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on stock markets**

Hélène RAYMOND

Banque de France

Université de Paris Ouest – Nanterre La Défense

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The effect of Sovereign Wealth Funds' involvement on stock markets

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This study assesses the reaction of stock markets, when Sovereign Wealth Funds (SWFs) announce that they have taken a stake in a listed company. It adds useful empirical results to the debate on the effect of SWFs on financial markets, which remains so far largely reliant on guess work.

We perform an event study using a sample of 50 SWF acquisitions of equity stakes in listed companies around the world, from May 2005 to April 2008. According to our results, the announcement of an acquisition by a SWF has a transitory positive impact on the share price of the target company, but there is no lasting effect. This stands in contrast to the results obtained in the academic literature for the investments of private equity funds, and to a lesser extent pension funds.

The tests conducted on a sub-sample of announcements targeting banks only made during the subprime crisis (between July 2007 and April 2008) do not exhibit more lasting effects. This may suggest that markets are not convinced that SWFs alone are capable of restoring the position of the banks concerned.

These results are however subject to some caveats, and notably, the relatively small size of the sample as well as a selection bias in favour of transparent SWFs, due to the lack of information on other funds.

Keywords: Sovereign Wealth Funds, Event Study.

Codes JEL: G14, G34.

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I | The growing attention to Sovereign Wealth Funds investments

The recent acquisitions made by Sovereign Wealth Funds (SWFs) in international banks have been receiving growing attention in the public debate. A sovereign wealth fund can be broadly defined as a government-owned or a government-controlled investment fund with a long-term investment horizon and very few explicit liabilities. It invests the surpluses of foreign exchange reserves, fiscal resources or commodity exports in international financial markets, often in instruments with higher risk/return profiles (e.g. equities) than the usual FX reserve management funds. The higher involvement of these funds as investors and shareholders in financial markets raises questions as to their ability to influence market functioning and valuation.

The governance, transparency and management objectives of SWFs remain an open issue. Some funds show a willingness to remain passive shareholders with a long-term strategy. However, taking into account their sheer size and its future increase, it is unlikely that they will have absolutely no influence on the share price and governance of target companies and on market dynamics in general. By the same token, they could also have a bearing on asset valuation and risk premia.

The purpose of this study is to measure the reaction of stock markets, when Sovereign Wealth Funds (SWFs) announce that they have taken a stake in a listed company. To our knowledge, only four very recent papers deal with a similar issue.

The first of these papers is an occasional paper by the ECB by Beck and Fidora (2008), which is focused on the announcements of disinvestments made by the Norwegian SWF. It concludes that these announcements have no effect on stock prices, as they are only made after the disinvestments have been completed. However, this result may just reflect the specific policy of the Norwegian SWF which, unlike most other SWFs, explicitly aims at minimising its market impact.

The event study of Fotak *et alii* (2008) is closer to the scope of our paper, as it excludes the investments by the Norwegian SWF. It also shares with our paper a selection bias in favour of Asian SWFs, which is difficult to avoid considering the lack of detailed information on many middle-eastern SWFs.¹ However, there are two differences with our approach. First, Fotak *et alii* (2008) do not seem to control for heteroskedasticity which is a major characteristic of daily stock price changes, whereas we fit conditional volatility by GARCH(1,1) processes and use these fitted series to standardize abnormal price changes. Second, Fotak *et alii* (2008) try to assess the long-term effect of SWF acquisitions whereas this study focuses solely on the short-term effects (horizon of 10 business days). They find more lasting but non-linear effects: positive in the short run and negative in the long-term.

The two other papers are by Chhaochharia and Laeven (2008) and by Kotter and Lel (2008). These papers are very similar in essence, as they both use an event study in a first step and, then, in a second step, attempt to explain the abnormal price reaction by the transparency score of the SWF. To the best of our knowledge these two papers do not control for heteroskedasticity in their event study. However their main conclusions are consistent with ours as they find positive short-term effects of SWFs acquisitions.

This paper is organized as follows: section 2 details the method and the sample used, section 3 summarises the main results, and section 4 concludes and suggests ways to expand and improve our study.

