Sovereign Wealth Funds as domestic investors of last resort during crises[*]

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Abstract:
Usual definitions of Sovereign Wealth Funds (SWFs) put emphasis on their foreign investments. But after September 2008, some Sovereign Wealth Funds refrained from foreign investments and intervened to support their home economies during the crisis. We show that the interventions of Sovereign Wealth Funds as domestic "investors of last resort" are far from marginal and that they are not a passing innovation of the last global crisis. We review first the cases of interventions of SWFs as "shareholders of last resort" and differentiate interventions targeted on banks, from more general interventions designed to support non financial firms. Running some regressions to quantify the impact of Gulf SWFs' interventions to support their home Stock markets during crises, we find that these interventions exerted a stabilizing short term effect on the Stock market, though it was sometimes very limited and the long term effectiveness of such interventions is questionable. We then turn to the interventions of SWFs as "lenders of last resort" and insurance funds against major crises. In some cases (Russia, 2009; Australia, 2007) the lending by SWFs is targeted on the home banking sector: contrary to Central banks, SWFs can easily provide long to medium term financing to banks. The intervention of Saudi Arabian SWFs in 2008 was, however, of a different kind, as the lending was targeted on non financial firms to make up for banks' reluctance to lend. Last, we discuss the role of Sovereign Wealth Funds as insurance funds against major crises. SWFs may be used for government spending during crises or even intervene on Stock markets to counter speculative attacks, as was illustrated by a dramatic intervention of the SWF of Hong Kong during the Asian crisis.

JEL codes: G01, G14, G28, G29

Keywords: Sovereign Wealth Fund, crises, investor of last resort, shareholder of last resort, lender of last resort, insurer of last resort, emergency intervention.

Résumé en français :
Les définitions usuelles des fonds souverains insistent sur leur mission d'investissement à l'étranger. Mais après septembre 2008 un certain nombre de ces fonds s'est détourné des investissements étrangers pour intervenir dans le soutien de leur économie d'origine. Nous montrons que ces interventions des fonds souverains comme « investisseurs en dernier ressort » sont loin d'être marginales et qu'elles ne sont pas une innovation éphémère liée à la dernière crise. Nous étudions d'abord les interventions des fonds souverains comme « actionnaires en dernier ressort », en distinguant les interventions spécifiquement ciblées sur les banques, des interventions plus générales. Nous quantifions ensuite l'impact d'interventions de fonds souverains du Golfe les marchés d'actions de leurs pays d'origine durant des crises. Nous trouvons que ces interventions ont eu un effet de court terme stabilisateur sur les bourses, bien qu'il soit parfois très limité. L'efficacité à long terme de ces interventions est toutefois douteuse. Enfin, nous étudions les interventions des fonds souverains comme prêteurs en dernier ressort et fonds d'assurance pendant les crises. Dans certains cas (Russie, 2009 ; Australie, 2007) les prêts des fonds souverains pendant les crises sont ciblés sur le secteur bancaire national. En effet, contrairement aux banques centrales, les fonds souverains peuvent facilement fournir des financements à long terme. L'intervention de 2008 de fonds souverains saoudiens a toutefois eu un objet très différent, dans la mesure où il ne s'agissait pas de refinancer les banques, mais de pallier l'insuffisance de leur offre de crédit en prêtant directement à des entreprises non financières. Enfin, nous envisageons le rôle des fonds souverains comme fonds d'assurance pendant les crises. Les fonds souverains peuvent être utilisés pour financer des dépenses publiques pendant les crises, voire même, plus rarement, pour repousser des attaques spéculatives sur le marché boursier, ainsi que l'a illustré une spectaculaire intervention du fonds souverain de Hong Kong pendant la crise asiatique.

Codes JEL : G01, G14, G28, G29

Mots clefs : Fonds Souverains, crises, investisseur en dernier ressort, actionnaire en dernier ressort, assureur en dernier ressort, intervention d'urgence.

