01	9.30	0.00	53.70	WDI
Arable land (hectares per person)	11478	0.37	0.47	0.00	2.42	WDI
Cereal yield (kg per Ha)	11478	5436.73	1966.06	0.00	8649.50	WDI
Clean energy production (% of total energy use)	11478	11.54	8.78	0.00	48.30	WDI
Electric power consumption (KWh per capita)	11478	9111.09	4358.61	0.00	25083.17	WDI
Electricity production from coal sources (% total)	11478	41.32	21.71	0.00	94.10	WDI
Energy imports, net (% of energy use)	11478	35.19	51.57	-602.66	100.00	WDI
Food production index	11478	97.06	26.14	0.00	130.57	WDI
Forest area (% of land area)	11478	35.36	20.25	0.00	73.87	WDI
CO2 emissions (kg per 2000 US\$ of GDP)	11478	0.68	0.73	0.00	4.30	WDI
Fuel exports % merchandises	11410	5.96	7.68	0.10	90.86	WDI
Agricultural raw materials as % of exports	11410	1.70	1.45	0.00	10.88	WDI
Ores and metals as % exports	11410	4.52	5.90	0.09	63.80	WDI
Bilateral trade and information (gravity model)						
Country contiguity	11478	0.01	0.11	0.00	1.00	CEPII
Common official language	11478	0.18	0.39	0.00	1.00	CEPII
Colonisation	11478	0.04	0.20	0.00	1.00	CEPII
Common colonisator	11478	0.00	0.05	0.00	1.00	CEPII
Distance	11478	8516.43	4783.36	9.56	19586.18	CEPII
Trade as % of GDP (SWF country)	8074	86.79	55.81	74.15	432.95	WDI
FDI (net inflows, SWF country)	11429	1.49	1.91	-2.11	26.24	WDI
FDI (net outflows, SWF country)	11405	2.97	1.30	0.03	29.50	WDI
Trade as % of GDP (recipient country)	5173	113.08	113.79	26.21	432.95	WDI
FDI (net inflows, recipient country)	11396	4.69	15.10	-2.11	380.35	WDI
FDI (net outflows, recipient country)	11189	5.22	19.78	0.07	505.53	WDI
Additional fund variables						
Fund size (total equity holdings)	11478	3.2E+10	2.5E+10	2.0E+06	2.5E+11	Factset/Lionshares
Log(fund size)	11478	10.04	0.89	6.30	11.40	Factset/Lionshares
Fund Performance Year-to-Date	11478	-6.25	91.88	-99.42	2384.00	Factset/Lionshares

of bilateral holdings.³⁸ In contrast to fund performance, fund size has a positive effect on SWF ownership, suggesting that large funds tend to have a higher participation. Commodity-sector and commodity-industry dummies (about 7% of the sample) are not significant when included in this specification.

Regressions including natural endowment variables occasionally showed signs of collinearity.³⁹ For this reason, I run individual regressions for each measure of natural endowments (in the recipient country) using a basic gravity specification (i.e. including distance, and firm size, leverage and foreign sales) across different samples. According to Proposition 2, non-commodity funds would be more likely to invest in countries with

of population). It incorporates internal distances based on area. Other definitions of distance were tested with similar results.

³⁸Other bilateral variables were introduced in the basic model but were not significant: contiguity, common language, national languages, colonial links.

³⁹The variance inflation factors was above 2.0 for specifications with simultaneous endowment factors.

Table 12: Baseline Gravity Model. Bilateral regressions

	All sample			Restricted Sample		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Distance	-0.0003*** [0.000]	-0.0003*** [0.000]	-0.0003*** [0.000]	-0.0018** [0.001]	-0.0018** [0.001]	-0.0018** [0.001]
Size	2.5332*** [0.212]	2.5190*** [0.213]	2.5223*** [0.213]	9.5070*** [1.564]	9.5521*** [1.567]	9.5660*** [1.568]
Leverage	-5.6134*** [1.647]	-5.6037*** [1.648]	-5.5995*** [1.654]	-23.7160** [11.443]	-23.6341** [11.454]	-23.5431** [11.458]
Invest. op.	0.0002 [0.007]	0.0003 [0.007]	0.0004 [0.007]	0.0146 [0.135]	0.0128 [0.136]	0.0153 [0.136]
ROE	-0.0136 [0.027]	-0.0141 [0.027]	-0.013 [0.027]	-0.1076 [0.277]	-0.1054 [0.281]	-0.1086 [0.281]
Dividend Yield	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.5178 [0.869]	0.517 [0.871]	0.5443 [0.872]
R&D	0 [0.000]	0 [0.000]	0 [0.000]	0.0009 [0.002]	0.0009 [0.002]	0.0009 [0.002]
Capex	-0.0008 [0.004]	-0.0007 [0.004]	-0.0007 [0.004]	-0.343 [0.422]	-0.3422 [0.422]	-0.339 [0.422]
Cash	0.0001 [0.000]	0.0001 [0.000]	0.0001 [0.000]	-0.0004 [0.000]	-0.0004 [0.000]	-0.0004 [0.000]
ADR		1.8147 [2.787]	1.7974 [2.796]		-6.3686 [12.858]	-6.5399 [12.865]
Foreign Sales		0.0029 [0.009]	0.003 [0.009]		0.0098 [0.097]	0.0113 [0.097]
Turnover			-16.1036 [28.427]			-152.3404 [282.841]
Log (fund size)	1.8116*** [0.546]	1.8174*** [0.547]	1.8246*** [0.547]	13.1428*** [3.951]	13.1602*** [3.959]	13.0101*** [3.969]
Performance (Year-to-Date)	0.0063 [0.005]	0.0062 [0.005]	0.0062 [0.005]	0.1241* [0.066]	0.1229* [0.066]	0.1244* [0.066]
Observations	11367	11367	11358	1443	1443	1443
R-squared	0.017	0.018	0.018	0.058	0.058	0.058
Number of country_code	53	53	53	43	43	43

Standard errors in brackets
 *** p<0.01, ** p<0.05, * p<0.1

larger natural endowments. Results are illustrated in table 13. In theory, non-commodity fund investments should be increasing to natural endowments in the recipient country, as illustrated by two variables (share agricultural land, share of arable land). Coefficients in the restricted sample for non-commodity funds are also positive but not significant. Interestingly, *fuel exports* is increasing to commodity fund holdings, suggesting that commodity-based funds could also invest in countries with fuel endowments (in contrast to Chhaochharia and Laeven 2008). However, the coefficient becomes not significant in the restricted sample.

To analyse the diversification motive, I integrate the cross-market stock correlations previously calculated in a basic gravity model for each group of funds. Results are displayed in table 14. In regressions (iii) to (xiv), the diversification indicator is significant to explain portfolio holdings for fund groups. For commodity funds, the effect of the cross-market stock correlation variable is negative and significant (in both samples). The opposite effect occurs for non-commodity funds.

These results suggest that the diversification motive is more relevant for commodity funds, and it can be explained by the results of Scherer (2009), where commodity funds

Table 13: Natural endowments and Gravity Model. Commodity vs Non-commodity Funds

All Sample

	Commodity Fuel Exports	Non-Commodity Fuel Exports	Commodity Agric. Land	Non-commodity Agric Land	Commodity Arable land	Non-commodity Arable Land	Commodity Raw Mat. Exports	Non- commodity Raw Mat. Exports	Commodity Metals Exports	Non- Commodity Metals Exports
Coefficient	0.3250***	-0.1012	-0.1456*	0.1540***	-0.2310	0.2352*	-0.6223	-0.8236	-0.0700	-0.4665**
Standard error	[0.092]	[0.145]	[0.085]	[0.050]	[0.144]	[0.136]	[1.026]	[0.640]	[0.184]	[0.196]
Observations	7206	4099	7237	4130	7237	4130	7206	4099	7206	4099
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Restricted Sample

	Commodity Fuel Exports	Non-Commodity Fuel Exports	Commodity Agric. Land	Non-commodity Agric Land	Commodity Arable land	Non-commodity Arable Land	Commodity Raw Mat. Exports	Non- commodity Raw Mat. Exports	Commodity Metals Exports	Non- Commodity Metals Exports
Coefficient	0.0081	-1.8234**	-0.0748	0.3989	0.1825	0.2361	-3.3565*	-4.8648**	0.7962	-2.2283*
Standard error	[0.144]	[0.835]	[0.137]	[0.249]	[0.268]	[0.645]	[2.021]	[2.353]	[0.666]	[1.184]
Observations	427	1004	428	1015	428	1015	427	1004	427	1004
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: OLS Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common colonisator, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls.

tend to diversify away their risk and hedge their commodity risk by investing in uncorrelated sectors of uncorrelated economies. To test for the role of commodity sensitivity in the allocation of SWFs, I include estimated commodity “betas” in the gravity model.⁴⁰ Results are presented in table 15. Results show that commodity funds are indeed more prone to invest in industries less correlated with commodity returns.