¹ 36 of the 75 events (48%) covered by their study are from Singaporean SWFs, compared with 26 out of 50 events (52%) for our study. 19 of the 75 events they cover are from two Malaysian and relatively marginal SWFs, which brings the total of Singaporean plus Malaysian stake announcements to 55/75 = 73% of the total number of events surveyed by Fotak *et alii* (2008).

2| What are the possible outcomes of Sovereign Wealth Funds acquisitions on stock markets?

Following the announcement of a SWF investment in a listed company, the share price of a target company can move according to three different dynamics.

The first possible outcome is that the share price of the target company tracks closely the movements of the global market index in the days immediately following the announcement. In this instance, the transactions of the SWFs have no influence on the market. This outcome is most likely to occur if the SWF takes a small stake or if the news is already integrated in market prices due to early leaks.

A second possibility is that the announcement has a short-lived influence. The expected outcome in this case is that the share price of the target company outperforms the market index ("abnormal" positive price change) on the days immediately following the announcement. This can be due to a mere liquidity effect: the price increases in response to the expected rise in the demand of shares. This outcome is most likely to occur when the SWF takes large stakes. Another interpretation is that the SWF investment relaxes the short-term financial constraints of the company, even though it does not improve its long-term profitability. Such an immediate reaction of the market reflects semi-strong efficiency: the new information is immediately reflected in the stock price.

The final possibility is that the announcement has a lasting influence on the behaviour of the share price of the target company. In this case, the market expects the SWF to have a significant leverage over the governance of the company and hence its profitability. The direction of this long-term effect can go either way depending on the circumstances: positive if, as a long-term shareholder, the SWF improves the long-term return of the company (Shleifer and Vishny, 1986); or negative, if as a state-owned entity, the SWF pursues strategic goals inconsistent with the maximization of the company's profitability.

2| I The method used

The simplest way of testing the different hypotheses is to have recourse to the method of event studies. Efficient markets process information immediately (Fama, 1965; Campbell *et alii* 1997): the arrival of new information - such as a stake taken by a SWF in a company - should immediately be reflected in the share price. It is therefore possible to detect an "abnormal" reaction in response to an announcement by looking at the behaviour of the share price of the target company around the date of the announcement. In what follows we define the "abnormal" price change as the difference between the actual change of the share price of the target company and its normal change, measured with the help of a market model, which controls for the sensitivity of the share price to the market developments (for more details see Appendix).

Abnormal price changes are computed for each target company, on the day of the "event" and the days of the "event window". The "event" is defined as the public announcement of the participation of a SWF in a listed company. The "event window" is the period surrounding the announcement over which tests are conducted, with the day of announcement being defined as day 0. To capture the reaction of the financial markets in case of a leak before the announcement, or an announcement after the acquisition of the shares, event studies often make the event window begin two days before the official day of the announcement. In the tests for abnormal price variations we use the event window: [-2, +10].

The parameters of the market model are estimated during a period of estimation, prior and unconnected to the event window (to avoid all disturbances in the estimation of the parameters). The period of estimation used in this study covers a period of 163 days, finishing 11 days before the event.

We use parametric and non parametric tests, following the standard event methodology (see Appendix for details) to test whether the average abnormal price change is significantly different from zero. In a first step we compute daily average abnormal price changes (averaged over all events for each day of the event window, including the event day) and cumulative average abnormal price changes (average abnormal price changes cumulated through time), then we test whether they are significantly different from zero. As stock price changes are heteroskedastic and volatility can vary throughout the event window, we choose to standardize the abnormal price variation using a GARCH process, in order to control for heteroskedasticity before applying parametric tests and the Corrado rank test.

2|2 The sample

Our database of events covers 50 acquisitions made from May 2005 to April 2008 by SWFs from 5 countries: China, Hong-Kong, Qatar, Singapore and the United Arab Emirates. The target companies are listed in 23 different countries ranging from Canada to Vietnam. The database of events has been constructed using sources such as Bloomberg, financial publications and information coming from the SWFs themselves. The bulk of the information is therefore biased towards recent events, and investments by the most transparent funds. Market data (share have been extracted from Bloomberg, such as the stock price of the company concerned and the stock index of the market considered, focusing on a period of 500 days around the date of the event.