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Section 1: Introduction

Sovereign Wealth Funds are long term government controlled investment funds, at least partially invested in foreign assets (IMF, 2008; IWG, 2008). Most of them are based in emerging countries and derive from persistent trade surpluses. As a result, the bulk of the Sovereign wealth managed by these funds is located in oil exporting countries (Gulf countries, Norway, Russia, …) and in Asian countries (China, Singapore, Hong-Kong, South Korea, Malaysia, …) holding excess Foreign Exchange Reserves. The assets managed by Sovereign Wealth Funds (SWFs) have increased from US$ 500 billion in 1990 to US$ 3000-4000 billion in 2008. This is more than the assets under the management of hedge funds, but about eight times less than the size of pension funds (Raymond, 2009a). Besides the dramatic increase in their overall size, SWFs have attracted a lot of attention by taking a few impressive stakes in the banking sector in 2007-2008. The rescue of major Western banks by these white knights symbolized the rising economic power of emerging countries (Santiso, 2009) and the failure of Western financial institutions. The publicity around Sovereign Wealth Funds' foreign investments has spurred an intense debate, as these government-owned funds "challenge the received notions of practice and governance embodied in […] Western" economies (Monk, 2009). However, with the worsening of the crisis in September 2008, a number of Sovereign Wealth Funds retreated from foreign risky investments and were used to support their home economies. In the French case, a new SWF (FSI) was even created specially to the purpose of supporting domestic firms.

Despite its depressing effects on commodity prices and on Asian exports, the recession of 2008-2009 did not stall the establishment of new SWFs (Maslakovic, 2009). But the crisis raises some new questions about the objectives of these State-owned Funds. Before the crisis, SWFs were described as funds designed to provide commodity exporters and Asian countries with an avenue by which they could invest abroad their growing external surpluses. They were often presented as an alternative to the accumulation of liquid and safe foreign assets in the Foreign Exchange Reserves of the Central Bank. The record level of Foreign Exchange (FX) Reserves in Emerging countries was largely debated long before the crisis. As FX Reserves are mostly in the form of low-yielding foreign Treasury bonds, holding Reserves entails an opportunity cost (Rodrik, 2006). A high level of Reserves can however be motivated by a self insurance objective (Aizenman and Lee, 2007): countries with large liquid foreign assets can better withstand sudden stops in foreign capital inflows. But, according to Aizenman (2007), the self insurance motive falls short of explaining the hoarding of FX Reserves in Asia in the 2000s. The rapid development of the overall size of Sovereign Wealth Funds' assets in the 2000s can therefore be interpreted as a by-product of excessive FX Reserves and (for commodity exporters) of booming oil and gas prices. When the net foreign assets of a country become large and the government chooses to retain control of a significant part of the foreign assets, FX reserves quickly reach record levels. The high opportunity cost associated with the low yield of FX reserves is then a strong incentive to establish a Sovereign Wealth Fund, in pursuit of higher returns (Aizenman and Glick, 2008). Setting up a SWF allows investing part of the external surplus in higher yield assets, without jeopardizing the exchange rate regime, provided the SWF is invested abroad. But this framework, in which SWFs are established with the objective of enhancing the yield on net foreign assets, cannot account for the domestic "investor of last resort" part played by SWFs during the

crisis. These domestic interventions of SWFs were far from marginal: over 40% of the deals by SWFs were targeted towards their domestic markets in Q4 2008.[1]

The investments of SWFs are getting a lot of attention lately. Academic studies in this field include, amongst others: Beck et al. (2008), Fotak et al. (2008), Kotter and Lel (2008), Chhaochharia and Laeven (2008), Raymond (2009b), Fernandes (2009), Bernstein et al. (2009). According to this rapidly expanding literature, the foreign investments of SWFs seem consistent with financial stability in the short run. When the stakes taken by foreign SWFs in local firms are announced, the firms' stocks returns increase on average, including for distressed firms.[2] Stock markets appear to welcome immediately the cash injection and the long term commitment involved in these investments.[3] However, this positive short term effect quickly fades away and the longer term impact is debated (Fotak et al., 2008; Fernandes, 2009). The bulk of this literature focuses on the profitability of SWFs' investments for the other stakeholders and (Bernstein et al., 2009) for the SWF itself. Contrary to the present study, it does not tackle the interventions of Sovereign Wealth Funds as home investors of last resort during crises. This last kind of investment is very specific, as it is not based on risk-return criteria and differs from the standard (foreign) investments made by SWFs in more tranquil times. The interventions of SWFs to finance their home economies during the last crisis were clearly not motivated by profit seeking: they were part of rescue measures decided by governments. To the best of our knowledge the only study devoted to the part played by SWFs to rescue their home economies during crises is a paper by Clark and Monk (2009). With this exception, the role of Sovereign Wealth Funds as investors of last resort has been so far largely underestimated and ignored by the academic literature.

