DO SOVEREIGN WEALTH FUNDS HERD IN EQUITY MARKETS?

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Abstract

With $4.4 trillion of assets at end-2010, feared and courted by governments all over the world, characterized by low levels of transparency and often accused of hidden motivations, sovereign wealth funds (SWFs) are today among the most controversial players in global financial markets. SWFs are government owned financial vehicles deriving their wealth from oil related or other fiscal or balance of payment surpluses. Based on a newly built database of 2740 SWF announced deals spanning 1990-2010 and involving 29 out of the 52 existing SWFs, this paper assesses whether SWFs herd in equity markets across industries. The results, a measure of herding equal to -5%, imply that SWFs do not herd across industries. Indeed they tend to follow a fairly similar investment strategy across industries in a given period. This homogeneity in their trading patterns across industries seems to be more pronounced compared to other types of investors.

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1. Introduction

This paper examines the investment behaviour of Sovereign Wealth Funds (SWFs) focusing in particular on their attitude towards herding across industries in equity markets where herding is defined as trading the same stock (industry), in the same direction (purchase or sale), over the same period of time.

SWFs are state-owned investment vehicles that manage portfolios of financial activities typically denominated in foreign currency deriving from surpluses of the balance of payments or other kinds of fiscal surpluses.

Interest in the financial behaviour of SWFs has increased rapidly over the last ten years, given their growing presence in financial markets, particularly in equity markets. According to the dataset assembled in this paper, SWFs reached the peak of their investment activity in 2007 with a total amount of acquisitions of USD 133 billion.

Assets under SWF management reached USD 4.5 trillion at end-2010, well exceeding the assets managed by private equity funds (USD 2.6 trillion) and hedge funds (USD 1.8 trillion) (TheCityUk, 2011). While much attention has been devoted to analysing private equity funds and hedge funds, SWFs have been largely overlooked. This is partly due to information gaps: most of them, even among the largest, publish limited information about their investment behaviour and portfolios. This has raised concerns among politicians, public opinion and operators that they could be pursuing hidden strategic objectives instead of the declared profit maximization targets.[1]

Given their size, it is critical to understand whether SWFs could potentially destabilize markets and exacerbate stock price volatility by following momentum based fads or investing in a herd-like manner. The idea that SWFs could potentially herd comes especially from the period 2007-2009 when they apparently first herded into and subsequently out of the financial sector.

The focus of this paper is therefore on SWF behaviour and in particular herding in equity markets across sectors. Equities indeed represent an important share of SWFs portfolios

[1] This worry is made worse considering that most SWFs come from countries where transparency standards are low and where there are no domestic authorities or regulation to comply with.

(estimated between 30-60% exception made for a few funds not allowed to trade in equities[2]).

In order to measure herding across industries, the methodology defined in Lakonishok, Shleifer and Vishny (1992) is adopted in this paper. Applying this approach to the 29 SWFs included in the dataset across the 12 Fama & French industries over the period 1st January 1995- 31st December 2010, the result is a negative LSV statistic equal to -5%. This result is particularly interesting because previous work using this methodology typically found positive, albeit often small, values for the LSV statistic. As explained below, a negative statistic means, not only that SWFs do not herd, but also that their behavior across industries is less volatile than what could be expected if trades where independently distributed. In other words, instead of herding - that is clustering on the same side of the market for some industries and not for others - each SWF tends to behave similarly across different industries. This result, when compared to the existing literature and to the outcomes of a test on a control sample of mutual funds conducted in this paper, suggests that SWFs behave differently from other institutional investors.

The contribution of this paper is twofold. First it contributes to the development of the literature on SWFs by identifying a specific characteristic of their behaviour in equity markets, herding, which has not been studied before. Secondly it contributes to the literature on herding by investigating the herding behaviour of a complete new set of investors based on a newly built database of 2740 SWFs' announced deals.

The remainder of the paper is organized as follows. Section 2 provides background information on SWFs. Section 3 summarizes the literature on SWFs and on herding. Section 4 describes the dataset. Section 5 presents the methodology adopted for testing herding. Section 6 reports the results along with robustness checks, the outcome of a Monte Carlo experiment and of a test on a control sample of mutual funds. Section 7 concludes.

2. Background information on SWFs

[2] For example the two Russian funds among the largest ones.

According to the definition in IMF (2008) and agreed upon by SWFs themselves, SWFs are “special purpose investment funds or arrangements that are owned by the general government. Created by the government for macroeconomic purposes, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies that include investing in foreign financial assets.” SWFs derive their wealth from balance of payments surpluses, proceeds of privatizations, fiscal surpluses and receipts from commodity exports.

A key issue in assessing the investment behaviour of SWFs is whether it is worthwhile to study them as a homogeneous category. Having diverse legal, institutional, governance structures and different objectives, SWFs could be considered a heterogeneous group of investors including funds as diverse as fiscal stabilization funds, saving funds, reserve investment corporations and pension reserve funds without explicit pension liabilities. The diversity of objectives, time horizons, funding source, risk-profit trade-offs, all imply different preferences for strategic asset allocations. As highlighted in Kunzel et al. (2011), for example, saving funds have varying proportions of equities in their portfolios, while stabilization funds hold mainly fixed income and cash and some of them do not even invest in equities. Most pension reserve funds also have some equity exposure, as do reserve investment corporations.

However, differences across these types of funds should not be overemphasized: different types of funds may co-exist within the same SWF. Indeed, some SWFs have multiple goals or have goals that evolve over time. Moreover and most importantly, SWFs share some common characteristics that make them worth considering as a single group of investors (Quadrio Curzio and Miceli, 2010). Firstly, all SWFs are government owned investment funds. Secondly they must have at least part of their portfolios denominated in foreign currency, albeit not necessarily totally or mostly. Thirdly they are not subject to short-term withdrawals. Fourthly, they share many characteristics with official reserves especially in terms of their origin, however they are separately managed even if owned by the central bank. Finally, they are clearly differentiated not only by official reserves held by central banks, but also by state-owned enterprises (SOEs) in the traditional sense and by public pension funds which directly dispense pension benefits and are financed with pension contributions.

Based on the above characteristics, there are currently 52 SWFs in the world for a total amount of assets of $4.4 trillion at end-2010. However due to lack of transparency, some

SWFs do not even disclose the amount of their assets[3]. Table 1 lists the 52 SWFs with their country of origin, total assets at end-2010, date of establishment, origin of their wealth (whether their wealth derives from export/royalties of energy/commodity or from other sources of fiscal proceeds), level of transparency as measured by the Linaburg Maduell Index[4], and type of funds as in Kunzel et al. (2011). 45% of total SWF assets are owned by Asian countries. Some of the most important Asian SWFs are Chinese (such as SAFE and CIC) followed by Singapore's Government Investment Corporation (GIC) and Temasek. In Asia the lion's share of SWFs are non-commodity. Middle Eastern SWFs - mostly managing oil-related revenues - own 31% of SWFs total assets. The region's largest SWFs are those managed by the Saudi Arabian Monetary Agency, the Abu Dhabi Investment Authority (ADIA), the Kuwait Investment Authority (KIA), the Qatar Investment Authority (QIA) plus several other funds belonging mainly to the UAE. Next comes Europe, representing 16% of SWFs' total assets. Most of these assets consist of the Norwegian pension fund and two Russian funds, the National Wealth Fund and the Reserve Fund, all of which are commodity-based.

In addition to the significant asset sizes, SWFs present another peculiar characteristic. Their assets are concentrated in the hands of just a few large operators. The 10 largest SWFs hold almost 80% of total assets and the first 15 almost 90%.

Their growth in the last decade has been impressive both in terms of assets and number of funds. The size of their assets increased from USD 500 billion in 1995 to USD 900 billion in 2004 (Quadrio Curzio and Miceli, 2010) and to $4.4 trillion in 2010. In terms of number of funds, less than a third predate 1990, almost 20% has been established in the '90s, while more than half of them (56%) was created in the 2000s (TheCityUk, 2011) particularly in the last five years (40%). This increase reflected the rise in commodity prices, the surge in Asian countries' exports and surpluses, and the related persistence of global imbalances between countries that consume too much (United States) and others that consume too little (China).

SWFs are expected to continue to grow rapidly even if at a slower pace than in the recent past. In spite of recent downward revisions following the financial crisis, some analysts

[3] The estimates referring to the less transparent funds are subject to a significant margin of error.
[4] Sovereign Wealth Fund Institute, http://www.swfinstitute.org/statistics-research/linaburg-maduell-transparency-index/

project SWFs' assets still to rise to USD 9,7 trillion in 2015 (Jen and Andreopoulos, 2008) compared to US$12 trillion forecast a year and a half earlier (Jen, 2007).

In SWFs, political and economic aspects intertwine. Since they are an expression of a new state capitalism, they are suspected, rightly or wrongly, of representing interests that go beyond their stated goal of profit maximisation, although at this time there is no empirical evidence to substantiate these concerns.

Transparency and good governance might contribute to alleviate fears and keep markets open and are important also for the citizens of the countries owning SWFs. For this reason, in 2008 the IMF set up a special working group (IWG) of countries owning SWFs which issued guidelines regarding transparency and governance to adopt on a voluntary basis, the so-called Santiago Principles published in October 2008. Later on, an international Forum of SWFs (IFSWF) was established by the same countries to monitor the adoption of the Principles and the funds' activity.

3. Literature review

This section will review two different strands of the literature: the first one concerns SWFs, while the second one is related to the empirical measurement of herding.

Despite SWF relevance, there has been little academic research on them. The limited literature on SWFs comprises several streams concerning different aspects of SWFs operations. A first stream analyses the effects on financial markets of SWFs investments both on stock prices and performances of target firms. This stream includes the works of Bortolotti et al. (2010); Bertoni and Lugo (2011); Dewenter et al. (2010); Fernandes (2011); Knill et al. (2010); Kotter and Lel (2010); Sun and Hesse (2009). These papers employ mainly event study methodologies to analyze the evolution of target firms stock prices, Tobin's Q, accounting variables, measures of risk, in the time interval including SWFs transaction announcements. This stream of literature will not be further analyzed here. Overall it suggests, exception made for Knill et al. (2010), that SWFs do not represent a destabilizing force in global financial markets.

A second stream of literature which this paper is related to, focuses on SWFs investment behaviour, the determinants of their investment and the differences with other comparable

investors. It includes the works by Bernstein et al. (2009); Chhaochharia and Laeven (2010); Dyck and Morse (2011), Karolyi and Liao (2009); Kotter and Lel (2010).[5]

Bernstein et al. (2009) focus on SWF direct private equity investments. SWFs seem to engage in a form of trend chasing, since they are more likely to invest at home when domestic equity prices are higher, and invest abroad when foreign prices are higher. The authors find that the involvement of politicians determines a greater likelihood of investing domestically and also that when politics is involved, the likely outcome for SWF is a worse performance.