3| Main results

The test results are shown using two different samples: the complete sample comprising the 50 stakes' announcements and a reduced sample limited to recent acquisitions made during the sub prime crisis.

3|1 An outperformance of the share price immediately after the announcement...

The test results for all 50 events are displayed in Table 1. They show that on average, there is a positive reaction in the markets on the day of the announcement of the acquisition of a stake by a SWF. Around the announcement (nearly always the day of the announcement or a few days before or after), there is an abnormal positive reaction of the stock price (columns 2 and 3 of Table 1). For both the standard parametric test and the Corrado non-parametric test (last line of Table 1), the abnormal daily variation of the stock price is strictly positive on the day of the event at the 1% percent significance level. On average, the abnormal rate of change is around 6%. But as two events on emerging markets clearly appear as outliers with positive abnormal price changes over 15% on the event day, we repeated the tests excluding these two events. The results of these tests on the database reduced to 48 events are displayed in the last four columns of table 1. The main results stay the same though the average abnormal price change on the event day drops to "only" 3,85%. This illustrates the sensitivity of the estimate of the average abnormal price change to the extreme abnormal price variations that can be observed on emerging markets, despite the correction for volatility that we apply. The outliers excluded are two announcements of acquisitions on emerging markets that were accompanied by a spectacular outperformance of the stock's price.²

² One of the company is China Eastern Airlines, for which quotation was suspended a few days before the announcement.

Table 1 Abnormal price changes standardized with GARCH

(level in %)

Day	50 events database				48 events database			
	Abnormal price change	Significance level	Abnormal cumulated price changes	Significance level	Abnormal price change	Significance level	Abnormal cumulated price changes	Significance level
-2	0.939	34.8	0.939	34.8	0.985	32.46	0.985	32.5
-1	-0.880	37.9	0.042	96.7	-0.826	40.88	0.112	91.0
0	6.075***	0.001	3.542***	0.04	3.847***	0.012	2.313**	2.07
+1	0.212	83.2	3.173***	0.15	0.264	79.17	2.135**	3.28
+2	1.251	21.1	3.398***	0.06	1.097	27.28	2.400**	1.64
+3	-1.764*	7.8	2.381**	1.7	-1.879*	6.02	1.424	15.4
+4	0.670	50.3	2.458**	1.4	0.654	51.29	1.566	11.7
+5	-1.234	21.7	1.863*	6.2	-1.245	21.32	1.024	30.6
+6	-1.166	24.4	1.368	17.1	-1.131	25.82	0.589	55.6
+7	-1.313	18.9	0.883	37.7	-1.236	21.65	0.168	86.7
+8	0.601	54.8	1.023	30.6	0.722	47.04	0.378	70.6
+9	-1.034	30.1	0.681	49.6	-1.227	21.98	0.007	99.4
+10	-0.084	93.3	0.631	52.8	-0.053	95.77	-0.008	99.4
Corrado rank test [0]: 3.235*** (0.12%) Corrado rank test [-2,+10]: -0.438 (66%)					Corrado rank test [0]: 2.8*** (0.5%) Corrado rank test [-2,+10]: -0.6 (55%)			

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

On the whole we agree with the first part of the conclusion made by Fotak *et alii* (2008) and with the results of Chhaochharia and Laeven (2008) and of Kotter and Lel (2008): there is a positive immediate effect of the announcements of SWFs acquisitions on the share prices of the companies.