6 Robustness Checks and Extensions

6.1 Fund by fund individual regressions

The aggregation of equity holdings for the sovereign funds in the sample does not allow to assess specific determinants of each fund allocation. To estimate individual funds’ investment preferences, I regress equation (3) on a set of individual funds: Norway, New

⁴⁰Commodity “betas” are a measure of the correlation between commodity and firm returns. I estimate correlations between commodity returns (using a standard commodity index) and industry-specific returns (according to Lionshares classification). To the extent that, according to Scherer, commodity funds are more prone to invest in non-commodity sectors, a regression of equity holdings should capture this effect.

Table 14: Gravity Model and Stock Market Correlations by Type of Fund

	All Sample		Restricted Sample	
	Commodity	Non-Commod.	Commodity	Non-Comm.
Distance	-0.0007 [0.001]	-0.0017*** [0.000]	-0.0041*** [0.001]	-0.0082*** [0.003]
Size	2.2686*** [0.114]	6.8909*** [1.181]	5.4048*** [0.996]	29.1322*** [5.846]
Leverage	-3.4552*** [0.913]	-12.8235 [9.412]	-12.7031 [12.203]	-9.4256 [31.161]
FX Sales	0.0044 [0.003]	-0.0119 [0.072]	-0.0447 [0.062]	-0.3362 [0.417]
Stock Mkt. Correl.	-28.3585*** [2.643]	54.3039** [24.609]	-17.6272** [7.041]	81.2850 [88.038]
Observations	3561	1726	294	312
Controls	Yes	Yes	Yes	Yes

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: OLS Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common colonisator, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls.

Zealand, Korea, Singapore, Kuwait, Saudi Arabia and United Arab Emirates.⁴¹

Results for the dataset on total SWF ownership per firm are presented in table 16.

⁴¹For the purpose of robustness, ownership shares from different sub-funds are aggregated for the case of Singapore (GIC and Temasek) and United Arab Emirates (Abu Dhabi Investment Authority, Dubai World and Emirates Investment Authority).

Table 15: Gravity Model and commodity sensitivity

	All sample		Restricted sample	
	Commodity	Non-commodity	Commodity	Non-commodity
Distance	-0.0008*** [0.000]	-0.0012*** [0.000]	-0.0043*** [0.001]	-0.0054*** [0.001]
Size	2.0967*** [0.070]	2.8321*** [0.500]	6.0997*** [0.826]	12.4634*** [2.070]
Leverage	-2.2213*** [0.520]	-5.2587 [4.102]	-15.3759 [9.931]	-14.6848 [14.348]
Foreign Sales	0.0266*** [0.004]	-0.0065 [0.033]	0.0178 [0.051]	-0.0647 [0.135]
Commodity sensitivity $\beta_{o,a}$	-5.6978*** [2.168]	-1.6556*** [0.281]	-21.2976*** [8.037]	-4.7998 [2.985]
Observations	7237	4130	428	1015
Controls	Yes	Yes	Yes	Yes
Number of country_code	50	48	35	35

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: Panel Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common colonisator, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls. Commodity sensitivity calculated as the regression of demeaned asset returns againsts demeaned oil returns.

Results show that, although there are common determinants of equity investments to most funds, there is significant differences on their effect. The random effect specification confirms the significance of size, leverage, cash holdings and turnover for most of the funds under study. The probit estimation for individual funds (using the SWF dummy variable) is consistent with these results. The marginal effects show that certain variables (e.g. *size*) have a more significant effect on SWF ownership for the cases of Norway and United Arab Emirates.

6.2 Individual regressions with % of total SWF portfolio

To establish investment preferences, the specification in the first section uses two definitions of sovereign wealth fund ownership as the factor to be explained. Ownership was previously defined as the total or partial participation of SWFs in each firm *as a share of firm's market capitalisation*. The variable is then an proxy for the probability of ownership on a SWF vis-a-vis other types of investors. However, this variable does not take into account the share of each SWF portfolio allocated to the firm. To consider this, I regress equation (3) to explain the fraction of each SWF (as a share of *total SWF*

9 Concluding Remarks

In this paper, I explore the dynamics of sovereign wealth fund investments at the firm and fund level. I study the investment preferences of sovereign funds discriminating by their source of proceeds, location and investment destination. Results show that sovereign funds target different types of firm depending on these underlying factors. Firm-level characteristics shed light on explaining equity-holding differences for several SWFs. The recent shift of sovereign wealth institutions towards commodity and natural resource sectors suggests that other determinants have played a role in their asset allocation. I integrate a gravity-model approach at the fund and firm level to analyze how differences in natural resource endowments explain this pattern.

The main findings of this paper are the following:

In regard to the *first* hypothesis, there is significant variance in the allocation of SWF equity investments, depending on underlying factors associated with the fund (source of proceeds, OECD “effect”, home/foreign bias). Whereas most SWFs are attracted to large firms, with proven profitability and international activities, differences among groups remain:

- Non-commodity funds favour firms with more foreign activity and higher turnover, in contrast to commodity-funds.
- OECD-based funds prefer firms with lower leverage levels, whereas non-OECD funds have a preference for profitable and international firms.
- SWF foreign investments are oriented towards large and highly leveraged firms, in contrast with their domestic (small and low leveraged) investments. Foreign investments are attracted to R&D sectors.
- In line with the previous literature, I find that SWF ownership has a positive effect on firm value. However, this effect is only significant for commodity and OECD-based funds.

In regard to the *second* hypothesis, I find that natural resource endowments, in particular arable and agricultural land, forest areas and fuel exports, are important to explain the shift of SWF equity investments towards commodity and energy-related sectors. The effect is preponderant when analyzing commodity-related investments and controlling for other determinants.

Some limitations and extensions to this analysis should be mentioned: *First*, although gathered data covers over 22 sovereign institutions, some bias may exist by the absence

of some funds in the sample (i.e. CIC). Ideally, this sample should be extended in the future. *Second*, a theoretical extension to the commodity-fund case presented by Scherer (2009) would be constructive to understand investments for non-commodity funds. *Third*, whereas the analysis focuses on public equity investments, a significant part of recent SWF investments is done through private equity and venture capital deals. Although I could have partial information on these deals, the high-frequency data of equity investments (and higher statistical power) allows much more conclusive results.

11 References

- Aggarwal, R., L. Klapper, and P.D. Wysocki (2005), "Portfolio preferences of foreign institutional Investors", *Journal of Banking and Finance* 29, pp. 2919-2946.
- Aizenman, J. and R. Glick (2008), "Sovereign Wealth Funds: Stylized Facts about their Determinants and Governance," NBER Working Papers 14562, National Bureau of Economic Research, Washington DC.
- Alfaro, L. and F. Kanczuk (2005), "Sovereign debt as a contingent claim: a quantitative approach", *Journal of International Economics*, Elsevier, vol. 65(2), pp. 297-314.
- Avendano, R. and J. Santiso (2009), "Are Sovereign Wealth Fund investments politically biased? A comparison with mutual funds", OECD Development Centre, Working Paper, 283, December.
- Barro, R. (1996), "Democracy and Growth", *Journal of Economic Growth*, Springer, vol. 1(1), pp. 1-27.
- Behrendt, S. and B. Kodmani (eds.) (2009), "Managing Arab Sovereign Wealth in Turbulent Times—and Beyond", *Carnegie Papers*, 16, Carnegie Middle East Center, Washington DC.
- Bekaert, G. and X. Wang (2009), "Home bias revisited", Columbia Business School (unpublished).
- Berstein, S., J. Lerner and A. Schoar, (2009), "The Investment Strategies of Sovereign Wealth Funds", Working Paper Harvard Business School, 09-112.
- Bortolotti, B., V. Fotak, W. Megginson and W. Miracky (2009). "Sovereign Wealth Fund Investment Patterns and Performance". Working Paper, University of Oklahoma.
- Brav, Alon, Wei Jiang, Randall S. Thomas, and Frank Partnoy, 2008, "Hedge fund activism, corporate governance, and firm performance", *Journal of Finance* 63, pp. 1729-1775.
- Brown, A., Papaioannou, M. and I. Petrova (2010), "Macrofinancial Linkages of the Strategic Asset Allocation of Commodity-Based Sovereign Wealth Funds", IMF Working Paper, January.
- Busby, G., Isham, J., Prichett, L., Woolcock, M. (2005), "The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth". *World Bank Economic Review* 19 (2). pp. 141-174.