Chhaochharia and Laeven (2010) find that SWFs tend to chase past returns and hold equity portfolios that are conservative and not well diversified, both geographically and across industries. These biases are more pronounced for less transparent and poorly governed SWFs. They imply a suboptimal risk-return trade-off and adverse implications on welfare and on the efficiency of global asset allocation. However the authors find much variation in investment behavior across SWFs highlighting the heterogeneity among them.

Dyck and Morse (2011) distinguish between SWFs investments following financial criteria and state industrial planning motivations. They find that industrial planning has considerable explanatory power for SWFs' portfolios variation.

Karolyi and Liao (2009) study SWFs investment behaviour within the broader framework of government-led acquisitions. What is relevant here is their analysis concerning the subset of deals involving SWFs comparing them with either other non-SWF government-controlled acquirers and private corporations. The authors find that SWF-led acquisitions are less likely to fail and they are more likely to pursue targets that are larger in total assets and with fewer financial constraints.

Kotter and Lel (2010), being at the intersection of the two streams of literature referred above, analyze SWFs investment determinants in comparison to other institutional investors. Their findings suggest that SWFs are similar to passive institutional investors in terms of preference for target characteristics and of impact on target firm performance.

These studies, except for Kotter and Lel (2010), convey the idea that SWFs behave differently, in some specific respects, from other institutional investors therefore representing a group on their own. This paper proceeds in the same direction by

[5] A third stream of literature - not analysed here - deals mostly with institutional aspects (see, for example, Das U., Mazarei A., van der Hoorn H. (eds), (2010), "Economics of Sovereign Wealth Funds: Issues for Policymakers", International Monetary Fund, Washington D.C.)

assessing whether SWFs herd across the same stocks or industries. The results are then compared to other institutional investor studies that employ the same methodology. Moreover a test is carried out on a control sample of mutual funds. The evidence in this paper suggests that, concerning a specific aspect of financial behaviour (herding), SWFs behave differently compared to other institutional investors. This is the first study dealing with this particular aspect of SWFs behaviour in financial markets.

The literature on herding is also relevant for this paper. Herding is defined as the behaviour of a group of investors who trade the same stock (industry), in the same direction (purchase or sale), over the same period of time.

Bikhandani and Sharma (2000) distinguish between "true" and "spurious" herding. "True" herding requires that investors must be aware of each others' behaviour and intentionally copy each other. This type of herding in some cases would allow prices to depart from their fundamental values and thus destabilizes financial markets. "True" herding could be due to various reasons: informational cascades (Banerjee, 1992; Bikhchandani et al. 1992); reputational risk (Scharfstein and Stein, 1990); compensation schemes that incentivize uniform behaviours; conformity and tendency to follow fads. In contrast, "spurious" herding reflects the fact that investors react similarly and at the same time to the same set of information or incentives (Froot, Scharfstein and Stein, 1992; Hirshleifer, Subrahmanyam and Titman, 1994). In these models herding does not produce prices disconnected from their fundamentals and therefore it does not destabilize markets. Therefore herding does not necessarily imply irrational, destabilizing behaviour as it can also reflect a response to commonly-shared information.

The statistical methodology applied in this, as well as in other papers on herding cannot disentangle its causes, and therefore evidence of herding would not necessarily lead to the conclusion that the action of SWFs is destabilizing. However, evidence of absence of herding would imply that the actions of SWFs are not destabilizing.

To empirically measure statistical correlation in investors' behaviours, the most commonly used measure, also adopted in this paper, is the one proposed by Lakonishok, Shleifer and Vishny (1992). The Lakonishok, Shleifer and Vishny measure (hereafter LSV) defines herding as the tendency of investors to trade a given stock (industry) together and in the same direction, for whatever reason, more often than would be expected if funds were trading independently. Specific formulas to calculate this measure will be provided in the

methodology section. The authors apply the LSV measure to 769 US funds (mainly pension funds), managed by 341 different portfolio managers, between 1985 and 1989. They find that the level of herding across stocks, as well as across industries, is statistically significant but not economically relevant.

The LSV measure is used in numerous subsequent studies dealing with herding of fund managers (Grinblatt, Titman, Wermers, 1995; Wermers, 1999; Choe et al., 1999; Borenzstein and Gelos, 2000; Kim and Wei, 2002; Sias, 2004; Wylie, 2005; Voronkova and Bohl, 2005; Walter and Weber, 2006; Lobao and Serra, 2007; Choi and Sias, 2009).

Evidence provided in the above studies shows that institutional herding is not so relevant in developed financial markets especially in the US and in the UK (Grinblatt, Titman and Wermers, 1995; Wermers, 1999; Sias, 2004; Wylie, 2005). In other non Anglo-Saxon developed markets herding appears slightly more significant (for example Walter and Weber (2006) analyse German mutual funds finding a higher level of herding than in the US and UK markets). On the contrary herding is more pronounced in less mature financial markets: Choe et al. (1999) find significant herding levels by foreign investors in Korean stocks in the period end-1996 to end-1997; Kim and Wei (2002) also study Korean stock market and find that off-shore funds herd even if less than on-shore funds; Borensztein and Gelos (2000) find that mutual funds from emerging markets herd significantly and are more willing to engage in momentum strategies selling past losers and buying past winners; Voronkova and Bohl (2005) analyse the investment behaviour of pension funds in the Polish stock market, showing that they are involved in herding and pursue feedback trading strategies more often than their counterparts in mature markets; Lobao and Serra (2007) analyse Portuguese mutual funds over the period 1998 to 2000 finding strong evidence of herding behaviour.

A slightly different approach is adopted in Choi and Sias (2009) for the US institutional investors converging to similar results of low level of herding for the US market. First they focus on herding across industries instead of stocks (that is the same focus adopted in this paper) and secondly they use, together with LSV, another method for detecting herding consisting of the cross-sectional correlation between institutional investors' trades in one period with other institutional investors' trades the next period. The latter methodology delivers a higher level of herding than LSV.

4. Data and descriptive statistics

In a study of SWFs, two choices relating to dataset comprehensiveness are relevant. The first is the choice between privileging the size of the sample in terms of funds on one hand and privileging the completeness of the sample in terms of portfolio holdings on the other one. The papers listed in the previous section typically favour the first approach. So does this paper since an analysis of herding behaviour appears significant only if a sizable number of SWFs is involved. Moreover, the problem of sample selection bias is less relevant in this context as intentional herding occurs only when deals are publicly disclosed. Not disclosed deals are not likely to generate herding.

The second choice relates to the use of specifically built datasets for SWFs deals on the one side and drawing from one or several international financial databases (including also information on SWFs deals) on the other. The first group includes the works of Bortolotti et al. (2010) who use data coming from a specifically built SWF deals dataset developed by Monitor Group and Fondazione Eni Enrico Mattei (FEEM); Dyck and Morse (2011) who assemble a picture of SWF portfolios through a hand research on many domestic and international sources; and Bertoni and Lugo (2011) who use the dataset developed by the Sovereign Wealth Fund Institute. The other papers mentioned in section 3 belong to the second group.

The present study follows a mixed approach as it combines the Monitor/FEEM SWF database with other financial international databases. The Monitor-FEEM SWF Database covers deals made by SWFs between May 1985 and June 2010 encompassing investments in listed equity, unlisted equity, commercial real estate, private equity funds and joint ventures for a total of 1273 deals.[6]

This database is integrated by information coming from two publicly-available sources: Standard & Poors' Capital IQ M&A database and Thomson One Banker M&A database. For these two databases, a name search was performed for each SWF listed in Table 1.

[6] The Monitor-FEEM database uses multiple public sources including financial databases (Bloomberg, SDC Platinum and Zephyr M&A), disclosures from fund websites, information aggregators (Lexis Nexis and Factiva) and other internet sources (Zawya.com, Sovereign Wealth Fund Institute).

The search covered the period between January 1990 and December 2010 and included also the fund's known subsidiaries (current and past).[7]

After merging together the three data sources, duplicates were deleted. In case of discrepancies across the sources, web searches were performed to solve any differences.

To ensure a clean sample of SWF deal announcements, four types of deals were discarded: first, mergers, joint ventures, stock dividend distributions, buybacks and self registration operations since they can not be classified either as buying or selling in the context of this analysis; second, deals classified with status "discontinued rumours" since they can not be considered announcements of either purchases or sales;[8] third, deals involving transfers between related subsidiaries of a given SWF because the assumption of independent trades does not hold in this case and thus they can not be considered suitable to generate intentional herding behaviour; and fourth, those deals with missing data in the fields of "announcement date" or "target" since they lack the minimum information required for the analysis .

As a result, the dataset consists of 2740 events spanning the period January 1990-December 2010 of which 2091 are acquisitions and 649 are sales. Deals included in the dataset encompass purchases and sales in listed equity and unlisted equity[9].

In terms of value, acquisitions total $564.7 billion corresponding to 1532 deals out of 2091, while dismissals total $190.7 billion corresponding to 372 deals out of 649[10].

As Figure 1 panel A shows, SWFs reached the peak of their investment activity between 2007 and 2008, then decreasing during the years of the global crisis. This holds both in terms of number of deals and of values. Looking at the selling side instead, the opposite pattern emerges (Figure 1 panel B).

[7] For example, Temasek makes some investments through its subsidiaries, such as Vertex Venture Holdings or Aranda Investments.

[8] On the contrary those transactions that were announced, even if not realized, have been kept in the dataset since their announcement is considered suitable for determining herding behaviour.

[9] Public financial databases have a threshold in terms of minimum amount under which they do not record stock acquisitions. For this reason the average amount of the deals is high being equal to 395 USD million.

[10] Only 1904 (as sum of acquisitions and dismissals) deals out of 2740 are considered for calculating the amounts because the remaining deals do not report any amount. For the transactions characterized by multiple investors/sellers, the amount related to the specific SWF was separated from the total amount of the deal. In case the amount attributable to the single SWF was not specified, the total figure of the deal was divided by the number of the participants.

Deals in the dataset refer to 29 SWFs out of 52 reported in Table 1. The 29 SWFs of the sample total almost $3.5 trillion of assets representing 79% of the total assets owned by all SWFs.

The 29 SWFs included in the sample are reported in Table 2 classified by country of origin: panel A reports the frequency in terms of number of deals; panel B in terms of amount of the deals. The most represented SWF both on the buy and on the sell side is Singapore's Temasek with deals representing 42% of the total. Other SWFs well represented in the sample are the Singapore based GIC, the Malaysian Khazanah and the Chinese CIC. Among the Middle Eastern SWFs is QIA from Qatar the most represented followed by KIA from Kuwait. The Asian SWFs are the best represented, while other funds are likely to be under represented especially if one considers their size. This is the case for the Norwegian Pension Fund due to the fact that this SWF, while heavily trading in equity (for 60% of its portfolio) [11], follows a strategy of buying small stakes that are not traced out in M&A databases. However this could turn into an advantage for this analysis since this SWF follows a different investment style than the majority of the funds represented in the sample[12].