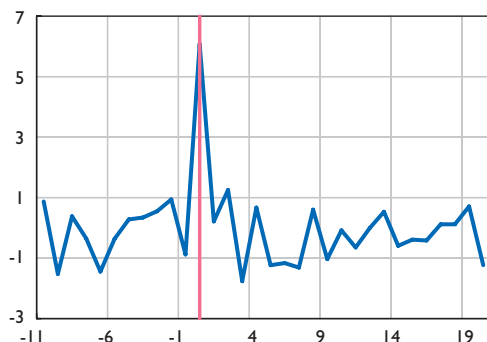
3 | 2 ... which dissipates rapidly

Nevertheless, as illustrated by Chart 1A, the effect dissipates rapidly. It is impossible to discern a significant effect on the average abnormal price change on the day following the announcement. This is shown by the relatively quick return back to zero of the cumulated abnormal price variation (Chart 1B): from the fifth day following the announcement, the effect on the cumulated abnormal price change is no longer significant (columns 4 and 5 of Table 1). This seems to indicate that there is neither a long lasting positive nor negative effect following the entry into the capital of a company by a sovereign wealth fund.

Chart 1 Abnormal price changes

(50 events; x-axis: days; y-axis: %)

A: Average daily



B: Cumulated



Notes: The red vertical line indicates the day of the acquisition (day 0). Period: -11 days; +20 days.

This conclusion must be treated with caution. The average results for the fifty announcements collected could conceal heterogeneity in the effect of the stake hold by the SWF. This could be due to the differing perception of investors towards the different funds as well as the differing strategy of the funds, depending on the markets they are investing in. Part of this positive transitory effect could be explained by SWFs investments in distressed companies (Chhaochharia and Laeven, 2008), large stakes (Chhaochharia and Laeven, 2008) and the SWF's transparency (Kotter and LeI, 2008).

Contrary to Fotak *et alii* (2008) and to Chhaochharia and Laeven (2008) we have not extensively tested the long-term impact of SWFs investments and therefore are unable to confirm their findings of a negative long term effect.³ We are limited to stating that according to our results the cumulative abnormal price increase seems to disappear a few days after the impact of the instantaneous market reaction, which does not exclude the possibility that in the long-term the markets' reaction could turn negative. However the standard methodology of the events study does not lend itself well to long-term tests (Kothari and Warner, 2007). The primary reason for this is that by extending the window of events the risk is increased that events other than the acquisition of shares by a SWF will have an effect on the share price, thereby distorting the results. There is also a range of more technical reasons, notably the fact that an extension of the window of events to test the long-term effects is usually accompanied by an increased cross correlation between the securities abnormal price changes, as well as the fact that specification errors of the normal price changes are magnified over a long-term horizon. As it appears that SWFs often invest in distressed companies (Chhaochharia and Laeven, 2008) it is of particular importance to compare the long-term performance of their investments with the long-term performance of similar companies, before drawing any definitive conclusions.

The weak persistence of the effect of the entrance by a SWF into the capital of a company could seem paradoxical as our sample contains events corresponding to the recapitalisation of companies by SWFs following the losses or depreciations occurring during the sub prime crisis.

In order to test whether the acquisitions made by SWFs during the period of the crisis have a longer lasting effect, we have set up a sub-sample of events observed during the sub prime crisis.

3 | 3 During the sub prime crisis : an apparent scepticism of markets towards SWFs as 'lenders of last resort'

We have tested the effect of the acquisitions of SWFs on a sub-range of 14 events, occurring between July 2007 and April 2008. These events include investments by SWFs in Citigroup, UBS, Morgan Stanley, Merrill Lynch and Crédit suisse.

To capture the effect of the crisis on the companies we start the estimation period closer to the day of the event whilst still ending it 11 days before the event, thereby reducing the estimation window to 119 days. This reduction of the estimation period allows us to take a better account of the increased sensitivity of stock prices to market developments during the crisis.⁴

The results obtained are displayed in Table 2 and show some differences with those seen in the study using the complete sample. The positive effect is somewhat weaker in the short-term. The daily abnormal price change on the day of the announcement of the investment by a SWF is significant at the threshold of 10%, yet is only around 2% (instead of 6% for the complete sample). This very short lived positive effect – confirmed by Corrado's Rank Test - is too weak to remain statistically significant when it is aggregated in cumulated abnormal price changes (columns 4 and 5 of Table 2). Even if cumulated abnormal price changes remain

³ Chhaochharia and Laeven (2008) find a negative long term impact at a 10% significance level only for one sub-sample of investments.

⁴ According to some preliminary tests not reported here, the alphas in the market model do not change much, but the betas increase during the crisis.