- Campbell, J., G. Chacko, J. Rodriguez and L.M. Viceira (2004), "Strategic asset allocation in a continuous-time VAR model", *Journal of Economic Dynamics and Control*, Elsevier, vol. 28(11), pp. 2195-2214.
- Chhaochharia, V. and L. Laeven, (2008), "Sovereign Wealth Funds: Their Investments Strategies and Performance", CEPR Working Paper, No. 6959.
- Claessens, S. and J. Kreuser (2009), "Strategic Investment and Risk Management for Sovereign Wealth Funds" Paper presented at the Joint BIS/ECB/World Bank Public Investors Conference on Strategic Asset Allocation for Central Banks & Sovereign Wealth Funds at ECB, Frankfurt am Main, November 24-25, 2008.
- Coeurdacier, N. and Aviat, A. (2007). "The Geography of Trade in Goods and Asset Holdings", *Journal of International Economics* 71, pp 22-51.
- Coeurdacier, N. and Guibaud, S. (2009). "International Portfolio diversification is Better than you Think", *Journal of International Money and Finance*, forthcoming.
- Del Guercio, D. and J. Hawkins, (1999), "The motivation and impact of pension fund activism", *Journal of Financial Economics* 52, pp. 293-340.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2008), The law and economics of self-dealing, *Journal of Financial Economics* 88, pp. 430-465.
- Di Giovanni, J. (2005), "What drives capital flows? The case of cross-border M&A activity and financial deepening", *Journal of International Economics*, 65, pp. 127-149.
- Eaton, Jonathan, Samuel Kortum and Francis Kramarz (2004). "Dissecting Trade: Firms, Industries and Export Destinations," *American Economic Review* Vol. 94, No.2, pp. 150-152.
- Engel, E., AND R. Valdes, (2000), "Optimal Fiscal Strategy for Oil Exporting Countries," IMF Working Paper WP/00/118 (Washington: International Monetary Fund).
- Fernandes, N. and A. Bris (2009), "Sovereign Wealth Funds revalued", *Financial Times*, 2009.
- Fernandes, N. (2009), "Sovereign Wealth Funds: Investment Choices and Implications around the World". IMD International, Working Paper (unpublished).
- Ferreira, M. A. and P. Matos (2008), "The color of investors' money: The role of institutional investors around the world", *Journal of Financial Economics*, Vol. 88 (3), 499-533.

Frankel, J. (2010), "The Natural Resource Curse: A Survey", Faculty Research Working Paper Series. Harvard Kennedy School, Harvard University.

Fuentes, R. Alvarez, R. (2006), "Paths of Development, Specialization, and Natural Resources Abundance", Working Papers Central Bank of Chile 383, Central Bank of Chile.

Gompers, P. and Metrick, A. (2001), Institutional investors and equity prices. *Quarterly Journal of Economics* 116, pp. 229-259.

Gompers, P., Ishii, J. and Metrick, A. (2003), Corporate governance and equity prices. *Quarterly Journal of Economics* 118, pp. 107-155.

Gorg, H., Halpern, L. and Murakozy, B. "Why do within firm-product export prices differ across markets?". Kiel Institute for the World Economy, 2009.

Greenaway, D., Gullstrand, J., and Kneller, R. (2008), "Firm Heterogeneity and the Gravity of International Trade", University of Nottingham, GEP, Discussion Papers No. 08/41.

Hartzell, J.C., Starks, L. (2003), "Institutional investors and executive compensation", *Journal of Finance* 58, pp. 2351-2374.

Hau, H. and H. Rey (2008a), "Home Bias at the Fund Level," *American Economic Review*, vol. 98(2), pp. 333-338.

Hau, H. and H. Rey (2008b), "Global Portfolio Rebalancing under the Microscope," NBER Working Paper 14165. National Bureau of Economic Research.

International Working Group on Sovereign Wealth Funds (2008), "Sovereign Wealth Funds Generally Accepted Principles and Practices – Santiago Principles", Santiago de Chile.

Khorana, A., S. Henri, and P. Tufano (2005), "Explaining the size of the mutual fund industry around the world", *Journal of Financial Economics* 78, pp. 145-185.

Kotter, J. and U. Lel (2010), "Friends or foes? The stock price impact of sovereign wealth fund investments and the price of keeping secrets," *Journal of Financial Economics* Vol 101(2), pp 360-381.

Kraay, K., Loayza, N. Servén, L. , Ventura, J. (2005) "Country Portfolios", *Journal of the European Economic Association*, Vol. 3, Issue 4, pp. 914-945.

Papaioannou, E. "What drives international financial flows? Politics, institutions and

- other determinants". *Journal of Development Economics* 88 (2009), pp. 269-281.
- Poelhekke, S., van der Ploeg, F. (2010), "Do Natural Resources Attract FDI? Evidence from Non-Stationary Sector-Level Data". CEPR Discussion Papers 8079.
- Reisen, H. (2008), "How to Spend it: Commodity and Non-commodity Sovereign Wealth Funds", Deutsche Bank Research, Research Notes No. 28, July.
- Rozanov, A. (2005), "Who holds the wealth of nations", *Central Banking Journal*, Volume 15, number 4, pp. 52-57.
- Santiso, J. (2008), "Sovereign Development Funds: Key Financial Actors in the Shifting Wealth of Nations", in M. Rietveld, ed. (2008), *New perspectives on sovereign asset management*, Central Banking Publications, London, pp. 173-193.
- Scherer, B. (2009) "A note on portfolio choice for sovereign wealth funds". *Financial Markets Portfolio Management*, Volume 23, Number 3.
- Sun, T. and H. Hesse (2009), "Sovereign Wealth Funds and Financial Stability. An Event Study Analysis," IMF Working Paper (forthcoming).
- Tinbergen, J. (1962), *Shaping the World Economy: Suggestions for an International Economic Policy*. New York.
- Woidtke, T. (2002), Agents watching agents? "Evidence from pension fund ownership and firm value", *Journal of Financial Economics* 63, pp. 99-131.

12 Annex

12.1 GDP Growth Correlations by Region

1980-1990

	East Asia & Pacific	Euro area	High income	High income: nonOECD	High income: OECD	Latin America & Caribbean	Least Developed Countries	Low & middle income	Low income	Lower middle income	Middle East & North Africa	Middle income	South Asia	Sub-Saharan Africa	Upper middle income	World
East Asia & Pacific	1.00	0.25	0.57	0.15	0.58	0.18	0.27	0.54	0.68	0.80	-0.18	0.54	0.24	0.21	0.27	0.61
Euro area		1.00	0.74	0.64	0.71	0.20	0.18	0.29	0.33	0.30	-0.25	0.27	0.33	0.52	0.10	0.73
High income			1.00	0.51	1.00	0.15	0.23	0.36	0.53	0.46	-0.29	0.35	0.25	0.30	0.14	0.99
High income: nonOECD				1.00	0.45	0.53	0.61	0.50	0.55	-0.21	-0.67	0.48	0.27	0.65	0.49	0.54
High income: OECD					1.00	0.12	0.19	0.33	0.45	0.49	-0.25	0.32	0.24	0.26	0.11	0.98
Latin America & Caribbean						1.00	0.49	0.92	0.06	-0.26	-0.73	0.92	-0.18	0.62	0.98	0.28
Least Developed Countries (UN)							1.00	0.51	0.66	-0.11	-0.79	0.49	-0.04	0.49	0.53	0.28
Low & middle income								1.00	0.46	0.11	-0.70	1.00	-0.04	0.64	0.94	0.49
Low income									1.00	0.42	-0.64	0.44	0.54	0.75	0.22	0.62
Lower middle income										1.00	0.24	0.11	0.37	-0.06	-0.22	0.45
Middle East & North Africa											1.00	-0.69	-0.19	-0.76	-0.73	-0.38
Middle income												1.00	-0.05	0.63	0.94	0.47
South Asia													1.00	0.33	-0.20	0.23
Sub-Saharan Africa														1.00	0.59	0.37
Upper middle income															1.00	0.27
World																1.00