Considering the sample in terms of value of the deals some differences can be detected even if not significantly changing the picture. The only exception being Temasek that decreases its share to 19%, a quota similar to the Chinese CIC (17% of the total). This shows that the average size of CIC deals is quite larger than Temasek. GIC has the 12% of the sample in terms of value quite in line with the frequency in terms of deals. The Asian funds remain the best represented in the sample also in terms of value, while Middle Eastern funds are only slightly better represented[13].

[11] The investment strategy of the Norwegian Pension Fund is outlined in Chambers et al. (2011).

[12] The same reasoning can be applied to other SWFs under represented in the sample such as SAMA belonging to Saudi Arabia or HKMA to Hong Kong or not even represented at all in the sample (the Chinese SAFE). Those SWFs, even if allowed to trade in equity, tend to follow portfolio strategies that involve acquisitions of small stakes and for this reason they are almost absent from M&A databases. A few other funds are not even allowed to trade in equity (Russian Federation (RF) or the Chilean ESSF). That is why they are not represented at all in the sample.

[13] As in the previous case, the pattern is quite similar splitting the sample and considering the acquisitions, while considering divestments the main difference with the total sample is related to the Chinese CIC that increases its share to 27% due to a few operations of significant amount such as the sale of a significant stake of China Construction Bank to Bank of America and to Asia Financial Holdings (owned by Temasek), the disposal of ING Summit Industrial Fund and the failed tender offers by BHP Billiton to acquire Potash Corp. of Saskatchewan (cfr Table 2 panel B).

Table 3 panel A reports the distribution of the announced deals by industries of target firms. Since the focus of this analysis is the herding behaviour across industries, it is necessary to attribute an industry to the target firm for each announced deal[14]. Industry classification used to this end is the Fama & French classification both with 30 industries[15] and 12 industries[16].

The most represented industry in terms of number of deals is the financial sector, with 27% both of acquisitions and divestments. This is in line with what we would have expected considering the significant activism of SWFs in the financial sector especially before and during the financial crisis. It has also to be noted that in Fama & French 12 industries classification the financial sector includes real estate. Considering the acquisitions only, Figure 2 suggests a phenomenon of clustering around some industries in certain periods (computer and software at the beginning of the 2000s and financial sector in the last part of the decade).

When considering the sample in terms of value of deals, the financial sector remains the dominant one representing 56% of the acquisitions and 43% of the divestments. These figures imply that the average deal amount was higher compared to the other industries. On the contrary the computer and software sectors are characterized by a lower average size of deals.

Table 3 panel B reports the distribution of the announced deals by geographic region of target firms. SWFs have invested in 97 countries between 1990 and 2010. Overall the Asian and European markets are those where SWFs are most active[17].

Table 3 panel C shows that SWFs are mostly active in developed economies representing 60% of their deals (both on the side of acquisitions and divestments) compared with 40%

[14] Since the dataset used in the analysis provided for each deal the SIC codes or industry description for the target firms, a correspondence has been defined between SIC codes coming out from the dataset and Fama & French classification.

[15] Cfr: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_30_ind_port.html

[16] Cfr: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html

[17] SWFs mostly invest in Asia with 931 announced deals representing 45% of the sample followed by the European Union with 378 (19% of the deals) and by North America (essentially US) with 376 deals (18% of the deals). In terms of divestments the picture is similar. Considering the value, the highest percentage is now represented by the European Union with 33% followed by Asia with 27% and North America with 16%. This means that the average amount of Asian deals is quite lower than the European one.

in emerging and developing countries.[18] The share of advanced countries is still higher when considering the sample in terms of amount of deals.

A control sample of mutual funds is used in order to test the robustness of results. Data for the control sample come from the same database Standard & Poors' Capital IQ M&A. Using the same source guarantees homogeneity in the nature of deals suggesting that any differences in the results must be due to the differences in the nature of investors. The control sample consists of 897 events spanning the period January 2000- December 2011 of which 536 are acquisitions and 361 are sales (see Table 4 panel A).

They encompass purchases and sales in listed equity and unlisted equity totalling $269.3 billion for acquisitions (corresponding to 515 deals out of 536) and $160 billion for dismissals (corresponding to 334 deals out of 361[19]).

Mutual funds included in the sample are 188. They are the all universe of mutual funds present in S&P Capital IQ database. They mostly come from the US followed by UK funds.

As Table 4 panel A shows, the control sample is smaller than the main sample of SWFs. However is similar in terms of main characteristics.

Table 4 panel B reports the distribution of the announced deals by industries of target firms. In order to classify mutual funds' deals by sector, the same classification as for SWFs is used (Fama & French classification with 12 industries[20]). The most represented industry in terms of number of deals is the financial sector both for acquisitions and divestments (with a similar pattern as for SWFs). In terms of value the financial sector remains the preferred one for acquisitions (as for SWFs) with a significantly high share (66%), while for divestments is the second most represented one after utilities.

5. Methodology

The LSV measure, H_{it}, of herding is applied to the SWFs dataset, focusing on industries instead of stocks (LSV 1992; Choi and Sias, 2009).

[18] Countries of target firms have been grouped by level of economic development according to IMF classification (IMF - World Economic Outlook Database—WEO Groups and Aggregates Information: http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/groups.htm)

[19] Only 849 (as sum of acquisitions and dismissals) deals out of 897 are considered for calculating the amounts because the remaining deals do not report the amount.

[20] Cfr: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html

If B_{it} is the number of SWFs who buy the industry i in period t, S_{it} is the number of SWFs who sell the industry i in period t and (B_{it}+ S_{it}) is the total number of SWFs in each industry/period, the LSV measure for each industry/period (H_{it}) is calculated as follows:

$$H_{it} = abs(p_{it} - p_t) - AF_{it} \ , \qquad [1]$$

where p_{it} is the proportion of SWFs trading industry i in period t that were buyers and is given by:

$$p_{it} = \frac{B_{it}}{(B_{it} + S_{it})} \qquad [2]$$

and

$$p_t = \frac{\sum_{i=1}^{k} B_{it}}{\sum_{i=1}^{k} (B_{it} + S_{it})} \qquad [3]$$

is the proportion of buyers among all traders during period t. p_t can be considered as a proxy of the average proportion of buyers (p_{it}) over all k industries traded in a given period t. p_t is constant across all industries during the same period but varies over time. Each p_t therefore represents the number of SWFs buying relative to the number of SWFs active in the same period aggregated across all the industries. In a given period we should not necessarily expect the same number of buyers and sellers across industries and therefore we should not expect p_t = 0.5. In our sample the average p_t is equal to 0.7 consistent with the fact the SWFs were net buyers across industries and periods.

In case of no herding, and for a sufficiently large number of traders, the LSV measure should be zero since independent trades will deliver differences between p_{it} and its expected value p_t that randomly compensate each other. However by taking absolute values, the first term in equation [1] will typically be positive, even when no herding exists.

For this reason LSV introduce an adjustment factor in equation [1], AF_{it}, that is calculated as the expected value of the random variation of p_{it} around its expected value p_t under the null hypothesis of independent trading and assuming B_{it} following a binomial distribution with parameters $p = p_t$ and n = total number of trades for each industry and period = $(B_{it}+ S_{it})$. The formula for AF_{it} can be expressed as follows:

$$AF_{it} = E(abs(p_{it} - p_t)) = \sum_{k=0}^{n} \Pr(k;(n, p_t)) * abs(\frac{k}{n_{it}} - p_t) \qquad [4]$$

Formula 4 calculates the expected value of $(p_{it} - p_t)$ using the mass distribution of the binomial. Under the null hypothesis of no herding, the probability of a randomly chosen SWF being a net buyer of industry i is p_t and therefore the expected value of $(p_{it} - p_t)$ is AF_{it} sending H to zero. As $(B_{it}+ S_{it})$ becomes larger, under the null, AF_{it} will be close to zero since p_{it} tends to p_t as the number of active SWFs increases. The main reason for including the adjustment factor is therefore to account for bias when the number of traders is small.

In order to obtain a single H, H_{it} are averaged across time and industries. When the total H is significantly larger than zero there is evidence of herding since the proportion of funds that trade a stock (industry) in the same direction (buying or selling) is above the expected proportion of funds trading in that direction under the null hypothesis of independent trading decisions by the funds. On the contrary, if H is not statistically different from zero there is no herding since the proportion of funds that trade a stock (industry) in the same direction (buying or selling) is randomly distributed and not systematically different from its expected value. If for example H assumes the value of 3%, this means that out of 100 funds trading an average stock, 3 more funds traded on the same side of the market than would be expected if investors made their decisions independently of one another.

In this study the number of SWFs buying or trading an industry has not been obtained, as is often common, by looking at whether the portfolio holdings of a certain stock/industry changed during the period t. According to this methodology whether funds are buyers or sellers of a stock/industry is determined by the differences between portfolio values at the beginning and end-period. Since the dataset reports SWFs deals, the number of buying/selling announced deals by SWFs is directly considered in the computation of B_{it}

and S_{it}. The method adopted has some advantages for example not losing intra-period trades. Announced deals are grouped per industry/period (half year or quarter) and classified into buy/sell. Of course, since counting the deals related to the same SWF would account for herding of a SFW with itself, only one deal has been considered for each combination of SWF/period/industry (classifying this either on the buying or on the selling side). Moreover since only 3% of the deals predated 1995, the analysis considers only the deals referring to 1995-2010.

The LSV measure has some weaknesses. For example the number of sales is bounded unless you allow for short selling. This happens because it is possible to sell a stock/industry only if a fund has a holding in that stock/industry at the beginning of the period. Since this restricts the number of sales, the actual binomial distribution of B_{it} is truncated and this could bias the measure. Wylie (2005) however, by running Monte Carlo simulations allowing for short selling, shows that, empirically, the constraint on B_{it} has limited impact on the H statistics.

On the other side, the LSV measure has the advantage of being used in numerous empirical studies on herding providing a standard that can allow for comparisons across countries and groups of investors.

6. Results

The LSV measure (H) calculated for the 29 SWFs represented in the dataset across the 12 Fama & French industries over the period January 1995-December 2010 is negative, equal to -5% (see Table 6 panel A) and significantly different from zero at 0.05% level.

As in many cases in the sample the number of SWFs trading an industry is very small (sometimes equal to 1), Table 6 panel A reports the herding results for n (where n is the total number of SWFs trading in each industry/period) ≥2, n ≥ 3, n ≥ 5, n ≥ 10. Results in all these cases are similar: H remains negative and significantly different from zero ranging between -6.1% and -4%. Even if it can be argued that calculating herding when n is equal to 1 does not qualify as a herd, however it has been demonstrated in the literature and the calculations in this paper confirm it, that results do not vary significantly when n is equal or higher than 1.