Table 2 Abnormal price changes standardized with GARCH during the sub prime crisis

(14 events; level in %)

Day	Abnormal price change	Significance level	Abnormal cumulated price changes	Significance level
-2	0.54607	58.5	0.54607	58.5
-1	-0.87274	38.3	0.23099	81.7
0	1.81571*	6.9	0.85970	39.0
+1	0.54087	58.9	1.01495	31.0
+2	0.55168	58.1	1.15452	24.8
+3	-0.68503	49.3	0.77427	43.9
+4	0.86488	38.7	1.04372	29.7
+5	-0.45645	64.8	0.81494	41.5
+6	0.53516	59.3	0.94671	34.4
+7	-0.80640	42.0	0.64312	52.0
+8	0.26577	79.0	0.69333	48.8
+9	-1.40032	16.1	0.25957	79.5
+10	1.10993	26.7	0.55723	57.7

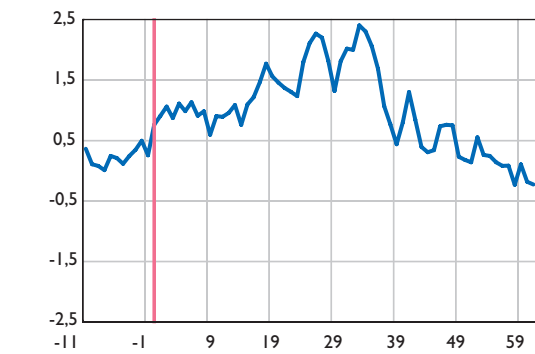
Corrado rank test [0]: 2.21120** (signif. level 2.7%)

Corrado rank test [-2,+10]: 1.25795 (signif. level 21%)

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

Chart 2 Daily cumulative standardized abnormal price changes during the sub prime crisis

(14 events; x-axis: days; y-axis: %)



Note: The red vertical line indicates the day of the acquisition (day 0).

positive over 30 days after the event (Chart 2), they are not statistically significant.

These results are subject to some caveats: there are few events in this sub-sample and the crisis constitutes a factor common to all events which invalidates the hypothesis of independent abnormal price changes. Moreover, the investors are probably uncertain of the long-term impact of these investments in this particular context. One possible interpretation of our results is that investors are not convinced as of yet of the capacity of the investment by SWFs to restore, on a permanent basis, the position of the companies concerned.

3|4 Comparison with the event studies on the investments of Private Equity and Pension Funds

This absence of a lasting positive effect for the two samples studied is wholly consistent with the findings of the others event studies on SWFs acquisitions. But it contrasts with some of the results of the empirical literature on the investments of pension funds, and above all with the main conclusions of the event studies on the investments of private equity funds. This difference in results could be easily explained if SWFs were totally passive investors. This is obviously not case for a large number of SWFs: SWFs from emerging countries often hold some controlling shares (Miracky *et alii*, 2008) and some SWFs holding minority stakes (such as the Norwegian GPF-global or the French FRR) actively use their voting rights to promote a better governance of the companies in which they invest.

The literature on private equity operations and leveraged buy outs generally concludes that there is a notable and lasting positive effect on the value and the performance of the target companies (Cumming *et alii*, 2007). The difference with our results –and more generally with the results of the event studies on SWFs- can be explained by the under-valuation of the companies targeted by private equity funds, by the fiscal advantages gained from the interest relating to their debt programme and by the positive effect they are assumed to have on the governance of the company. The private equity funds are known for their policy of aggressive restructuring of the companies they have acquired, allowing them to quickly increase the profitability of the company.

Some of the literature on pension funds shareholdings finds a positive “CalPERS” effect on the performance of the targeted companies, due to the shareholder activism of the Californian Pension Fund bearing the same name. Alongside shareholder resolutions to change the management of the underperforming companies, CalPERS uses its communication policy as a tool to identify and disclose underperforming managers: CalPERS has published an annual ‘Focus List of Underperformers’ since 1992. Nevertheless, the positive effect of CalPERS activism on the share prices of the companies in which it holds stakes remains controversial. Thus, English *et alii* (2004) confirm the CalPERS effect, whilst Nelson (2006) finds that after a methodological bias has been corrected, the effect becomes non-significant. Despite the size of CalPERS, its long history as an active shareholder and the publicity around its announcements there is no consensus on a positive and lasting “CalPERS effect”. Therefore, it is not very surprising to have not found a lasting positive effect of the investments made by SWFs.