1990-2000

	East Asia & Pacific	Euro area	High income	High income: nonOECD	High income: OECD	Latin America & Caribbean	Least Developed Countries	Low & middle income	Low income	Lower middle income	Middle East & North Africa	Middle income	South Asia	Sub-Saharan Africa	Upper middle income	World
East Asia & Pacific	1.00	-0.60	-0.22	0.49	-0.26	0.38	-0.39	0.25	-0.44	0.82	-0.60	0.28	0.04	-0.23	-0.02	-0.11815
Euro area		1.00	0.67	0.07	0.68	-0.27	0.38	-0.01	0.29	-0.39	0.52	-0.03	0.00	0.32	0.13	0.557043
High income			1.00	0.25	1.00	-0.14	0.56	0.52	0.50	0.17	0.06	0.51	0.37	0.60	0.49	0.973101
High income: nonOECD				1.00	0.19	0.23	-0.38	0.17	-0.31	0.28	-0.08	0.19	-0.26	-0.15	0.15	0.253407
High income: OECD					1.00	-0.16	0.59	0.51	0.52	0.15	0.08	0.49	0.39	0.61	0.48	0.968566
Latin America & Caribbean						1.00	-0.15	0.44	-0.23	0.17	-0.29	0.47	-0.57	0.07	0.53	0.002846
Least Developed Countries (UN)							1.00	0.65	0.92	0.12	0.07	0.62	0.31	0.93	0.62	0.644276
Low & middle income								1.00	0.59	0.54	-0.40	1.00	0.05	0.76	0.92	0.700563
Low income									1.00	0.01	0.12	0.56	0.28	0.94	0.59	0.576282
Lower middle income										1.00	-0.50	0.56	0.46	0.26	0.18	0.285087
Middle East & North Africa											1.00	-0.41	0.00	0.06	-0.25	-0.05089
Middle income												1.00	0.04	0.73	0.91	0.690665
South Asia													1.00	0.31	-0.24	0.319194
Sub-Saharan Africa														1.00	0.69	0.706776
Upper middle income															1.00	0.653233
World																1

2000-2008

	East Asia & Pacific	Euro area	High income	High income: nonOECD	High income: OECD	Latin America & Caribbean	Least Developed Countries	Low & middle income	Low income	Lower middle income	Middle East & North Africa	Middle income	South Asia	Sub-Saharan Africa	Upper middle income	World
East Asia & Pacific	1.00	0.22	0.39	0.65	0.36	0.69	0.66	0.87	0.65	0.96	0.58	0.87	0.79	0.82	0.72	0.63
Euro area		1.00	0.80	0.49	0.82	0.43	0.06	0.31	0.06	0.14	0.12	0.31	0.00	0.17	0.42	0.72
High income			1.00	0.88	1.00	0.59	0.03	0.52	0.06	0.31	0.12	0.53	0.26	0.34	0.65	0.94
High income: nonOECD				1.00	0.86	0.75	0.25	0.77	0.27	0.60	0.31	0.77	0.57	0.59	0.84	0.95
High income: OECD					1.00	0.56	0.01	0.49	0.03	0.28	0.10	0.49	0.22	0.31	0.62	0.93
Latin America & Caribbean						1.00	0.76	0.95	0.77	0.78	0.75	0.95	0.78	0.89	0.98	0.81
Least Developed Countries (UN)							1.00	0.79	0.99	0.82	0.89	0.78	0.80	0.91	0.67	0.34
Low & middle income								1.00	0.80	0.92	0.76	1.00	0.87	0.95	0.96	0.78
Low income									1.00	0.82	0.86	0.79	0.84	0.93	0.68	0.36
Lower middle income										1.00	0.70	0.92	0.91	0.94	0.78	0.59
Middle East & North Africa											1.00	0.75	0.58	0.84	0.70	0.40
Middle income												1.00	0.87	0.94	0.96	0.79
South Asia													1.00	0.92	0.76	0.53
Sub-Saharan Africa														1.00	0.86	0.62
Upper middle income															1.00	0.86
World																1.00

Source: World Development Indicators, 2010.

12.2 GDP Stock Correlations by Country

	OECD	Latin America	Asia	Africa	Middle East	Ratio
Australia	1.00	0.95	0.93	0.92	0.91	0.90
Austria	1.00	0.95	0.93	0.92	0.91	0.90
Belgium	1.00	0.95	0.93	0.92	0.91	0.90
Canada	1.00	0.95	0.93	0.92	0.91	0.90
Denmark	1.00	0.95	0.93	0.92	0.91	0.90
Finland	1.00	0.95	0.93	0.92	0.91	0.90
France	1.00	0.95	0.93	0.92	0.91	0.90
Germany	1.00	0.95	0.93	0.92	0.91	0.90
Japan	1.00	0.95	0.93	0.92	0.91	0.90
Italy	1.00	0.95	0.93	0.92	0.91	0.90
South Korea	1.00	0.95	0.93	0.92	0.91	0.90
Spain	1.00	0.95	0.93	0.92	0.91	0.90
Sweden	1.00	0.95	0.93	0.92	0.91	0.90
Switzerland	1.00	0.95	0.93	0.92	0.91	0.90
United Kingdom	1.00	0.95	0.93	0.92	0.91	0.90
United States	1.00	0.95	0.93	0.92	0.91	0.90
OECD	1.00	0.95	0.93	0.92	0.91	0.90
Argentina	0.95	0.90	0.85	0.80	0.75	0.70
Brazil	0.90	0.85	0.80	0.75	0.70	0.65
Chile	0.85	0.80	0.75	0.70	0.65	0.60
Colombia	0.80	0.75	0.70	0.65	0.60	0.55
Costa Rica	0.75	0.70	0.65	0.60	0.55	0.50
Cuba	0.70	0.65	0.60	0.55	0.50	0.45
Ecuador	0.65	0.60	0.55	0.50	0.45	0.40
El Salvador	0.60	0.55	0.50	0.45	0.40	0.35
Guatemala	0.55	0.50	0.45	0.40	0.35	0.30
Honduras	0.50	0.45	0.40	0.35	0.30	0.25
India	0.45	0.40	0.35	0.30	0.25	0.20
Indonesia	0.40	0.35	0.30	0.25	0.20	0.15
Israel	0.35	0.30	0.25	0.20	0.15	0.10
Italy	0.30	0.25	0.20	0.15	0.10	0.05
Japan	0.25	0.20	0.15	0.10	0.05	0.00
Korea	0.20	0.15	0.10	0.05	0.00	0.00
Malaysia	0.15	0.10	0.05	0.00	0.00	0.00
Mexico	0.10	0.05	0.00	0.00	0.00	0.00
Netherlands	0.05	0.00	0.00	0.00	0.00	0.00
Norway	0.00	0.00	0.00	0.00	0.00	0.00
Peru	0.00	0.00	0.00	0.00	0.00	0.00
Portugal	0.00	0.00	0.00	0.00	0.00	0.00
South Africa	0.00	0.00	0.00	0.00	0.00	0.00
Spain	0.00	0.00	0.00	0.00	0.00	0.00
Sweden	0.00	0.00	0.00	0.00	0.00	0.00
Switzerland	0.00	0.00	0.00	0.00	0.00	0.00
Taiwan	0.00	0.00	0.00	0.00	0.00	0.00
Thailand	0.00	0.00	0.00	0.00	0.00	0.00
United Kingdom	0.00	0.00	0.00	0.00	0.00	0.00
United States	0.00	0.00	0.00	0.00	0.00	0.00
OECD	0.00	0.00	0.00	0.00	0.00	0.00
Algeria	0.00	0.00	0.00	0.00	0.00	0.00
Angola	0.00	0.00	0.00	0.00	0.00	0.00
Benin	0.00	0.00	0.00	0.00	0.00	0.00
Burkina Faso	0.00	0.00	0.00	0.00	0.00	0.00
Burundi	0.00	0.00	0.00	0.00	0.00	0.00
Cameroon	0.00	0.00	0.00	0.00	0.00	0.00
Cote d'Ivoire	0.00	0.00	0.00	0.00	0.00	0.00
Egypt	0.00	0.00	0.00	0.00	0.00	0.00
Ghana	0.00	0.00	0.00	0.00	0.00	0.00
Guinea	0.00	0.00	0.00	0.00	0.00	0.00
Kenya	0.00	0.00	0.00	0.00	0.00	0.00
Madagascar	0.00	0.00	0.00	0.00	0.00	0.00
Mali	0.00	0.00	0.00	0.00	0.00	0.00
Morocco	0.00	0.00	0.00	0.00	0.00	0.00
Mozambique	0.00	0.00	0.00	0.00	0.00	0.00

Note: Based on standard correlations of domestic stock market indices (monthly observations) for selected countries over the period 1990-2009. Source: Thomson Datastream, 2010.