Another issue is whether herding, where present, is more likely to occur when a significant number of funds trade an industry, in other words whether "a bigger herd makes for a stronger herd" (Wermers, 1999). However, theories of herding do not demand higher activity than two managers trading a stock during a given period. Indeed, the results in Table 6 show that not only does herding not monotonically increase with n, as already verified by Wermers (1999)[21], but it does not follow any clear pattern, since it first increases until n ≥ 3 and then it decreases for n ≥ 5 and n ≥ 10. Wermers (1999) found that for n>50, the average level of herding was decreasing.

The significantly negative result obtained in this analysis is unusual when compared to the earlier literature on this topic, which always found positive H values of around 2% for the US market (LSV, 1992; Grinblatt, Titman and Wermers, 1995; Sias, 2004); between 2% and 3% for the UK market (Wylie, 2005); between 2% and 6% for the German market (Walter and Weber, 2006); up to around 12% for the Portuguese market (Lobao and Serra, 2007) and 22% for the Korean market (Choe et al., 1999)[22]. Also considering those studies that analyzed herding across industries, values for H had been positive as well. In particular as highlighted in Table 5, LSV (1992) and Choi and Sias (2009) find positive albeit small evidence of herding behavior across industries (between 1.3% and 1.4%).

In order to understand the reason for the negative result in this paper and its meaning, its robustness was assessed in various ways[23].

First, H was calculated using a different industry classification (30 industries as defined by Fama & French[24]) and a different time frame (quarters instead of half years). As shown in Table 6 panels B and C, results do not vary significantly. When using the 30 F&F industry classification, results range between -4% in case of n ≥ 1 and -7.5% in case of n ≥ 10. When dividing the total period into quarters, the results range from -3.8% for n ≥ 1 to -6.2% for n ≥ 3.

Second, H has been calculated for two sub-periods (2000-2010 and 2005-2010) considering in both cases the 12 F&F industry classification and half years. Results are

[21] Walter and Weber (2006) however find a slightly monotonically increasing result.
[22] See Table 4 for a summary of the empirical literature adopting LSV methodology.
[23] The only case where the LSV measure comes out positive is when all deals are considered regardless of whether they are carried out by the same SWF or not. In this case the LSV measure is positive (significantly different from zero) and equal to 2.66%. However this is due to the fact that SWFs "herd on themselves" and this makes their trades not independent. This outcome provides a proof that the sample can convey a positive result when trades are not independent.
[24] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_30_ind_port.html

shown in Table 6 panels D and E respectively. They vary between -3.7% in case of n ≥ 5 (2005-2010) and -5.6% for n ≥ 3 (2000-2010).

Third, it was tested if H was affected by whether the period/industry considered was one in which sellers or buyers were prevailing. In Table 7, H is reported conditioned on $p_{it} > p_t$ and $p_{it} < p_t$, defining them respectively BH and SH following Wermer (1999). The BH measure remains significantly negative ranging between -6.1% (for n ≥ 1) and -3.1% (for n ≥ 2) and it does not appear significantly different compared to the previous not conditioned cases. The SH measure varies between -3.2% (for n ≥ 1) and -7.7% (for n ≥ 2). This last number is particularly high pointing to the fact that whenever industries are considered for which p_{it} is lower than the average p_t i.e. industries where sellers are relatively more numerous than buyers, the pattern that SWFs follow across industries is almost identical to the average pattern.

Since results are robust to different industry classifications, time frames and horizons, other explanations were tested. First, whether the negativity of H could be due to the smallness of the sample and in particular of n. Second, whether the different outcomes found in this paper can be due to the different types of deals involved in this study compared to the rest of the literature on herding.

In order to test the first hypothesis a Monte Carlo experiment was carried out where trades are independently distributed. In the Monte Carlo experiment, the hypothesis is a binomial distribution with probability of success (p_t) respectively equal to 0.25, 0.5 and 0.75 with number of independent extractions (n) for each observation varying between 2 and 100 and a sample of 200 observations. These characteristics of the experiment have been chosen in order to simulate as similarly as possible the actual calculations. The experiment is based on 5000 replications. Results are reported in Table 8 (panel A for p_t= 0.25, panel B for p_t = 0.5 and panel C for p_t = 0.75). They show that the average values for H are almost zero (with no exception for n=2) and those values are not significantly different from zero according to a t-test that considers a minimum threshold of 10% significance level (values of the t-statistics are reported in Table 8 along with the mean values for Hs). The conclusion from the Monte Carlo experiment is that even with small n, provided that the underlying binomial distribution is independently distributed, there is no reason to expect a higher number of H statistics deviating from zero for a lower n. This suggests that the small n can not account for the significantly negative results obtained in this analysis.

To test the second hypothesis i.e. whether the result of negative herding can be due to the specific nature of deals included in M&A databases, the LSV measure (H) is calculated for a control sample. of 897 announced deals coming from the same M&A database referring to 188 mutual funds. H is calculated across the 12 Fama & French industries over the period January 2000 - December 2011[25]. The outcome is positive (+2.25% see Table 9) and significantly different from zero at 5% level. Table 9 also reports the herding results for n ≥2, n ≥ 3, n ≥ 5 (where n is the total number of mutual funds trading in each industry/period). Results in all these cases are slightly positive (ranging between 1.7% and 0.4%) even if not significantly different from zero. This outcome suggests that the data source (M&A database) does not affect the results and confirms that mutual funds' behavior is more similar to what found in the literature on herding than to SWFs behaviour as outlined in this paper. Even in those cases where Hs are not significantly different from zero, they never turn to be negative. The negativity of H for SWFs does reflect a behavior specific to this group of investors and is not related to the nature of the deals.

Altogether the conclusions from the robustness analysis along with the Monte Carlo experiment and the test on the control sample of mutual funds suggest that the negativity of H cannot be explained by other reasons but an underlying economic behaviour specific to SWFs.

The question is then: what does a negative H mean?

To answer this question, consider that the LSV formula is made up of two parts. The first one, in the absence of herding (i.e. for independently selected realizations investment decisions around a mean equal to p_t) is supposed to be larger than zero because of the random dispersion of the results and the fact that the differences around the mean are taken in absolute value. The second part, AF is supposed to correct this bias away from zero related to the smallness of the sample. A negative H emerges when this correction is "too large" or, put it another way, when the first part of H is too small. This arises when there is not enough dispersion of the buying/selling decisions across sectors around the mean. One possible reason why this could occur is that buying/selling decisions are not independent across industries for the same fund and follow a similar pattern. Apparently this behavior seems to be particularly strong for SWFs.

[25] Whenever the same mutual fund was trading the same industry/period different times, it has been counted as 1 as in the case of SWFs dataset.

Coming back to the original question (what does a negative H mean), it is worth considering two extreme cases: a) when there is high dispersion of p_{it} around its mean p_t , meaning that funds follow a differentiated investing pattern (buying/selling) across industries; b) when there is zero dispersion of p_{it} around its mean p_t (with $p_{it} = p_t$) meaning that funds follow the same investing pattern (buying/selling) across industries. Cases a) and b) can be considered under two variants: i) funds trading independently from each other; ii) at least some of the funds trading in a correlated way (while others trading independently).

Case a)i) is simple: it implies funds acting independently from each other and across industries as well. This corresponds to the null hypothesis of independent trades delivering, by the LSV definition, H=0.

Under case a)ii) (high dispersion of p_{it} around p_t and at least some of the funds trading in a correlated way), H will be positive signaling herding, where herding is defined as in the original LSV paper, that is as investors clustering on the same side (buy/sell) of the market for some stocks/industries and not for others[26]. In other words in order to have herding under the LSV definition you not only need funds trading in a correlated way, but you also need a significant differentiation in buying/selling decisions across stocks/industries buying/selling some sectors instead of others (i.e. a significant variation in p_{it}).

In case b)i) (zero dispersion of p_{it} around p_t and funds trading independently from each others) funds take their investment decisions independently and, at the same time, they follow the same pattern across industries i.e. either they buy or sell in all industries. In this case the variance of p_{it} around p_t is reduced to zero. Therefore the first part of H will be zero, and because of the AF factor, a negative result for the total H will come out. In this case the negative H clearly means that no herding exists.

In case b)ii) (zero dispersion of p_{it} around p_t and at least some of the funds trading in a correlated way) there is some correlation in funds trading and the result is not so straightforward. Simulations show that, since the first part of H would be zero, the AF correction would move H into negative territory[27]. Therefore the existence of correlation in trades will not be detected. This highlights that the driver of H lies more in the dispersion of p_{it} around p_t than in the actual correlation in trades. What does a negative H mean in this

[26] It can be shown that H comes out strongly positive also when all the funds copy each others.

[27] In case all the funds copy each others, it can be shown that H comes out 0 suggesting a compensation effect between independence across funds and across industries.

case? That there is still no herding under the LSV definition: investors do not cluster on the same side (buy/sell) of the market for some stocks/industries and not for others. This does not rule out some correlation in funds' trades provided that this is not differentiated across stocks/industries.

What does all this mean for the present study? Since this study finds a negative H, this implies that SWFs can be classified into the b)i) or b)ii) scenarios. They show a particularly weakly differentiated investing pattern (buying/selling) across industries. However, it is not clear whether there is some correlation in investment activity taking place. If any, this shall be uniformly distributed across industries, meaning that there is no herding according to the definition provided by LSV.

This result has also some implications for the previous studies adopting the LSV methodology. The level of H (usually positive) found in those studies could reflect the independency of strategies across stocks/industries more than the correlation in funds' trades. The effect on H due to the behaviour of the investors that do not differentiate across industries could prevent the detection of correlation in trades. The issue arises especially for those studies that found values of H slightly positive even if significantly different from zero. Could a high level of correlated investment activity across funds been masked by the uniformity in funds' strategies across stocks/industries? A market strategy that involves limited differentiation across industries is plausible not only for SWFs but also for other institutional investors. Therefore a level of H say equal to +2% could be the outcome either of a low level of correlated investment activity going on across funds or of a higher level of correlated investment activity coupled with a low variation of p_{it} around p_t.

The extent to which the detection of herding (in a broader sense than the LSV definition) is hindered by the uniformity in strategies across industries/stocks by some agents could be assessed through a Monte Carlo experiment aimed at quantifying the compensation effect between the two components of the formula explained above on the overall H. This will be subject of further research.

Some conclusions can be drawn at this point. First, a negative H implies absence of herding in the LSV definition i.e. SWFs do not cluster buying/selling some industries instead of others.

Second, they tend to follow a fairly similar investment strategy across industries, in a given period: their trading is not independent across industries, on the contrary it is very similar from one industry to another. This investment approach, common to the majority of SWFs,

appears a rational choice for large funds pursuing long-term returns. However, this does not exclude that there can be correlated behaviour among SWFs while following similar strategies across sectors.