There are two opposite views of the support provided by Sovereign Wealth Funds to their domestic economies during the crisis. The first one is that it is anecdotal and ephemeral: SWFs will soon return to their objective of seeking optimal returns. The second one is that SWFs have more complex objectives than is apparent at first sight: their use as domestic investors of last resort is not just another passing symptom of the exceptional magnitude of the crisis in 2008-2009 and of the panic that surrounded it. Investing Sovereign wealth abroad is, indeed, far from being the sole purpose of the establishment of SWFs. Some Sovereign Wealth Funds were initially designed to hold stakes in domestic firms. This is the case for TEMASEK, a Singaporean SWF, which holds the State's shares in the Government Linked Companies (GLCs). According to Santiso (2009), most Sovereign Wealth Funds can, indeed, be considered as development funds, as they contribute to development in their homelands through their domestic investments. Interestingly, during past crises, SWFs have already been used to provide an exceptional support to their home economies. In this paper we therefore take the second view of SWFs' interventions as investors of last resort: we argue that the investments of SWFs to alleviate the consequences of the 2008-2009 period of crisis on their domestic economies did not happen by chance. Not only have similar interventions of SWFs

[1] "Sovereign Wealth Fund Analysis, SWFs Take Passive Approach in Cross-Border Investment*", Corporate Financing Week,* 5 March 2010.

[2] An exception is the case of the Norwegian SWF (GPF), the investments or disinvestments of which have no perceivable impact on the stocks concerned (Beck et al., 2008). However, the GPF stands apart, as it strictly limits the size of its stakes and takes care to smooth down the impact of its transactions on the stocks' prices.

[3] The results of the academic literature do not support the public negative opinion of SWFs. As Marchick (2008) concludes, popular concerns are contradicted by SWFs' 50-year track record of investing.

happened before, but some SWFs - such as the Singaporean GIC - are even designed, from the beginning, to allow them to provide exceptional support to their home economy during crises.

The objective of this paper is to look into episodes of crises during which SWFs were investors of last resort for their home economies. As mentioned before, the literature on this subject is nearly inexistent, with the notable exception of the paper by Clark and Monk (2009). However, Clark and Monk (2009) focus on the case of the Government of Singapore Investment Corporation (GIC) and take an institutional approach. We try a more comprehensive (though less detailed) treatment of the reported cases of SWFs acting as domestic investors of last resort. We also take a more quantitative view than Clark and Monk (2009) and hence assess the impact of some Gulf SWFs interventions on domestic Stock market prices and volatility by means of EGARCH-X models. Three reasons motivate our choice of the interventions by the Qatari and the Kuwaiti SWFs for these quantitative "case studies". First, the clearly stated objective of these interventions was to support the local stock market, which was plummeting because of a crisis: it is therefore legitimate to assess their success by quantifying their impact on the stock market. Second, the interventions can be precisely dated as they were immediately reported by press agencies and acknowledged by Government officials. Third, Gulf countries have been amongst the first to set up SWFs and account for about 40% of the total assets under SWFs' management; accordingly they have also been amongst the first to use their SWFs as rescue funds during crises. We find that the Qatari and Kuwaiti SWFs both succeeded in boosting up their home stock markets, though the intervention of the Kuwaiti SWF had a more limited impact. We explain this difference by the fact that the Qatari intervention was closely coordinated with policy moves of neighboring countries and involved a long term commitment to recapitalize local banks. Besides, the Kuwaiti Stock market being more open to private investors and more prone to fads (Hammoudeh and Choi, 2006) than the Qatari Stock market, it is less easy for the Government to gain control of the Kuwaiti Stock index. On the whole, we show that interventions of SWFs as home investors of last resort are far from marginal: they concern a large number of countries, owning major Sovereign Wealth Funds. We review reported cases of rescue home interventions of SWFs from oil exporting countries (Kuwait, Qatar, Saudi Arabia, Russia), from Asia (China, Singapore, Hong-Kong) and from Western countries (Australia, France). Most of these interventions occurred after the news of Lehman Brothers' failure and the aggravation of the last global crisis. However, some of the interventions reviewed occurred during past crises (the Middle East Stock market crisis of 2006, the Asian crisis of 1997-1998). They illustrate the fact that SWFs interventions as domestic investors of last resort are not an innovation imputable to the last crisis. In some cases (the Singaporean SWF GIC), the possibility of such interventions is even provided for in the legal framework of the SWF. We conjecture that the use of SWFs as instruments of rescue operations for the home economy during crises is in part due to an important specificity of SWFs: contrary to traditional Foreign Exchange Reserves funds and Central Banks, SWFs are fit to take long term stakes in companies and therefore they provide Governments with a ready policy instrument to recapitalize domestic firms. However, the use of a SWF as a policy instrument during crises comes at some cost: it can exhaust prematurely the SWF and jeopardize its long term saving objective.