12.3 Sample of Sovereign Wealth Funds. Location, number of holding firms, total holdings in USD dollars, source of proceeds and OECD membership

SWF Institute	Country	Total SWF Assets 2009 USD Billion	Total Amount Equity Holdings USD Million	Commodity fund	OECD fund	% of SWF Equity Portfolio in Sample ⁽¹⁾
Bahrain - Mumtalakat Holding Company	Bahrain	9.1	528.0	Yes	No	100.0
Botswana - Pula Fund	Botswana	6.9	25.5	Yes	No	14.9
Brunei Investment Agency	Brunei	30	35.7	Yes	No	100.0
Canada - Alberta's Heritage Fund	Canada	14.4	39.6	Yes	Yes	7.5
China Investment Corporation	China	332.4	252434.8	No	No	98.5
Hong Kong - Monetary Authority IP	Hong Kong	259.3	145.6	No	No	100.0
Korea Investment Corporation	Korea	37	196.5	No	Yes	86.6
Kuwait Investment Authority	Kuwait	202.8	4717.3	Yes	No	39.6
Libyan Investment Authority	Libya	70	149.4	Yes	No	62.8
Malaysia - Khazanah Nasional	Malaysia	25	20900.2	No	No	77.8
New Zealand Superannuation Fund	New Zealand	12.1	957.1	No	Yes	81.0
Norway - Government Pension Fund	Norway	512	50363.5	Yes	Yes	83.0
Oman Investment Fund	Oman	-	2.0	Yes	No	100.0
Qatar Investment Authority	Qatar	85	2125.6	Yes	No	100.0
Saudi Arabia - SAMA Foreign Holdings	Saudi Arabia	439.1	559.4	Yes	No	56.8
Singapore - Temasek Holdings	Singapore	133	53783.8	No	No	93.2
Singapore - GICS	Singapore	247.5	7877.8	No	No	74.8
Thailand - SWF presumed	Thailand	-	8.1	No	No	
UAE - Emirates Investment Authority	United Arab Emirates	-	1580.0	Yes	No	100.0
UAE - Dubai World	United Arab Emirates	19.6	13594.9	Yes	No	1.2
UAE - Abu Dhabi Investment Authority	United Arab Emirates	627	4513.0	Yes	No	95.6
USA - Alabama Trust Fund	United States	-	19.4	No	Yes	79.1

Source: Authors' calculation, based on Factset (Lionshares) and Thomson Financial, 2010.

12.4 Baseline Model of SWF Ownership. Linear Probability Model

	Baseline						Country effects			
	SWF dummy (ii)	M/E	SWF dummy (iii)	M/E	SWF dummy (iv)	M/E	SWF dummy (vi)	M/E	SWF dummy (vii)	M/E
Size	0.3144*** [0.018]	0.0204	0.3141*** [0.019]	0.0201	0.3345*** [0.021]	0.0184	0.3617*** [0.025]	0.3617	0.3588*** [0.026]	0.3588
Inv. Op.	0.1140** [0.052]	0.0074	0.1182** [0.052]	0.0076	0.1191** [0.060]	0.0066	0.1362** [0.064]	0.1362	0.1379** [0.064]	0.1379
ROE	0.0091*** [0.003]	0.0006	0.0094*** [0.003]	0.0006	0.0082*** [0.003]	0.0005	0.0069** [0.003]	0.0069	0.0071** [0.003]	0.0071
R&D	0.5125*** [0.115]	0.0332	0.5101*** [0.117]	0.0326	0.5756*** [0.124]	0.0317	0.4891*** [0.120]	0.4891	0.4828*** [0.122]	0.4828
Capital Expend.	-1.7216*** [0.559]	-0.1116	-1.6519*** [0.564]	-0.1055	-2.2422*** [0.635]	-0.1234	-1.4033** [0.666]	-1.4033	-1.4566** [0.670]	-1.4566
Cash	-0.0116*** [0.003]	-0.0008	-0.0111*** [0.003]	-0.0007	-0.0121*** [0.003]	-0.0007	-0.0149*** [0.003]	-0.0149	-0.0146*** [0.004]	-0.0146
Foreign Sales	0.0077*** [0.001]	0.0005	0.0075*** [0.001]	0.0005	0.0062*** [0.001]	0.0003	0.0030*** [0.001]	0.0030	0.0029** [0.001]	0.0029
GDP (firm)					-0.0063*** [0.001]	-0.0003				
Observations	5732		5523		5523		5732		5523	
Pseudo R-squared	0.183		0.1834		0.2107					
Controls	Yes		Yes		Yes		Yes		Yes	
Country fixed effects	No		No		No		Yes		Yes	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Note: Probit estimation. Dependent variable is a dummy for stakes larger than 1% of firm value. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depositary Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

12.5 Preliminary Stages for Bilateral Regressions SWF Equity Holdings and Firm Dimension. Baseline Model. Commodity vs non-Commodity Funds

	Firm-level characteristics and Country Variables								Country Random Effects		
	Comm_own	Non-comm-own	Comm_own	Non-comm-own	Comm_own	Non-comm-own	Comm_own	Non-comm-own	Comm_own	Non-comm-own	Comm_own
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(iv)	(x)	(xi)
Size	-0.0708*** [0.007]	0.1120*** [0.008]	-0.0698*** [0.007]	0.1106*** [0.008]	-0.0702*** [0.007]	0.1108*** [0.008]	-0.0673*** [0.007]	0.1089*** [0.008]	-0.0721*** [0.007]	0.1153*** [0.007]	-0.0714*** [0.007]
Leverage	-0.0006 [0.056]	-0.2941*** [0.096]	-0.0073 [0.056]	-0.2826*** [0.096]	0.0069 [0.057]	-0.2780*** [0.096]	-0.0127 [0.056]	-0.2436*** [0.092]	0.0097 [0.055]	-0.2620*** [0.061]	0.0056 [0.055]
Invest. op.	0.0005 [0.000]	-0.0002 [0.000]	0.0005 [0.000]	-0.0002 [0.000]	0.0005 [0.000]	-0.0002 [0.000]	0.0003 [0.000]	-0.0001 [0.000]	0.0004 [0.000]	-0.0001 [0.000]	0.0004 [0.000]
ROE	0.0016* [0.001]	0.0035** [0.002]	0.0017** [0.001]	0.0032* [0.002]	0.0015* [0.001]	0.0032* [0.002]	0.0008 [0.001]	0.0038** [0.002]	0.0000 [0.001]	0.0045*** [0.001]	0.0001 [0.001]
Dividend Yield	-0.0003** [0.000]	0.0001* [0.000]	-0.0003** [0.000]	0.0001* [0.000]	-0.0003** [0.000]	0.0001* [0.000]	-0.0003** [0.000]	0.0001 [0.000]	-0.0003 [0.000]	0.0001 [0.000]	-0.0003 [0.000]
R&D	0.0001 [0.000]	-0.0001 [0.000]	0.0001 [0.000]	-0.0001 [0.000]	0.0001 [0.000]	-0.0001 [0.000]	0.0001* [0.000]	-0.0001 [0.000]	0.0001 [0.000]	-0.0001 [0.000]	0.0001 [0.000]
Capex	0.0033** [0.001]	-0.0002 [0.000]	0.0033** [0.001]	-0.0002 [0.000]	0.0034** [0.001]	-0.0002 [0.000]	0.0017 [0.001]	-0.0001 [0.000]	0.0014 [0.001]	-0.0001 [0.000]	0.0015 [0.001]
Cash	-0.0000* [0.000]	0.0000** [0.000]	-0.0000 [0.000]	0.0000* [0.000]	-0.0000 [0.000]	0.0000* [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000** [0.000]	-0.0000 [0.000]
Foreign Sales			0.0558 [0.090]	-0.1082 [0.094]	0.0421 [0.090]	-0.1146 [0.094]	-0.0550 [0.090]	-0.0469 [0.094]			-0.0267 [0.092]
Turnover			-0.0013*** [0.000]	0.0024*** [0.000]	-0.0013*** [0.000]	0.0024*** [0.000]	-0.0016*** [0.000]	0.0026*** [0.000]			-0.0007* [0.000]
GDP (firm)					-1.9843* [1.096]	-1.9921* [1.154]	1.5927 [1.047]	-7.3836*** [1.993]			
MKap/GDP (firm)							-0.0000*** [0.000]	0.0000*** [0.000]			
ADR							-0.0003** [0.000]	0.0005*** [0.000]			
Observations	11385	11385	11385	11385	11376	11376	11374	11374	11385	11385	11385
Number of country_code	55	55	55	55	55	55	55	55	55	55	55

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation, based on Factset (Lionshares) and Thomson Financial, 2010.