Third, SWFs behave differently compared to other institutional investors since the level of homogeneity in their trading patterns across industries (in terms of buying/selling) is more pronounced than for other investors as the test on the control sample of mutual funds confirmed. This finding suggests SWFs' similarity in terms of nature, purposes and time horizons lending support to the idea that they could be considered a category of investors on their own.

7. Conclusions

SWFs are important players in financial markets managing assets in the order of about $4.4 trillion and being expected to grow significantly in the near future. For this reason it is important to understand their financial behaviour and whether they are different from other institutional investors.

This paper analyzed the investment behaviour of SWFs focusing on their attitude towards herding across industries in equity markets. To empirically measure herding, the LSV methodology (LSV, 1992) has been applied to a specifically built database of 2740 announced deals by SWFs in the equity markets covering 29 SWFs across the 12 Fama & French industries over the period January 1995- December 2010.

The key finding of the analysis is a negative, significantly different from zero, H equal to -5%. This is unusual when compared to the earlier literature on herding adopting the LSV methodology, which always found positive, albeit small, H values. In order to understand the reason for this negative result and its meaning, its robustness was assessed in various ways checking against different industry classifications, time frames and horizons. In addition a Monte Carlo experiment was carried out to test whether the small sample can account for the significantly negative result. Finally a test on a control sample of mutual funds was implemented in order to test whether the different results found in this paper can be due to the different types of deals considered in this study compared to the rest of the literature.

The conclusion from all the above controls is that the negativity of H reflects an underlying economic behaviour specific to SWFs. However, little can be said at this stage about the rationale at its base and its market implications. This will be subject of future research.

From the analysis it is possible to conclude that: first, a negative H implies absence of herding in the LSV definition i.e. SWFs do not cluster buying or selling some industries instead of others. Second, they tend to follow a fairly similar investment strategy across industries in a given period. Third, SWFs behave differently compared to other institutional investors since the level of homogeneity in their trading patterns across industries is more pronounced than for other investors, suggesting SWFs' similarity in terms of nature, purposes and time horizons and lending support to the idea of SWFs being a group of investors on their own.

The need of specific rules for SWFs is an argument hotly debated in the financial *fora* and needs empirical substance to be supported. Otherwise, a special treatment could only be considered discriminating and this would particularly be risky in a world where emerging financial powers gain influence in global markets.

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Table 1. SWFs by total assets

Table 1 presents the 52 SWFs classified by total assets with information on country of origin, amount of total assets at end-2010 (except when otherwise reported in the footnotes), year of establishment, level of transparency as measured by the Linaburg-Maduell Transparency Index (cfr SWF Institute), source of wealth ("Comm" for commodity funds and "NC" for non commodity funds), and the policy purpose as in Kunzel et al. (2011) ("Stf": stabilization funds; "SF": saving funds; "PRF": pension reserve funds; "RIC": reserve investment corporation).

Country	SWF	Tot Assets (US$ billion)	Year	Transp. LM Index	Source	Policy purpose
China	SAFE Investment Company	568[i]	1997	2/10	NC	RIC
Norway	Norwegian Government Pension Fund – Global (NGPF-G)	561[ii]	1990	10/10	Comm	SF + PRF
Saudi Arabia	SAMA Foreign Holdings	473[iii]	-	2/10	Comm	RIC
China	China Investment Corporation (CIC)	410[iv]	2007	7/10	NC	RIC
UAE - Abu Dhabi	Abu Dhabi Investment Authority (ADIA)	342[v]	1976	3/10	Comm	SF
Kuwait	Kuwait Investment Authority (KIA)	296[vi]	1953	6/10	Comm	StF + SF
China-HK	HK Monetary Authority – Investment Portfolio (HKMA)	292[vii]	1998	8/10	NC	RIC
Singapore	Government Investment Corporation (GIC)	248[viii]	1981	6/10	NC	RIC
Singapore	Temasek Holdings	153[ix]	1974	10/10	NC	SF

[i] Sovereign Wealth Fund Institute (updated July 2011). Available at: http://www.swfinstitute.org/fund-rankings/
[ii] As of March 31, 2011, Government Pension Fund—First Quarter 2011 (http://www.nbim.no/en/press-and-publications/Reports/810/811/)
[iii] Sovereign Wealth Fund Institute (updated July 2011)
[iv] As of December 31, 2010. CIC Annual Report 2010
[v] Monitor SWF AuM Estimates (updated July, 2011) available at: http://www.monitor.com/Portals/0/MonitorContent/imported/MonitorUnitedStates/Articles/PDFs/Monitor_SWF_AUM_Assets_Table_07_07_2011.pdf
[vi] Monitor SWF AuM Estimates (updated July, 2011)
[vii] Sovereign Wealth Fund Institute (updated July 2011).
[viii] Sovereign Wealth Fund Institute (updated July 2011).
[ix] As of March 31, 2011. Monitor SWF AuM Estimates (updated July, 2011)

China	National Social Security Fund (NSSF)	132[x]	2000	5/10	NC	PRF
Russia	National Wealth Fund (NWF)	93 [xi]	2008	5/10	Comm	PRF
Qatar	Qatar Investment Authority (QIA)	80[xii]	2005	5/10	Comm	SF
Australia	Australian Government Future Fund (AGFF)	77[xiii]	2006	10/10	NC	PRF
Libya	Libyan Investment Authority (LIA)	65[xiv]	2006	2/10	Comm	SF
Algeria	Revenue Regulation Fund	57[xv]	2000	1/10	Comm	StF + SF
UAE - Abu Dhabi	International Petroleum Investment Company (IPIC)	50[xvi]	1984	n/a	Comm	SF
Kazakhstan	Kazakhstan National Fund	43[xvii]	2000	6/10	Comm	StF
USA	Alaska Permanent Fund (APF)	40[xviii]	1976	10/10	Comm	SF
South Korea	Korea Investment Corporation (KIC)	38[xix]	2005	9/10	NC	RIC
Malaysia	Khazanah Nasional	37[xx]	1993	4/10	NC	SF
Ireland	National Pensions Reserve Fund (NPRF)	33[xxi]	2001	10/10	NC	PRF
Brunei	Brunei Investment Agency (BIA)	30[xxii]	1983	1/10	Comm	SF

[x] As of March 31, 2011. Monitor SWF AuM Estimates (updated July, 2011)
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[xiii] As of March 31, 2011. Available at:
http://www.futurefund.gov.au/__data/assets/pdf_file/0015/4362/Portfolio_update_310311_A173416_.pdf
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[xvi] As of December 31, 2011. Monitor SWF AuM Estimates
[xvii] As of June 1, 2011. Available at: http://www.minfin.kz/index.php?uin=1180583603&lang=eng
[xviii] As of June 30, 2011. Available at: http://www.apfc.org/home/Content/home/index.cfm
[xix] As of December 31, 2010. Monitor SWF AuM Estimates
[xx] As of December 31, 2010. Khazanah Annual Review 2011, available at:
http://www.khazanah.com.my/docs/KAR2011_MediaReview_Jan2011.pdf
[xxi] As of March 31, 2011. National Pensions Reserve Fund, Quarterly Performance and Portfolio Update at 31 March 2011. Available at:
http://nprf.ie/Publications/2011/Q1_2011_Performance_and_Portfolio_update.pdf
[xxii] Sovereign Wealth Fund Institute (updated July 2011).

Azerbaijan	State Oil Fund (SOFAZ)	30[xxiii]	1999	10/10	Comm	StF + SF
UAE - Abu Dhabi	Mubadala Development Company	28[xxiv]	2002	NA	Comm	SF
Russia	Reserve Fund (RF)	27[xxv]	2008	5/10	Comm	StF
Iran	Oil Stabilization Fund	23[xxvi]	1999	1/10	Comm	StF
UAE - Dubai	Investment Corporation of Dubai (ICD)	20[xxvii]	2006	4/10	Comm	SF
New Zealand	New Zealand Superranuation Fund (NZSF)	16[xxviii]	2001	10/10	NC	PRF
Canada	Alberta's Heritage Fund	15[xxix]	1976	9/10	Comm	SF
US New Mexico	New Mexico State Investment Council	15[xxx]	1958	9/10	NC	SF
Bahrain	Bahrain Mumtalakat Holding Company	14[xxxi]	2006	8/10	Comm	SF
Chile	Economic and Social Stabilization Fund (ESSF)	13[xxxii]	2007	10/10	Comm	StF
UAE - Dubai	Istithmar World	12[xxxiii]	2003	NA	Comm	SF
Brazil	Sovereign Fund of Brazil	11[xxxiv]	2008	NA	NC	SF
UAE	Emirates Investment Authority (EIA)	10[xxxv]	2007	2/10	Comm	SF

[xxiii] As of June 28, 2011 http://www.oilfund.az/en/news/322 .
[xxiv] As of December 31,2010. Mubadala Development Company, Full Year Results 2010 available at: http://mubadala.ae/images/uploads/FY_2010_Stakeholder_Call_Presentation.pdf.
[xxv] As of June 1, 2011. Available at: http://www1.minfin.ru/en/nationalwealthfund/statistics/amount/index.php?id4=5830
[xxvi] Sovereign Wealth Fund Institute (updated July 2011).
[xxvii] Sovereign Wealth Fund Institute (updated July 2011).
[xxviii] As of May 31, 2011. New Zealand Superannuation Fund, Performance and Portfolio Update to 31 March 2011, available at: http://www.nzsuperfund.co.nz/files/Fund_performance_to_31_May_2011.pdf.
[xxix] As of March 31, 2011, Heritage Fund 2010-11 Annual Report available at: http://www.finance.alberta.ca/business/ahstf/index.html
[xxx] As of March 31, 2011, US New Mexico State Council, Investment Performance Report First Quarter 2011, available at: http://www.sic.state.nm.us/PDF%20files/Q1%202011%20-%20New%20Mexico%20SIC%20Executive%20IPA.pdf
[xxxi] As of June 30, 2010. Interim consolidated statement of Financial Position, available at: http://www.bmhc.bh//webmaster/uploads/files/FinancialResult/2010/financialposition.pdf
[xxxii] As of June 2011, ESSF Financial Situation available at: http://www.minhda.cl/english/sovereign-wealth-funds/economic-and-social-stabilization-fund/financial-situation/market-value.html
[xxxiii] As of December 2009, Miracky and Bortolotti (2010).
[xxxiv] Sovereign Wealth Fund Institute (updated July 2011).