As sovereign foreign investors, SWFs have to be more cautious than private long run investors. Also, SWFs do not have homogeneous practices as to the transparency of their investment policies and market participants may have some difficulties in interpreting their involvement in the governance of the companies. What is more, even the most transparent SWFs often pursue macroeconomics goals, besides purely financial goals such as the maximisation of returns relative to risks. Some SWFs aim at stabilizing the incomes drawn from commodity exports, some are development funds, some aim at stabilizing their exchange rates, etc. None of these motives are of course illegitimate, but objectively it is more complex for market participants to assess the motives of SWFs investments than those of private equity funds or pension funds.

For a better assessment of the long run impact of SWFs on the governance of the companies in which they invest, more robust results from long run event studies are needed. As has been indicated, the scope of our event-study is limited to the assessment of short run effects. Pursuing the study into the long-term is however difficult in regards to the robustness of the obtained results: whilst the methodology used in the short-term events study is well prepared, the long-term methodology still needs to be improved (Kothari and Warner, 2007). Using a standard long-term methodology, Fotak *et alii* (2008) find that the acquisitions of SWFs have a negative long-term impact on the profitability of the acquired company. However the elimination of 11 events out of 53 is sufficient to remove this negative effect. Considering the illiquidity and the volatility of many of the shares on emerging markets and the fact that SWFs often invest in distressed companies (Chhaochharia and Laeven, 2008), it cannot yet be excluded that this negative impact has other causes than solely the governance policy of these SWFs.

4| Sovereign Wealth Funds: Guardian angels or strategic investors?

The ongoing debate on the role played by SWFs on financial markets is far from being settled. But with elevated oil prices, the accumulation of excess FX reserves and the difficulties of the banking sector, the investments of SWFs have attracted growing attention.

As confirmed by four other recent studies on the subject, as well as by this study, the use of event studies can help us to understand how the markets react to the announcement of a SWF taking a stake in a listed company. These first studies yield interesting results but are subject to some caveats. Due to the lack of comprehensive data on SWF investments we inevitably focus on the most publicized investments. Therefore, these primary results have to be considered with caution.

Overall, for the fifty events of our database we confirm the result of Fotak *et alii* (2008), Kotter and Lel (2008) and Chhaochharia and Laeven (2008), according to whom there is an immediate, strong and positive effect of SWF investments on share prices. Part of this positive short-term effect could be explained by SWFs investments in distressed companies (Chhaochharia and Laeven, 2008), large stakes (Chhaochharia and Laeven, 2008) and the SWF's transparency (Kotter and Lel, 2008).

Contrary to Fotak *et alii* (2008) we do not confirm that SWFs have a negative long-run effect on the target companies. However, we do not attempt to gauge the effect of the announcement of SWFs acquiring stakes beyond 10 days after the event.

The tests we conduct on a sub-sample of announcements made during the Subprime crisis yield results similar to those obtained with the whole sample. The announcements of the SWFs investments have a short-term positive effect on the share price. But we do not find more lasting effects. One possible interpretation is that markets are not convinced that SWFs alone are capable of restoring the position of the banks concerned.

Much work remains to be done on SWFs. In the field of event studies, major improvements would be to construct databases which are more representative of the relative sizes of the SWFs and to study in detail the investment policies of the main funds. SWFs still have heterogeneous investment policies, though the recent agreement on a set of voluntary best practices (IMF, 2008) could lead to some homogenization of their practices as investors.

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Appendix

Testing for abnormal price changes

The abnormal return for security i and time observation t is computed as the difference between the actual logged price change and a theoretical “normal” logged price change that would prevail in the absence of the event:¹

$$AR_{it} = R_{it} - R_{it}^N$$

where AR_{it} , R_{it} , R_{it}^N are, respectively, the abnormal, actual and normal logged price changes.