The rest of the paper is organized as follows. Section 2 presents the interventions of Sovereign Wealth Funds as "Shareholders of last resort" and distinguishes between the rescue of the home banking system and the rescue of domestic non financial firms. It recalls the rationale behind the State's interventions to recapitalize banks and reviews recent and older interventions of SWFs as "Shareholders of last resort". Section 3 presents the specificities of Gulf Stock markets along with the

methodology used to assess empirically the efficiency of Gulf SWFs to support these markets. Section 4 quantifies and comments the effects of the interventions of the Qatari and Kuwaiti SWFs on their respective home Stock markets. Section 5 presents and discusses the interventions of Sovereign Wealth Funds as lenders of last resort and insurance funds against major crises. Section 6 concludes.

Section 2: Sovereign Wealth Funds as "shareholders of last resort"

In this section we will present the rescue interventions of SWFs to buy domestic stocks during crises. The stated objectives of these interventions were to support home stock prices and recapitalize home firms. We will distinguish the interventions specifically targeted on the rescue of the home banking system – designed to keep the systemic risk under control - from the more general interventions addressing the recapitalization of non financial firms.

2.1 SWFs as shareholders of last resort for the banking sector

The first stage of the 2007 Subprime crisis was characterized by a form of liquidity trap (Levintal, 2009). The interest rate cuts and the liquidity injections of the Central Banks were not sufficient to restore the stability of the financial system. When banks experience major losses, their capital quickly falls below the minimum regulatory level and they need to raise funds. But the uncertainty about the value of banks assets and the prospects for recovery deter investors. The government may have to step in to recapitalize banks. The question of the recapitalization of damaged financial institutions is not new: the conditions under which banks should be recapitalized have been studied by Diamond (2001). In practice, recapitalizing banks in a systemic crisis is always a complex process (Garcia et al., 2001). Using a Sovereign Wealth Fund (SWF) to recapitalize banks does not overcome this complexity and it can be inconsistent with the other objectives of the SWF. The appropriateness of using SWFs to recapitalize banks - and more generally to recapitalize domestic firms during crises - is debatable. However, SWFs have been used – and are currently used (China, Qatar) – to that purpose. SWFs are tailored to take stakes in companies and they have experience in asset management. This gives them an advantage over traditional FX Reserves funds and Central Banks, which can provide emergency liquidity, but are – in theory – not designed for the purchase and the management of equity stakes.

There are at least two cases in which SWFs openly intervened to recapitalize the banking sector of their home economies. These two cases involve emerging countries: China and Qatar. After the turmoil triggered by Lehman Brothers' Failure in September 2008, emerging Stock markets started plummeting and local banks experienced difficulties. Some countries resorted to the support provided by the IMF, whereas countries owning SWFs could resort to them to rescue the domestic banking system. Qatar and China used their SWFs to take stakes in ailing local banks. The Qatari intervention being the subject of an empirical case study in section 4, we will focus in the following paragraphs on the Chinese intervention.

The rescue of Chinese banks by China Investment Corporation after the aggravation of the crisis in September 2008

The Chinese SWF - China Investment Corporation (CIC) - was established in September 2007, six months after it was first announced, with the objective to improve the yield on Chinese holdings of Foreign Assets. Until then China had held its Foreign Assets mostly in the form of low-yielding FX Reserves. The Chinese FX Reserves swelled from US$ 165.6 billion in 2000 to US$ 1433.6 billion in September 2007.[4] The considerable opportunity cost of these huge Reserves motivated the establishment of CIC to diversify the Chinese Sovereign wealth into high-yielding foreign securities. The Chinese approach was cautious: at the beginning CIC was endowed with US$ 200 billion[5]. It allowed him to rank amongst the ten main SWFs (Table A1, appendix), but was a relatively low amount compared with the huge level of China's FX Reserves. This caution was *ex post* justified by the heavy losses incurred by CIC on some of its first overseas investments, after the failure of Lehman Brothers and the collapse of Stock markets in September 2008. In October 2008 the US$ 3 billion stake of CIC in the private equity fund Blackstone Group had lost 2/3 of its initial value. CIC also suffered a nearly 80% (unrealized) loss on its five-billion-dollar investment in the bank Morgan Stanley. In September 2008 the fund faced severe criticism at home for its bad foreign investments and had to adjust its strategy.[6] The economic situation in China was deteriorating, local Stock markets tumbled – the Shanghai Composite Index had already lost 52% before the failure of Lehman Brothers and was to lose 18% more after - and the vulnerability of Chinese banks put them at danger. CIC then refrained from making more overseas investments, turned to cash and came to rescue to Chinese banks on its home Stock markets.