Oman	State General Reserve Fund (SGRF)	8[xxxvi]	1980	1/10	Comm	SF
East Timor	Timor Leste Petroleum Fund	8[xxxvii]	2005	6/10	Comm	StF + SF
Botswana	Pula Fund	7[xxxviii]	1994	6/10	Comm	SF
Mexico	Oil Revenues Stabilization Fund	6[xxxix]	2000	6/10	Comm	StF
Saudi Arabia	Public Investment Fund (PIF)	5[xl]	2008	3/10	Comm	SF
US Wyoming	Permanent Mineral Trust Fund	5[xli]	1975	9/10	Comm	SF
Chile	Pension Reserve Fund	4.4[xlii]	2006	10/10	Comm	PRF
Trinidad & Tobago	Heritage and Stabilization Fund	3[xliii]	2000	8/10	Comm	StF + SF
UAE-Ras al Khaimah	RAK Investment Authority	1.2[xliv]	2005	3/10	Comm	SF
Venezuela	Macroeconomic Stabilization Fund	0.8[xlv]	1998	1/10	Comm	StF
Vietnam	State Capital Investment Corporation (SCIC)	0.6[xlvi]	2005	4/10	NC	SF
Kiribati	Revenue Equalization Reserve Fund	0.4[xlvii]	1956	1/10	Comm	SF
Indonesia	Government Investment Unit	0.3[xlviii]	2006	NA	NC	SF

[xxxv] Monitor SWF AuM Estimates (updated July, 2011)
[xxxvi] Sovereign Wealth Fund Institute (updated July 2011).
[xxxvii] As of March 31, 2011. Petroleum Fund of Timor-Leste Quarterly Report, June 2010, http://www.bancocentral.tl/Download/Publications/Quarterly_report23_en.pdf
[xxxviii] Sovereign Wealth Fund Institute (updated July 2011).
[xxxix] Sovereign Wealth Fund Institute (updated July 2011).
[xl] Sovereign Wealth Fund Institute (updated July 2011).
[xli] As of April 30, 2011, Permanent Mineral Trust Fund internet site: http://www.wyotax.org/PMTF.aspx
[xlii] As of June 2011, ESSF Financial Situation available at: http://www.minhda.cl/english/sovereign-wealth-funds/pension-reserve-fund/financial-situation/market-value.html
[xliii] Sovereign Wealth Fund Institute (updated July 2011).
[xliv] Sovereign Wealth Fund Institute (updated July 2011).
[xlv] Sovereign Wealth Fund Institute (updated July 2011).
[xlvi] As of April 30, 2011, Portfolio Overview available at: http://www.scic.vn/english/index.php?option=com_content&view=category&layout=blog&id=16%3Adanhmucdautu&Itemid=8
[xlvii] Monitor SWF AuM Estimates (updated July, 2011)
[xlviii] Sovereign Wealth Fund Institute (updated July 2011).

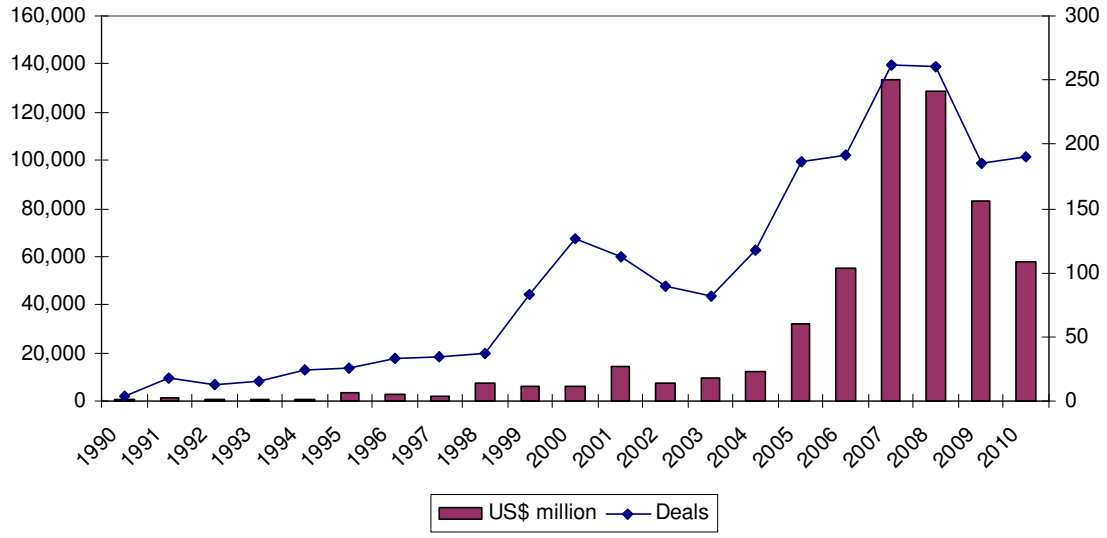
Mauritania	National Fund for Hydrocarbon Reserves	0.3[xlix]	2006	1/10	Comm	SF
Sao Tomè & Principe	National Oil Account	0.01[l]	2004	NA	Comm	SF
Nigeria	Nigerian Sovereign Investment Authority	NA	2011	NA	Comm	SF
Oman	Oman Investment Fund (OIF)	NA	2006	NA	Comm	SF
TOTAL		**4,402**				

[xlix] Sovereign Wealth Fund Institute (updated July 2011).

Figure 1. Number of deals and their amount across the years

Figure 1 shows the trend in terms of total number of deals and value (USD million) for the period 1990-2010 distinguishing between acquisitions and divestments. Panel A shows the trend of acquisitions for the period 1990-2010. Panel B shows the trend of divestments for the period 1990-2010.

Panel A: number of acquisitions and their value (USD million) for the years 1990-2010



Panel B: number of divestments and their value (USD million) for the years 1990-2010

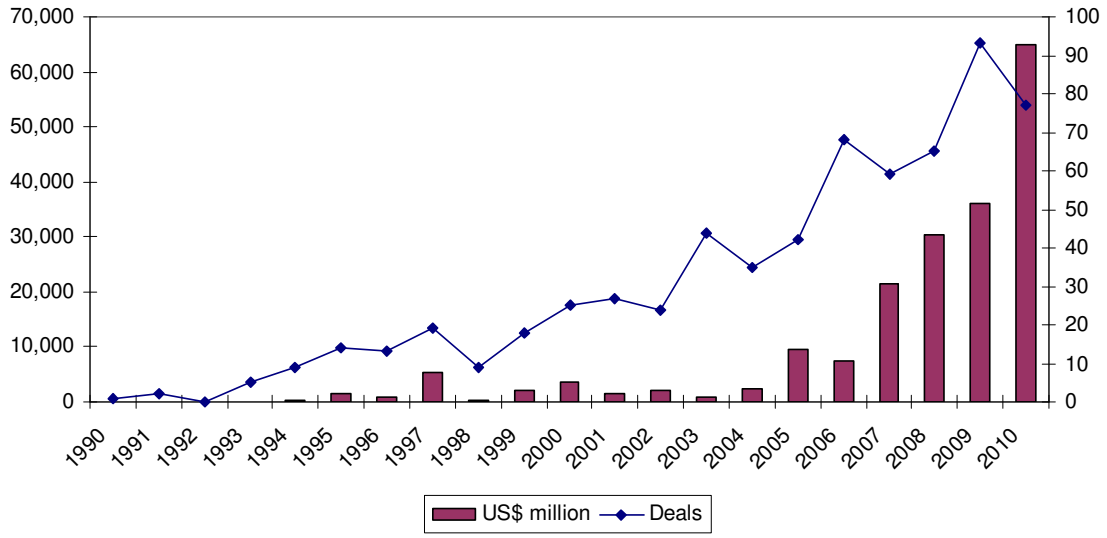


Table 2. SWFs in the sample

Table 2 presents the distribution of the announced deals for the 29 SWFs in the sample.
Panel A reports the distribution of the announced deals by country of origin of the SWFs considering respectively the whole dataset, the buy-side and the sell-side.
Panel B reports the distribution of the amount of the announced deals in USD million by country of origin of the SWFs considering respectively the whole dataset, the buy-side and the sell-side.

Panel A: SWFs and their country of origin by number of deals

Country	***SWFs***	***Events***	***Frequency***	***Events***	***Frequency***	***Events***	***Frequency***
		Total deals		***Buy***		***Sell***	
Australia	AGFF	13	0.47%	12	0.57%	1	0.15%
Azerbaijan	SOFAZ	1	0.04%	1	0.05%	-	-
Bahrain	Mumtalakat	6	0.22%	3	0.14%	3	0.46%
Brunei	BIA	17	0.62%	14	0.67%	3	0.46%
China	CIC	180	6.57%	127	6.07%	53	8.17%
China	NSSF	6	0.22%	5	0.24%	1	0.15%
China - HK	HKMA	1	0.04%	1	0.05%	-	-
Ireland	NPRF	7	0.26%	6	0.29%	1	0.15%
Kuwait	KIA	105	3.83%	57	2.73%	48	7.40%
Libya	LIA (LFB)	60	2.19%	56	2.68%	4	0.62%
Malaysia	Khazanah	252	9.20%	158	7.56%	94	14.48%
New Zealand	NZSF	9	0.33%	7	0.33%	2	0.31%
Norway	NGPF-G	7	0.26%	5	0.24%	2	0.31%
Oman	OIF	14	0.51%	13	0.62%	1	0.15%
Oman	SGRF	4	0.15%	4	0.19%	-	-
Qatar	QIA	124	4.53%	105	5.02%	19	2.93%
Saudi Arabia	PIF	4	0.15%	4	0.19%	-	-
Saudi Arabia	SAMA	1	0.04%	1	0.05%	-	-
Singapore	GIC	354	12.92%	297	14.20%	57	8.78%
Singapore	Temasek	1161	42.37%	890	42.56%	271	41.76%
South Korea	KIC	10	0.36%	10	0.48%	-	-
UAE - Abu Dhabi	ADIA	65	2.37%	56	2.68%	9	1.39%

UAE - Abu Dhabi	IPIC	85	3.10%	61	2.92%	24	3.70%
UAE - Abu Dhabi	Mubadala	74	2.70%	69	3.30%	5	0.77%
UAE – Dubai	ICD	39	1.42%	34	1.63%	5	0.77%
UAE – Dubai	Istithmar	102	3.72%	78	3.73%	24	3.70%
UAE – Ras al Khaimah	RAK	11	0.40%	8	0.38%	3	0.46%
USA	Alaska Perm Fund	5	0.18%	3	0.14%	2	0.31%
Vietnam	SCIC	23	0.84%	6	0.29%	17	2.62%
	TOTAL	**2740**	**100%**	**2091**	**100%**	**649**	**100%**

Panel B: SWFs and their country of origin by amount of the deals (USD million).