The “normal” price change is computed, as is usual, from the market model:²

$$R_{it}^N = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$$

where R_{mt} is the market price index change, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated over an estimation period ending 10 days before the day of announcement of the investment.

Cumulative abnormal price changes ($CAR_i[\tau_1, \tau_2]$) can then be computed by totalling the abnormal price change recorded during the event window $[\tau_1, \tau_2]$, which begins two day before the announcement and ends ten days after:

$$CAR_i[\tau_1, \tau_2] = \sum_{t=\tau_1}^{\tau_2} AR_{it}$$

Usually AR s are computed for each day of the event window and CAR s are computed over windows progressively extended from the first day of the event and the days following it.

Standardized cumulative abnormal price changes can then be computed as:

$$SCAR_i[\tau_1, \tau_2] = \frac{CAR_i[\tau_1, \tau_2]}{\sigma_i[\tau_1, \tau_2]}$$

where $\sigma_i[\tau_1, \tau_2]$, the standard error of $CAR_i[\tau_1, \tau_2]$.

The standard error can be estimated using different hypotheses on the variance of the abnormal price change. In this study, we estimate the standard error alternatively assuming the homoskedasticity of the abnormal price change and assuming heteroskedasticity. Heteroskedasticity is modelled here using the $GARCH(1,1)$ process (Bollerslev, 1986). To save space, only the results for GARCH standardized abnormal price changes are reported. But the results of the tests are similar under both methods of standardization: controlling for heteroskedasticity reduces, on average, the size of abnormal price change over the event window, but does not change the main results.

¹ Taking the difference of the logged price rather than the exact rate of growth of the price has the advantage of reducing the kurtosis of the series.

² The market model is generally fitted on the stock return -including the dividend- rather than on the rate of growth of the stock price. However at a daily frequency the two series are close and yield very similar results. Besides, the short-term expected effect of the announcement of the stake taken by a SWF is only on the stock price. Contrary to the CAPM model the market model does not rely on interest rates for which homogeneous data are difficult to collect for both emerging and developed countries. However, over short event windows the results of event studies are not very sensitive to the model used (Campbell et alii, 1997).

The following step is to compute the average of SCARs for all N securities included in the event study:

$$\overline{SCAR}[\tau_1, \tau_2] = \frac{\sum_{i=1}^N SCAR_i[\tau_1, \tau_2]}{N}$$

Finally the test statistic $J2$ is defined as (Campbell *et alii*, 1997):

$$J2 = \sqrt{\frac{N(L_1 - 4)}{L_1 - 4}} \overline{SCAR}[\tau_1, \tau_2]$$

where L_1 is the length of the period over which the market model has been estimated.

$J2$ has a standard normal distribution in large samples. When $J2$ is above the threshold associated with a 5% significance level, the hypothesis of zero cumulative abnormal price changes is rejected. $J2$ can of course also be computed over periods of only one day: therefore in tables reporting the test results we display $J2$ for each day of our event period, which begins 2 days before the day of the event and ends 10 days after. We also report $J2$ for sub-periods progressively extended towards the end of the event window; that is for the following sub periods: $[-2, -2]$, $[-2, -1]$, ..., $[-2, +10]$.

In this paper the graphs of cumulative abnormal price changes display standardized cumulative abnormal price changes computed over a larger window (usually $[-11, +30]$) to give a more general picture of the evolution of the SCARs. But the tests themselves are not reported for sub-periods extending over 10 days after the event because our results show that the effect of the event vanishes very quickly: ARs are not significantly different from zero after the day of the event. Extending the tests beyond 10 days after the event entails the risk of capturing the effects of events other than the announcement of a stake taken by a SWF.

Non-parametric tests are often used to check the results of parametric tests such as the tests based on the statistic $J2$. In this paper we use the Corrado rank test, which is based on the rankings of abnormal price changes (see Campbell *et alii*, 1997 or Serra, 2004 for a detailed description). The main advantage of non-parametric tests is that they do not rely on a specific assumption about the distribution of price changes.