12.6 Model. OECD vs non-OECD funds

	Firm-level characteristics and Country Variables								Country Random Effects					
	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(iv)	(x)	(xi)	(xii)	(xiii)	(xiv)
Size	-0.0028 [0.008]	0.1222*** [0.015]	0.0019 [0.008]	0.1103*** [0.016]	0.0017 [0.008]	0.1099*** [0.016]	0.0024 [0.008]	0.1139*** [0.015]	0.0058 [0.008]	0.1369*** [0.016]	0.0085 [0.008]	0.1301*** [0.016]	0.0086 [0.008]	0.1301*** [0.016]
Leverage	-0.3864*** [0.072]	0.2266*** [0.085]	-0.3836*** [0.072]	0.2249** [0.088]	-0.3693*** [0.070]	0.2674*** [0.084]	-0.3657*** [0.070]	0.1987* [0.102]	-0.3407*** [0.061]	0.2302** [0.105]	-0.3379*** [0.061]	0.2241** [0.105]	-0.3242*** [0.062]	0.2240*** [0.105]
Invest. op.	0.0005* [0.000]	0.0001 [0.000]	0.0005* [0.000]	0.0001 [0.000]	0.0005* [0.000]	0.0001 [0.000]	0.0005* [0.000]	0.0001 [0.000]	0.0007* [0.000]	-0.0004 [0.001]	0.0007* [0.000]	-0.0003 [0.001]	0.0007* [0.000]	-0.0003 [0.001]
ROE	0.0034*** [0.001]	0.0148*** [0.003]	0.0035*** [0.001]	0.0133*** [0.003]	0.0033*** [0.001]	0.0131*** [0.003]	0.0033*** [0.001]	0.0119*** [0.003]	0.0038*** [0.001]	0.0070*** [0.003]	0.0038*** [0.001]	0.0063*** [0.003]	0.0036*** [0.001]	0.0063*** [0.003]
Dividend Yield	0.0000 [0.000]	-0.0004** [0.000]	0.0000 [0.000]	-0.0003* [0.000]	0.0000 [0.000]	-0.0002 [0.000]	0.0000 [0.000]	-0.0004 [0.001]	0.0000 [0.000]	-0.0060 [0.007]	0.0000 [0.000]	-0.0056 [0.007]	-0.0000 [0.000]	-0.0055 [0.007]
R&D	0.0000* [0.000]	0.0000* [0.000]	0.0000* [0.000]	0.0000* [0.000]	0.0000* [0.000]	0.0000* [0.000]	0.0000* [0.000]	0.0000*** [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]
Capex	0.0032* [0.002]	0.0000 [0.000]	0.0034* [0.002]	0.0000 [0.000]	0.0034* [0.002]	0.0000 [0.002]	0.0035* [0.002]	-0.0000 [0.000]	0.0036* [0.002]	0.0001 [0.000]	0.0036* [0.002]	0.0001 [0.000]	0.0036* [0.002]	0.0001 [0.000]
Cash	0.0000* [0.000]	-0.0000*** [0.000]	0.0000* [0.000]	-0.0000*** [0.000]	0.0000* [0.000]	-0.0000*** [0.000]	0.0000* [0.000]	-0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]
Foreign Sales			-0.5336*** [0.093]	0.7747*** [0.105]	-0.5472*** [0.094]	0.5999*** [0.108]	-0.5458*** [0.094]	0.5575*** [0.110]			-0.3613*** [0.099]	0.2768** [0.130]	-0.3733*** [0.099]	0.2861** [0.130]
Turnover			0.0000 [0.000]	0.0026*** [0.001]	0.0000 [0.000]	0.0024*** [0.001]	-0.0000 [0.000]	0.0018*** [0.001]			0.0004 [0.000]	0.0011 [0.001]	0.0004 [0.000]	0.0011 [0.001]
GDP (firm)					-1.9042* [1.048]	-62.5641*** [11.571]	-2.1232* [1.101]	-16.5706** [7.382]					-2.1609** [0.964]	0.4049 [3.119]
MKap/GDP (firm)							0.0000 [0.000]	-0.0000*** [0.000]						
ADR							0.0003* [0.000]	-0.0005*** [0.000]						
Observations	11385	11385	11385	11385	11376	11376	11374	11374	11385	11385	11385	11385	11376	11376
Number of country_code	55	55	55	55	55	55	55	55	55	55	55	55	55	55

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation, based on Factset (Lionshares) and Thomson Financial, 2010.

12.7 Baseline Model. Domestic vs. Foreign Ownership

	Firm-level characteristics and Country Variables								Country Random Effects			
	Domestic Ownership (i)	Foreign Ownership (ii)	Domestic Ownership (iii)	Foreign Ownership (iv)	Domestic Ownership (v)	Foreign Ownership (vi)	Domestic Ownership (vii)	Foreign Ownership (viii)	Domestic Ownership (iv)	Foreign Ownership (x)	Domestic Ownership (xi)	Foreign Ownership (xii)
Size	-0.0712** [0.032]	0.0509*** [0.009]	-0.0728** [0.032]	0.0510*** [0.009]	-0.0643** [0.031]	0.0511*** [0.009]	-0.0665* [0.037]	0.0546*** [0.009]	0.0505 [0.038]	0.0470*** [0.009]	0.0487 [0.038]	0.0477*** [0.009]
Leverage	0.0755 [0.096]	-0.3676*** [0.080]	0.0706 [0.096]	-0.3651*** [0.080]	0.1121 [0.091]	-0.3471*** [0.078]	-0.3007 [0.250]	-0.3452*** [0.077]	-0.7969* [0.407]	-0.3120*** [0.061]	-0.8113** [0.410]	-0.3091*** [0.061]
Invest. op.	-0.0001 [0.000]	0.0007* [0.000]	-0.0001 [0.000]	0.0007* [0.000]	-0.0000 [0.000]	0.0007* [0.000]	-0.0001 [0.000]	0.0006 [0.000]	0.0001 [0.002]	0.0008* [0.000]	0.0001 [0.002]	0.0008* [0.000]
ROE	0.0069*** [0.002]	0.0050*** [0.001]	0.0070*** [0.002]	0.0049*** [0.001]	0.0064*** [0.002]	0.0047*** [0.001]	0.0020 [0.002]	0.0043*** [0.001]	-0.0057 [0.005]	0.0043*** [0.001]	-0.0058 [0.005]	0.0042*** [0.001]
Dividend Yield	-0.0001* [0.000]	-0.0000 [0.000]	-0.0001* [0.000]	-0.0000 [0.000]	-0.0000** [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0002 [0.001]	-0.0000 [0.000]	0.0002 [0.001]	-0.0000 [0.000]
R&D	-0.0001* [0.000]	0.0000 [0.000]	-0.0001* [0.000]	0.0001 [0.000]	-0.0001** [0.000]	0.0000 [0.000]	-0.0008*** [0.000]	0.0000 [0.000]	-0.0002 [0.001]	0.0001 [0.000]	-0.0002 [0.001]	0.0001 [0.000]
Capex	0.0000 [0.000]	0.0053*** [0.002]	0.0000 [0.000]	0.0053*** [0.002]	0.0000 [0.000]	0.0054*** [0.002]	-0.0001 [0.000]	0.0047** [0.002]	0.0000 [0.001]	0.0065*** [0.002]	0.0000 [0.001]	0.0064*** [0.002]
Cash	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]
Foreign Sales			0.3729 [0.235]	-0.1019 [0.113]	0.1887 [0.239]	-0.1239 [0.114]	0.1385 [0.253]	-0.1791 [0.114]			0.2998 [0.361]	-0.1545 [0.117]
Turnover			-0.0006** [0.000]	0.0006 [0.000]	-0.0006** [0.000]	0.0006 [0.000]	-0.0004 [0.000]	0.0006 [0.000]			-0.0019 [0.001]	0.0007** [0.000]
GDP (firm)					-76.7583*** [14.668]	-3.5742** [1.522]	-32.4065* [16.601]	-2.8312** [1.253]				
MKap/GDP (firm)							-0.0000*** [0.000]	-0.0000*** [0.000]				
ADR							-0.0022*** [0.000]	0.0005** [0.000]				
Observations	11385	11385	11385	11385	11376	11376	11374	11374	11385	11385	11385	11385
Number of country_code	55	55	55	55	55	55	55	55	55	55	55	55

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation, based on Factset (Lionshares) and Thomson Financial, 2010.