Country	***SWFs***	***US$ million***	***Frequency***	***US$ million***	***Frequency***	***US$ million***	***Frequency***
		Total deals		***Buy***		***Sell***	
Australia	AGFF	4,811	0.64%	2,838	0.50%	1,973	1.33%
Azerbaijan	SOFAZ	150	0.02%	150	0.03%	-	-
Bahrain	Mumtalakat	1,457	0.19%	340	0.06%	1,117	0.75%
Brunei	BIA	974	0.13%	900	0.16%	74	0.05%
China	CIC	133,006	17.61%	81,734	14.47%	51,273	34.50%
China	NSSF	2,869	0.38%	2,780	0.49%	89	0.06%
China - HK	HKMA	4,689	0.62%	4,689	0.83%	-	-
Ireland	NPRF	25,085	3.32%	19,943	3.53%	5,142	3.46%
Kuwait	KIA	32,233	4.27%	17,190	3.04%	15,043	10.12%
Libya	LIA (LFB)	7,050	0.93%	6,211	1.10%	840	0.57%
Malaysia	Khazanah	31,829	4.21%	19,056	3.37%	12,773	8.60%
New Zealand	NZSF	2,761	0.37%	1,383	0.24%	1,377	0.93%
Norway	NGPF-G	719	0.10%	719	0.13%	-	-
Oman	OIF	1,904	0.25%	1,469	0.26%	435	0.29%
Oman	SGRF	1,221	0.16%	1,221	0.22%	-	-
Qatar	QIA	93,448	12.37%	83,169	14.73%	10,279	6.92%
Saudi Arabia	PIF	4,266	0.56%	4,266	0.76%	-	-
Saudi Arabia	SAMA	-	-	-	-	-	-

Singapore	GIC	91,383	12.10%	77,153	13.66%	14,230	9.58%
Singapore	Temasek	140,194	18.56%	107,411	19.02%	32,783	22.06%
South Korea	KIC	2,676	0.35%	2,676	0.47%	-	-
UAE - Abu Dhabi	ADIA	22,209	2.94%	21,038	3.73%	1,171	0.79%
UAE - Abu Dhabi	IPIC	52,863	7.00%	37,091	6.57%	15,772	10.61%
UAE - Abu Dhabi	Mubadala	31,456	4.16%	20,507	3.63%	10,949	7.37%
UAE - Dubai	ICD	43,046	5.70%	35,757	6.33%	7,288	4.90%
UAE - Dubai	Istithmar	20,538	2.72%	13,541	2.40%	6,997	4.71%
UAE – Ras al Khaimah	RAK	887	0.12%	351	0.06%	536	0.36%
USA	APFC	1,616	0.21%	1,147	0.20%	469	0.32%
Vietnam	SCIC	44	0.01%	2	0.00%	41	0.03%
	TOTAL	**755,383**	**100%**	**564,732**	**100%**	**190,651**	**100%**

Table 3. Descriptive statistics

Table 3 presents some descriptive statistics of the sample.
Panel A reports the distribution of the announced deals (both in terms of number of deals and amount) by industries of target firms distinguishing between acquisitions and divestments. Industries come from Fama & French 12 industry classification. For correspondence with SIC codes see: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html
Panel B reports the distribution of the announced deals (both in terms of number of deals and amount) by geographic region of target firms distinguishing between acquisitions and divestments.
Panel C reports the distribution of the announced deals by group of country of target firms (both in terms of number of deals and amount) distinguishing between acquisitions and divestments. The country grouping comes from IMF - World Economic Outlook Database—WEO Groups and Aggregates Information: http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/groups.htm

Panel A: Industries of target firms by number of deals and amount (USD million)

Industries	***Events***	***Frequency***	***Events***	***Frequency***	***US$ million***	***Frequency***	***US$ million***	***Frequency***
	Buy		***Sell***		***Buy***		***Sell***	
01 Consumer non-durables	90	4.3%	24	3.7%	4,626	0.8%	1,314	0.7%
02 Consumer durables	30	1.4%	8	1.2%	26,290	4.7%	3,270	1.7%
03 Manufacturing	86	4.1%	44	6.8%	2,938	0.5%	763	0.4%
04 Energy (oil, gas, coal)	75	3.6%	21	3.2%	26,614	4.7%	6,020	3.2%
05 Chemicals	46	2.2%	32	4.9%	18,570	3.3%	22,799	12.0%
06 Business Equipment, Computer, Software	342	16.4%	91	14.0%	13,327	2.4%	8,147	4.3%
07 Telecommunications	123	5.9%	44	6.8%	28,711	5.1%	12,176	6.4%
08 Utilities	75	3.6%	22	3.4%	26,861	4.8%	20,233	10.6%
09 Wholesale, Retail, Other personal services	66	3.2%	25	3.9%	8,658	1.5%	3,353	1.8%
10 Health care, Medical equipment, Drugs	108	5.2%	15	2.3%	8,404	1.5%	2,265	1.2%
11 Finance, Real Estate	580	27.7%	174	26.8%	315,055	55.8%	82,425	43.2%

12 Other (Mines, Construction, Transportation, Hotels, Other services)	470	22.5%	149	23.0%	84,677	15.0%	27,885	14.6%
TOTAL	**2091**	**1**	**649**	**1**	**564,732**	**1**	**190,651**	**1**

Panel B: geographic region of target firms by number of deals and amount (USD million).

Geographic Region	***Events***	***Frequency***	***Events***	***Frequency***	***US$ million***	***Frequency***	***US$ million***	***Frequency***
	Buy		***Sell***		***Buy***		***Sell***	
European Union	378	18.1%	92	14.2%	187,646	33.2%	40,203	21.1%
Europe non –EU	40	1.9%	7	1.1%	33,820	6.0%	654	0.3%
North America	376	18.0%	88	13.6%	91,492	16.2%	45,720	24.0%
Latin America & Caribbean	44	2.1%	14	2.2%	8,972	1.6%	4,739	2.5%
Asia	931	44.5%	342	52.7%	153,161	27.1%	71,521	37.5%
Australia Pacific	107	5.1%	25	3.9%	34,405	6.1%	6,913	3.6%
MENA	174	8.3%	73	11.2%	51,447	9.1%	20,379	10.7%
Sub-Saharian Africa	20	1.0%	6	0.9%	1,335	0.2%	472	0.2%
CIS Countries	21	1.0%	2	0.3%	2,454	0.4%	50	0.0%
TOTAL	**2091**	**100%**	**649**	**100%**	**564,732**	**100%**	**190,651**	**100%**

Panel C: countries of target firms grouped by level of economic development (number of deals and amount in USD million).

Economic Group	***Events***	***Frequency***	***Events***	***Frequency***	***US$ million***	***Frequency***	***US$ million***	***Frequency***
	Buy		***Sell***		***Buy***		***Sell***	
Advanced G7 Economies	653	31.2%	141	21.7%	219,221	38.8%	64,562	33.9%
Other advanced economies	610	29.2%	242	37.3%	175,760	31.1%	59,382	31.1%
Emerging and Developing economies	828	39.6%	266	41.0%	169,751	30.1%	66,707	35.0%
TOTAL	**2091**	**100%**	**649**	**100%**	**564,732**	**100%**	**190,651**	**100%**

Figure 2. The share of industries (acquisitions only)

Figure 2 shows the share of industries when considering the acquisitions only in terms of number of deals for the period 2001-2010. Industries come from Fama & French 12 industry classification and they are further grouped into macro-categories.

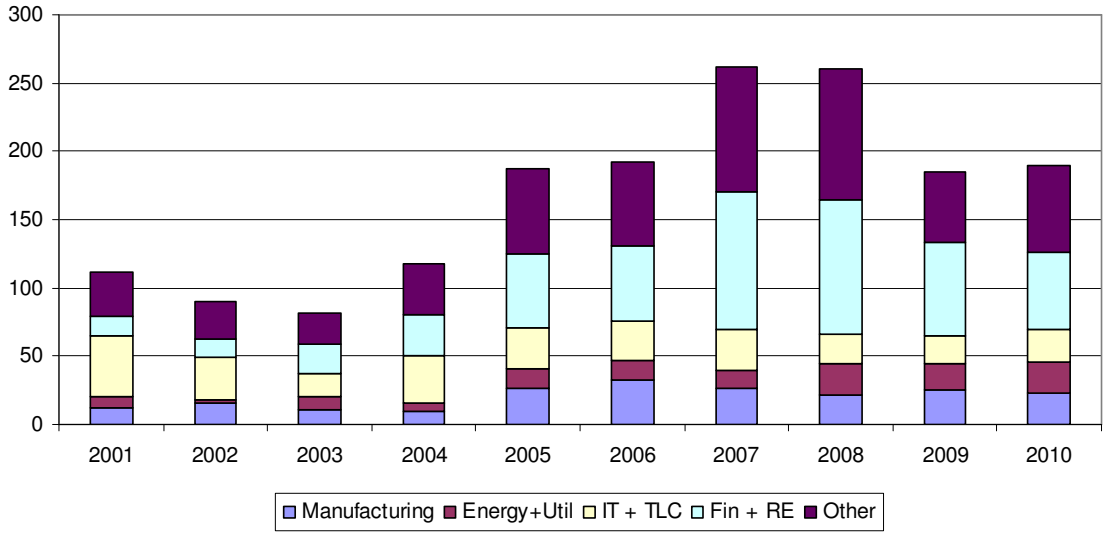


Table 4. Control sample of mutual funds: descriptive statistics

Table 4 reports some descriptive statistics of the control sample.
Panel A reports the main characteristics of the control sample considering respectively the whole dataset, the buy-side and the sell-side.
Panel B reports the distribution of the announced deals (both in terms of number of deals and amount) by industries of target firms distinguishing between acquisitions and divestments. Industries come from Fama & French 12 industry classification. For correspondence with SIC codes see: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html

Panel A: characteristics of the control sample (mutual funds) by number of deals and amount (USD million).

	TOTAL	***BUY***	***SELL***
Tot N° of deals	***897***	***536***	***361***
N° of Mutual Funds in the sample	188	155	131
Average N° of deals x fund	4.8	3.5	2.8
Minimum N° of deals per fund	1	1	1
Maximum N° of deals x fund	33	23	14
Total value of deals (US$ mln)	429,273	269,325	159,947
N° of deals with value	849	515	334
Average size of deals (US$ mln)	506	523	479
Minimum size of deals per fund (US$ mln)	0.54	0.54	1
Maximum size of deals x fund (US$ mln)	11,760	9,377	11,760
N° of mutual funds' countries of origin in the sample	11	11	9
Most represented country of origin	USA	USA	USA
N° of USA funds	129	109	87
N° of USA deals	650	386	263

Panel B: Industries of target firms by number of deals and amount (USD million)

Industries	***Events***	***Frequency***	***Events***	***Frequency***	***US$ million***	***Frequency***	***US$ million***	***Frequency***
	Buy		***Sell***		***Buy***		***Sell***	
01 Consumer non-durables	0	0.0%	6	1.7%	-	0.0%	268	0.2%
02 Consumer durables	3	0.6%	7	1.9%	64	0.0%	14,701	9.2%
03 Manufacturing	14	2.6%	8	2.2%	212	0.1%	243	0.2%
04 Energy (oil, gas, coal)	58	10.8%	44	12.2%	24,890	9.2%	21,092	13.2%
05 Chemicals	9	1.7%	10	2.8%	309	0.1%	435	0.3%
06 Business Equipment, Computer, Software	56	10.4%	41	11.4%	2,253	0.8%	9,824	6.1%
07 Telecommunications	6	1.1%	6	1.7%	2,760	1.0%	2,201	1.4%
08 Utilities	55	10.3%	29	8.0%	49,142	18.2%	50,487	31.6%
09 Wholesale, Retail, Other personal services	18	3.4%	10	2.8%	642	0.2%	1,553	1.0%
10 Health care, Medical equipment, Drugs	118	22.0%	66	18.3%	4,173	1.5%	9,491	5.9%
11 Finance, Real Estate	123	22.9%	91	25.2%	177,612	65.9%	30,629	19.1%
12 Other (Mines, Construction, Transportation, Hotels, Other services)	76	14.2%	43	11.9%	7,268	2.7%	19,026	11.9%
TOTAL	**536**	**100%**	**361**	**100%**	**269,325**	**100%**	**159,947**	**100%**

Table 5. Summary of the empirical literature adopting LSV

This table presents the main findings of the empirical literature adopting LSV methodology for n ≥ 1, n ≥ 2, n ≥ 5, n ≥ 10 where n=total number of traders (buyers+sellers) distinguishing between herding across stocks and herding across industries.