12.8 Determinants of SWF equity investments. Individual regressions. Bilateral Database

	Firm-level characteristics and country variables						
	Norway	New Zealand	Korea	Singapore	Kuwait	Saudi Arabia	UAE
size_fer	-0.0812*** [0.007]	0.0643*** [0.008]	0.2321*** [0.027]	0.0974*** [0.018]	0.1374*** [0.020]	0.0627* [0.036]	0.1096*** [0.035]
leverage_fer	-0.0162 [0.056]	-0.3295*** [0.073]	-0.2910** [0.144]	0.2287** [0.117]	0.1175 [0.128]	0.2041** [0.097]	0.1505 [0.148]
invop_fer	0.0003 [0.000]	-0.0000 [0.000]	-0.0020 [0.003]	-0.0003 [0.000]	-0.0002 [0.001]	-0.0015 [0.002]	-0.0018 [0.003]
roe_fer	0.0004 [0.001]	0.0005 [0.001]	0.0168*** [0.005]	0.0146*** [0.003]	0.0139*** [0.005]	0.0047 [0.011]	0.0182*** [0.004]
dividendyield	-0.0003* [0.000]	0.0001** [0.000]	-0.0029** [0.001]	-0.0021 [0.005]	-0.0000 [0.000]	-0.0139 [0.015]	-0.0028 [0.013]
rd_fer	0.0000** [0.000]	-0.0001 [0.000]	-0.0000 [0.000]	-0.0002** [0.000]	0.0000*** [0.000]	-0.0001 [0.000]	-0.0003*** [0.000]
capex_fer	0.0013 [0.001]	-0.0001 [0.000]	-0.0002 [0.004]	-0.0001 [0.000]	-0.0090 [0.007]	-0.0070 [0.010]	0.0001 [0.000]
cash_fer	-0.0000 [0.000]	0.0000 [0.000]	0.0000 [0.000]	-0.0000** [0.000]	-0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]
adr_fer	-0.2311*** [0.089]	-0.1840* [0.101]	-0.0925 [0.312]	0.5213*** [0.136]	0.3436** [0.155]	0.7209*** [0.204]	0.4743** [0.223]
fx_sales	-0.0021*** [0.000]	0.0022*** [0.000]	0.0032*** [0.001]	0.0010 [0.001]	0.0042*** [0.001]	0.0013 [0.001]	0.0029** [0.001]
turnover_fer	2.0076* [1.117]	-6.1346*** [2.098]	-8.0488* [4.636]	-8.8790 [5.261]	-78.9981*** [21.792]	-18.0150 [13.377]	-9.5816 [9.467]
gdp_firm	-0.0000*** [0.000]	0.0000*** [0.000]	0.0000*** [0.000]	-0.0000*** [0.000]	-0.0000*** [0.000]	-0.0000* [0.000]	-0.0000** [0.000]
mkap_country_firm_to_gdp	-0.0002 [0.000]	0.0003* [0.000]	0.0009*** [0.000]	-0.0002 [0.000]	-0.0010*** [0.000]	-0.0003 [0.000]	-0.0021** [0.001]
Observations	11374	11374	11374	11374	11374	11374	11374
Number of country_code							
Robust standard errors in brackets							
*** p<0.01, ** p<0.05, * p<0.1							

	Country Random Effects						
	Norway	New Zealand	Korea	Singapore	Kuwait	Saudi Arabia	united_emirates
size_fer	-0.0858*** [0.007]	0.0665*** [0.008]	0.2872*** [0.018]	0.1073*** [0.021]	0.1544*** [0.029]	0.0776 [0.049]	0.1123** [0.044]
leverage_fer	0.0134 [0.056]	-0.2856*** [0.070]	-0.3895** [0.163]	0.2276** [0.113]	0.0210 [0.308]	0.3377 [0.350]	0.1229 [0.420]
invop_fer	0.0004 [0.000]	0.0000 [0.000]	-0.0021 [0.002]	-0.0001 [0.001]	0.0001 [0.002]	-0.0025 [0.005]	-0.0048 [0.005]
roe_fer	-0.0002 [0.001]	0.0013 [0.001]	0.0205*** [0.003]	0.0138*** [0.004]	0.0098* [0.006]	-0.0034 [0.008]	0.0192** [0.008]
dividendyield	-0.0003 [0.000]	0.0001** [0.000]	-0.0028 [0.004]	-0.0085 [0.011]	0.0000 [0.001]	-0.0243 [0.043]	-0.0104 [0.029]
rd_fer	0.0000 [0.000]	-0.0001 [0.000]	0.0000 [0.000]	-0.0000 [0.001]	0.0000 [0.000]	-0.0001 [0.002]	-0.0003 [0.001]
capex_fer	0.0005 [0.001]	-0.0001 [0.000]	0.0001 [0.001]	0.0000 [0.001]	-0.0002 [0.008]	-0.0145 [0.018]	0.0001 [0.001]
cash_fer	-0.0000 [0.000]	0.0000 [0.000]	-0.0000 [0.000]	-0.0000 [0.000]	-0.0000 [0.000]	-0.0000 [0.000]	0.0000 [0.000]
adr_fer	-0.1477 [0.093]	-0.1209 [0.106]	0.0434 [0.328]	0.2542* [0.154]	-0.0201 [0.199]	0.7214*** [0.278]	0.2122 [0.268]
fx_sales	-0.0008** [0.000]	0.0016*** [0.000]	0.0033*** [0.001]	0.0007 [0.001]	0.0028* [0.002]	0.0030 [0.002]	0.0027 [0.002]
turnover_fer	1.0136 [1.120]	-2.9769* [1.552]	-12.3912*** [4.077]	0.5709 [2.835]	-16.8334 [24.451]	0.7835 [16.184]	2.5827 [7.116]
gdp_firm							
Observations	11376	11376	11376	11376	11376	11376	11376
Number of country_code	55	55	55	55	55	55	55
Robust standard errors in brackets							
*** p<0.01, ** p<0.05, * p<0.1							

12.9 Sectors and Industry classification - Number of holdings

Sector Lionshares	Number of holdings	Industry Lionshares	Number of holdings	Industry Lionshares	Number of holdings
Finance	2097	Regional Banks	511	Electronics/Appliances	71
Producer Manufacturing	1057	Real Estate Development	373	Chemicals: Major Diversified	69
Electronic Technology	1035	Engineering & Construction	347	Computer Peripherals	68
Process Industries	746	Electric Utilities	265	Broadcasting	65
Consumer Services	639	Industrial Machinery	235	Personnel Services	64
Retail Trade	625	Electronic Components	207	Pulp & Paper	64
Consumer Non-Durables	609	Semiconductors	194	Specialty Telecommunications	64
Non-Energy Minerals	575	Chemicals: Specialty	190	Casinos/Gaming	61
Health Technology	551	Medical Specialties	186	Textiles	61
Consumer Durables	465	Investment Banks/Brokers	184	Beverages: Alcoholic	60
Transportation	459	Miscellaneous Commercial Services	183	Food: Major Diversified	59
Technology Services	423	Information Technology Services	173	Movies/Entertainment	56
Industrial Services	422	Major Banks	171	Railroads	56
Commercial Services	400	Finance/Rental/Leasing	170	Savings Banks	55
Utilities	398	Steel	161	Services to the Health Industry	55
Distribution Services	280	Other Metals/Minerals	158	Air Freight/Couriers	54
Communications	259	Biotechnology	156	Electronics Distributors	54
Health Services	175	Wholesale Distributors	154	Chemicals: Agricultural	53
Energy Minerals	150	Trucks/Construction/Farm Machinery	153	Hospital/Nursing Management	53
Miscellaneous	109	Electronic Equipment/Instruments	150	Data Processing Services	51
Not Classified	4	Specialty Stores	147	Cable/Satellite TV	50
		Electrical Products	144	Pharmaceuticals: Major	50
		Pharmaceuticals: Other	138	Oil & Gas Production	49
		Auto Parts: OEM	134	Publishing: Newspapers	49
		Marine Shipping	133	Coal	48
		Property/Casualty Insurance	126	Commercial Printing/Forms	48
		Industrial Specialties	125	Automotive Aftermarket	47
		Food: Specialty/Candy	124	Computer Processing Hardware	46
		Apparel/Footwear Retail	123	Trucking	43
		Restaurants	119	Beverages: Non-Alcoholic	42
		Telecommunications Equipment	118	Home Furnishings	41
		Food Retail	117	Medical Distributors	41
		Apparel/Footwear	116	Discount Stores	40
		Financial Conglomerates	115	Specialty Insurance	39
		Major Telecommunications	113	Computer Communications	38
		Aerospace & Defense	112	Tobacco	38
		Construction Materials	112	Publishing: Books/Magazines	35
		Metal Fabrication	107	Medical/Nursing Services	34
		Investment Trusts/Mutual Funds	105	Managed Health Care	33
		Packaged Software	103	Environmental Services	32
		Electronic Production Equipment	102	Financial Publishing/Services	32
		Precious Metals	102	Food Distributors	31
		Investment Managers	101	Office Equipment/Supplies	31
		Other Consumer Services	101	Catalog/Specialty Distribution	29
		Internet Software/Services	96	Electronics/Appliance Stores	29
		Homebuilding	95	Integrated Oil	27
		Agricultural Commodities/Milling	94	Home Improvement Chains	26
		Gas Distributors	93	Oil Refining/Marketing	26
		Containers/Packaging	90	Water Utilities	26
		Industrial Conglomerates	90	Media Conglomerates	25
		Miscellaneous Manufacturing	89	Forest Products	24
		Other Transportation	89	Insurance Brokers/Services	22
		Recreational Products	89	Oilfield Services/Equipment	22
		Airlines	84	Tools & Hardware	22
		Household/Personal Care	83	Pharmaceuticals: Generic	21
		Wireless Telecommunications	82	Drugstore Chains	20
		Motor Vehicles	80	Other Consumer Specialties	20
		Hotels/Resorts/Cruiselines	78	Aluminum	18
		Multi-Line Insurance	78	Internet Retail	18
		Department Stores	76	Consumer Sundries	15
		Life/Health Insurance	76	Alternative Power Generation	14
		Real Estate Investment Trusts	76	Oil & Gas Pipelines	11
		Building Products	74	Contract Drilling	10
		Advertising/Marketing Services	73	Miscellaneous	4
		Food: Meat/Fish/Dairy	72	Not Classified	4

Source: Factset (Lionshares) and Thomson Financial, 2010.

12.10 Number of equity holdings per Sector

Industry Lionshares	Commodity related industry	Number of holdings
Finance	0	2097
Producer Manufacturing	0	1057
Electronic Technology	0	1035
Process Industries	0	746
Consumer Services	0	639
Retail Trade	0	625
Consumer Non-Durables	0	609
Non-Energy Minerals	1	575
Health Technology	0	551
Consumer Durables	0	465
Transportation	0	459
Technology Services	0	423
Industrial Services	0	422
Commercial Services	0	400
Utilities	0	398
Distribution Services	0	280
Communications	0	259
Health Services	0	175
Energy Minerals	1	150
Miscellaneous	0	109
Not Classified	0	4

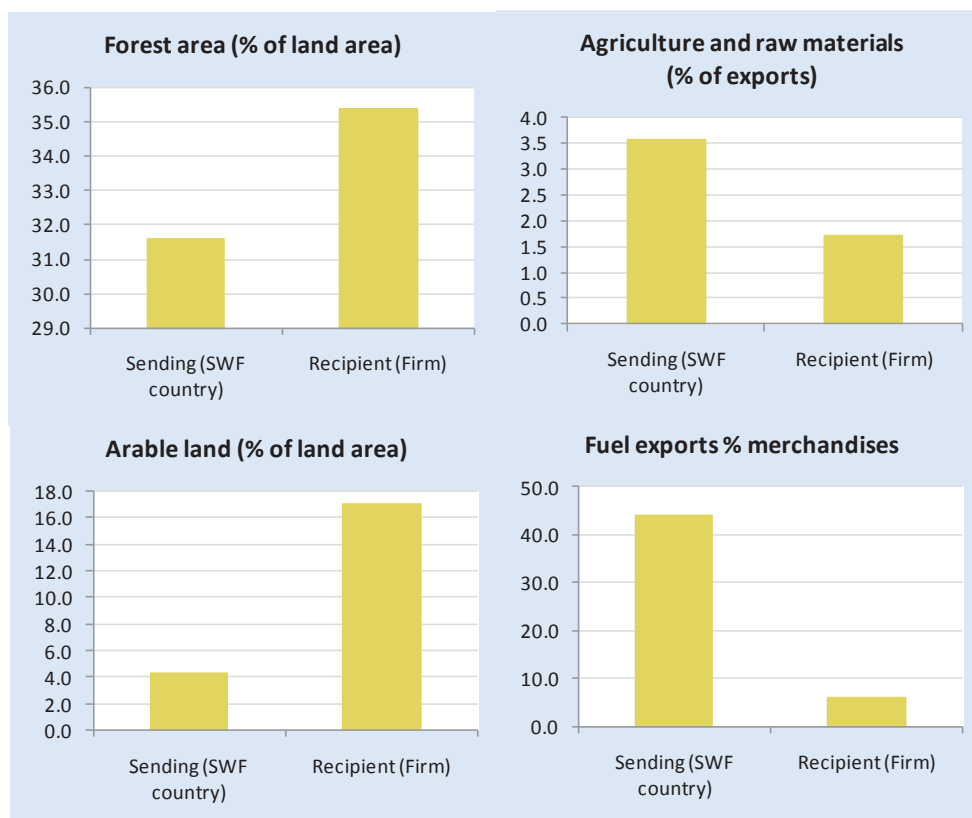
Source: Factset (Lionshares) and Thomson Financial, 2010.

12.11 Definition of Proxies for Natural Resource Endowments

Indicator	Definition
Agricultural irrigated land (% of total agricultural land)	Agricultural irrigated land refers to agricultural areas purposely provided with water, including land irrigated by controlled flooding.
Forest area (% of land area)	Forest area is land under natural or planted stands of trees of at least 5 meters in situ, whether productive or not, and excludes tree stands in agricultural production systems (for example, in fruit plantations and agroforestry systems) and trees in urban parks and gardens.
Agricultural raw materials exports (% of merchandise exports)	Agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).
Food exports (% of merchandise exports)	Food comprises the commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels).
Manufactures exports (% of merchandise exports)	Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).
Ores and metals exports (% of merchandise exports)	Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).
Fuel exports (% of merchandise exports)	Fuels comprise SITC section 3 (mineral fuels).
Agricultural land (% of land area)	Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures. Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber. This category includes land under flowering shrubs, fruit trees, nut trees, and vines, but excludes land under trees grown for wood or timber. Permanent pasture is land used for five or more years for forage, including natural and cultivated crops.
Arable land (% of land area)	Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.
Arable land (hectares per person)	Arable land (hectares per person) includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.
Cereal yield (kg per hectare)	Cereal yield, measured as kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals relate to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded.
Clean energy production (% of total energy use)	Clean energy is noncarbohydrate energy that does not produce carbon dioxide when generated. It includes hydropower and nuclear, geothermal, and solar power, among others.
Electric power consumption (kWh per capita)	Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants.
Energy imports, net (% of energy use)	Net energy imports are estimated as energy use less production, both measured in oil equivalents. A negative value indicates that the country is a net exporter. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.
Energy use (kg of oil equivalent per capita)	Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.

Source: World Development Indicators.

12.12 Descriptive Statistics Natural Resource Endowments - Selected indicators



Source: World Development Indicators.

12.13 Sector Distribution by Sovereign Wealth Fund

Distribution of SWF allocations by sector - Selected funds (% of total per fund)

	Finance	Producer Manufacturing	Electronic Technology	Process Industries	Consumer Services	Retail Trade	Consumer Non-Durables	Non-Energy Minerals	Health Technology	Consumer Durables	Transportation	Technology Services	Industrial Services	Commercial Services	Utilities	Distribution Services	Communications	Health Services	Energy Minerals	Total per SWF
Korea Investment Corporation	33	5	12	3	5	6	6	1	10	1	1	7	1	1	3	1	2	2	1	100
Kuwait Investment Authority	19	5	2	2	2	2	8	5	7	0	0	0	0	1	3	0	4	0	40	100
Malaysia - Khazanah Nasional	3	0	0	0	2	0	0	0	0	0	30	0	6	0	25	1	29	4	0	100
New Zealand Superannuation Fund	24	4	7	4	4	4	4	5	7	3	13	4	2	1	6	1	5	2	2	100
Norway - Government Pension Fund - Global	21	7	7	5	4	5	9	5	9	3	2	5	2	1	5	1	6	1	3	100
Saudi Arabia - SAMA Foreign Holdings	66	1	3	3	6	0	9	0	3	0	0	0	0	4	0	0	3	0	2	100
Singapore - GICS	21	4	1	2	3	7	14	13	10	3	3	1	0	1	2	0	6	0	11	100
Singapore - Temasek Holdings	48	5	7	0	0	0	0	0	0	0	11	0	0	0	1	0	25	0	0	100
Total per Sector	29	4	5	2	3	3	6	4	6	1	8	2	1	1	6	1	10	1	7	100

Source: Factset (Lionshares) and Thomson Financial, 2010.