Authors	Investors	Period				
Stock			n ≥ 1	n ≥ 2	n ≥ 5	n ≥ 10
LSV 1992	US pension funds	1985-1989	2.70%	-	-	2%
GTW 1995	US mutual funds	1974-1984	2.50%	-	-	-
Wermers 1999	US mutual Funds	1975-1994	-	-	3.40%	3.60%
Choe et al 1999	Korean foreign investors	1996-1997		22.20%	-	-
Borensztein Gelos 2000	Emerging mkt mutual funds	1996-1999	7.20%	-	-	-
Kim Wei 2002	Korean foreign investors	1996-1999	4-6%	-	-	-
Sias 2004	US institutional investors	1983-1997	1.78%		2.46%	2.83%
Wylie 2005	UK mutual funds	1986-1993	-	2.60%	2,5%	3.30%
Voronkova Bohl 2005	Polish pension funds	1999-2001	14.60%	-	10.90%	11.50%
Walter Weber 2006	German mutual funds	1997-2002	2.67%	5.11%	5.59%	5.59%
Lobao Serra 2007	Portuguese mutual funds	1998-2000	11.38%	12.44%	13.54%	13.96%
Industry						
LSV 1992	US pension funds	1985-1989	1.3% (54 SIC)			
Choi Sias 2009	US institutional investors	1983-2005	1,39% (49F&F)			

Table 6. Results

Table 6 presents the results obtained applying LSV formula to the 29 SWFs represented in the dataset across the 12 (30) Fama & French industries over the period 1st January 1995- 31st December 2010. The reported H is calculated as the average of H_{it} across all industry/periods traded by at least the number of funds (n) indicated in each column and in particular for n ≥ 1; n ≥ 2; n ≥ 3; n ≥ 5; n ≥ 10. H_{it} is obtained applying formula [1] $H_{it} = abs(p_{it} - p_t) - AF_{it}$ where p_{it} is the proportion of SWFs trading industry i in period t that were buyers, p_t is the proportion of purchases among all trades during period t and AF_t is an adjustment factor. For more details on formula [1] see the methodology section. In round parenthesis are reported the t-statistics all highly significant and in square parenthesis the number of industry/periods used for each calculation. Stars indicate the level of significance: ** Significance at the 1% level; *** Significance at the 0.05% level.

Panel A: Results with 12 F&F industries and half-year periods (1995-2010)

1995-2010 (HY)	**H**	H with n ≥ 2	H with n ≥ 3	H with n ≥ 5	H with n ≥ 10
F&F12	-0.049***	-0.058***	-0.061***	-0.051***	-0.039***
	(-7.92)	(-9.38)	(-9.44)	(-7.22)	(-3.82)
	[329]	[246]	[168]	[75]	[20]

Panel B: Results with 30 F&F industries and half-year periods (1995-2010)

1995-2010 (HY)	**H**	H with n ≥ 2	H with n ≥ 3	H with n ≥ 5	H with n ≥ 10
F&F30	-0.040***	-0.052***	-0.065***	-0.058***	-0.075***
	(-6.86)	(-8.01)	(-9.54)	(-6.51)	(-10.51)
	[530]	[298]	[178]	[68]	[14]

Panel C: Results with 12 F&F industries and quarterly periods (1995-2010)

1995-2010 (Quarters)	**H**	H with n ≥ 2	H with n ≥ 3	H with n ≥ 5	H with n ≥ 10
F&F12	-0.038***	-0.051***	-0.062***	-0.060***	-0.060***
	(-7.03)	(-8.86)	(-9.10)	(-8.79)	(-6.96)
	[551]	[359]	[193]	[74]	[28]

Panel D: Results with 12 F&F industries and half-year periods (2000-2010)

2000-2010 (HY)	**H**	H with n ≥ 2	H with n ≥ 3	H with n ≥ 5	H with n ≥ 10
F&F12	-0.050***	-0.052***	-0.056***	-0.047***	-0.039***
	(-7.69)	(-7.80)	(-8.11)	(-6.76)	(-3.82)
	[247]	[207]	[149]	[72]	[20]

Panel E: Results with 12 F&F industries and half-year periods (2005-2010)

2005-2010 (HY)	**H**	H with n ≥ 2	H with n ≥ 3	H with n ≥ 5	H with n ≥ 10
F&F12	-0.046***	-0.048***	-0.054***	-0.037***	-0.039***
	(-5.77)	(-6.27)	(-6.74)	(-5.11)	(-3.82)
	[141]	[130]	[111]	[60]	[20]

Table 7. Results: BH and SH

Table 7 presents the results obtained conditioning the calculation of H on $p_{it} > p_t$ and $p_{it} < p_t$, defining them respectively BH and SH. The LSV formula is applied to the 29 SWFs represented in the dataset across the 12 Fama & French industries over the period 1st January 1995-31st December 2010 considering half year periods. BH is calculated as the average of H_{it} across all industry/periods traded by at least the number of funds (n) indicated in each column and in particular for n ≥ 1; n ≥ 2; n ≥ 3; n ≥ 5. Only those H_{it} are averaged for which $p_{it} > p_t$. SH is calculated as the average of H_{it} across all industry/periods traded by at least the number of funds (n) indicated in each column and in particular for n ≥ 1; n ≥ 2; n ≥ 3; n ≥ 5. Only those H_{it} are averaged for which $p_{it} < p_t$. H_{it} is obtained applying formula [1] $H_{it} = abs(p_{it} - p_t) - AF_{it}$ where p_{it} is the proportion of SWFs trading industry i in period t that were buyers, p_t is the proportion of purchases among all trades during period t and AF_t is an adjustment factor. For more details on formula [1] see the methodology section. In round parenthesis are reported the t-statistics all highly significant and in square parenthesis the number of industry/periods used for each calculation. Stars indicate the level of significance: ** Significance at the 1% level; *** Significance at the 0.05% level.

1995-2010 (HY)	**BH**	BH with n ≥ 2	BH with n ≥ 3	BH with n ≥ 5
F&F12	-0.061***	-0.031***	-0.042***	-0.042***
	(-9.91)	(-3.62)	(-4.03)	(-3.91)
	[172]	[109]	[75]	[35]
	SH	SH with n ≥ 2	SH with n ≥ 3	SH with n ≥ 5
F&F12	-0.032**	-0.077***	-0.068***	-0.043***
	(-2.95)	(-9.15)	(-8.45)	(-5.22)
	[154]	[134]	[83]	[34]

Table 8. Monte Carlo experiment

Table 8 presents the results of a Monte Carlo experiment where the hypothesis is that trades are independently distributed according to a binomial distribution with probability of success (p_t) respectively equal to 0.25, 0.5 and 0.75 , with number of extractions (n) for each observation varying between 2 and 100 and a sample of 200 observations. The experiment is based on 5000 replications. H is calculated across the sample applying formula [1] $H_{it} = abs(p_{it} - p_t) - AF_{it}$ where p_{it} is the proportion of successes for each observation, p_t is the probability of success across the distribution and AF_t is an adjustment factor. For more details on formula [1] see the methodology section. Panels report the means for Hs and the t-statistics for each combination of p_t and n for the 5000 replications of the experiment.
No stars are reported since the Hs are not significantly different from zero (considering a 10% significance level as a minimum threshold) in any case.

Panel A: Monte Carlo simulation with p_t = 0.25, number of extractions (n) varying between 2 and 100, sample of 200 observations, replications = 5000.

	H with n ≥ 2	H with n ≥ 5	H with n ≥ 10	H with n ≥ 100
Mean (H)	-0.000076	0.00013538	0.000019271	-0.0000007444
t statistic	-0.624885062	1.211748304	0.24775736	-0.029243187

Panel B: Monte Carlo simulation with p_t = 0.5, number of extractions (n) varying between 2 and 100, sample of 200 observations, replications = 5000.

	H with n ≥ 2	H with n ≥ 5	H with n ≥ 10	H with n ≥ 100
Mean (H)	0.000167	-0.000069	-0.000025775	-0.0000023087
t statistic	0.656037958	-0.574004328	-0.264140251	-0.074204428

Panel C: Monte Carlo simulation with p_t = 0.75, number of extractions (n) varying between 2 and 100, sample of 200 observations, replications = 5000.

	H with n ≥ 2	H with n ≥ 5	H with n ≥ 10	H with n ≥ 100
Mean (H)	-0.0001085	-0.00010602	0.000010171	0.000028886
t statistic	-0.892105648	-0.937093262	0.130763329	1.075025604

Table 9. Results for the control sample of mutual funds

Table 9 presents the results obtained applying LSV formula to the control sample of mutual funds across the 12 Fama & French industries over the period 1st January 2000- 31st December 2011. The reported H is calculated as the average of H_{it} across all industry/periods traded by at least the number of funds (n) indicated in each column and in particular for n ≥ 1; n ≥ 2; n ≥ 3; n ≥ 5.

H_{it} is obtained applying formula [1] $H_{it} = abs(p_{it} - p_t) - AF_{it}$ where p_{it} is the proportion of mutual funds trading industry i in period t that were buyers, p_t is the proportion of purchases among all trades during period t and AF_t is an adjustment factor. For more details on formula [1] see the methodology section. In round parenthesis are reported the t-statistics all highly significant and in square parenthesis the number of industry/periods used for each calculation. Stars indicate the level of significance: * Significance at the 5% level; **Significance at the 1% level.

2000-2011 (HY)	**H**	H with n >=2	H with n >=3	H with n>=5
F&F12	0.0225*	0.0171	0.0139	0.0039
	(1.99)	(1.42)	(1.07)	(0.28)
	[168]	[126]	[102]	[72]