In fact, the recapitalization of Chinese banks – riddled by non-performing loans - began long before September 2008. The State-owned company Central Huijin Investment – now a domestic investment arm of the CIC – was established to that purpose in 2003. However, the operations launched on local Stock markets by the CIC in the aftermath of Lehman Brothers' failure were clearly rescue interventions, carried out in reaction to the crisis. The first interventions did not, strictly speaking, recapitalize the Chinese banks, as they did not allow them to raise new capital, but they were intended to preserve the market value of existing capital.

On the 16th September 2008, just after the failure of Lehman Brothers, CIC stated (through its subsidiary Central Huijin) that it was going to buy stakes in three Chinese banks - the Industrial and Commercial Bank of China, the Bank of China and the China Construction Bank - on the local Stock Exchanges and had already begun to do so. The objectives put forward were to stabilize the banks' Stock prices, support the steady operation of these major State-controlled lenders and ensure the government's interest in the three banks. A China Securities Regulatory Commission spokesman declared that "the decision was important for a stable operation of the capital market".[7] The same day, two other actions were taken by Chinese authorities to support Stock prices. The director of the

[4] The crisis did not stop the hoarding of Reserves by the People's Republic of China, but it slowed down their average rate of increase from +112% /year, over December 2000 - September 2007, to +68% / year, over September 2007- March 2010 (Source: S.A.F.E.).

[5] The capital of its wholly owned subsidiary Central Huijin was part of the initial endowment of CIC.

[6] See the statements of the vice executive President and of the CEO of CIC, reported in the AFP news of January 5, 2009: "China's sovereign wealth fund to slow investment: report" (AFP, Shangaï).

[7] Source: "China cancels stamp tax on stock purchase to support equities market", 2008-09-18, Xinhua, available on http://news.xinhuanet.com/english/2008-09/18/content_10075566.htm.

State-owned Assets Supervision and Administration Commission encouraged the centrally-administered State-owned enterprises to buy more stocks of their listed subsidiaries.[8] Besides, China decided to suppress the stamp tax on stock purchase to stimulate investments in the local Stock markets.

These three coordinated moves were clearly part of a prompt action taken by the Chinese government to halt the slump in the Chinese Stock markets and signal forcefully the commitment of China to support its banking system. Indeed the Shanghai Stock market bust was relatively short: it lasted from November 2007 to November 2008, whereas the trough of the SP500 was only reached in March 2009. The ending of the Chinese Stock market bust only two months after the first interventions of the Sovereign Wealth Fund CIC might of course be a coincidence. If the interventions of the CIC played a part in this recovery, they are probably only one factor amongst many others: a thorough specific study would be needed to unravel the determinants of the early recovery of the Chinese Stock Market.

The interventions of the Chinese SWF to rescue local banks fulfill its assignment to prevent a "national socio-economic crisis"

The purchases by the Chinese Sovereign Wealth Fund – through Central Huijin - of shares in the same three major Chinese commercial banks continued over a long period. New purchases were announced in January 2009 and October 2009. The motivation put forward in October 2009 was to reassure investors and stabilize the Stock market. In November 2008, the Agricultural Bank of China had also received a massive capital injection of $19 billion from the CIC and the ministry of finance, in order to strengthen the bank and prepare its initial public offering. But commercial banks were not the only financial institutions to be supported by the Sovereign Wealth Fund. In October 2009 again, the International Far Eastern Leasing Company was recapitalized for an amount of US$ 160 million, by a consortium comprising China International Capital Corporation, a company controlled by the Chinese State through a subsidiary of Central Huijin. The stated objective of the recapitalization was to develop financial leasing in China. At the end of 2009, half to two-thirds of CIC consisted of assets of Central Huijin, which purpose is to recapitalize and restructure local financial institutions.

Far from being marginal tasks of the Chinese Sovereign Wealth Fund CIC, the recapitalization of Chinese financial institutions and the stabilization of the local Stock markets appear as major assignments of the Fund during the crisis. It is consistent with the analysis of Chao and Ping (2009) - two economists of CIC - according to whom the objectives of SWFs from fast growing emerging countries (such as China) should include the "prevention of national socio-economic crisis and assistance of the government's overall development strategy".

2.2 Sovereign Wealth Funds as shareholders of last resort for (non financial) domestic firms

In this subsection we review cases of Sovereign Wealth Funds taking stakes in domestic firms to support them during crisis. The interventions reviewed here differ from those studied previously (in subsection 2.1) in that they are not specifically targeted on the banking sector.

[8] Source: China supports strategic SOEs to buy more stocks of listed subsidiaries, 2008-09-18, Xinhua, available on http://news.xinhuanet.com/english/2008-09/18/content_10075965.htm.

The interventions of State-owned funds to buy shares in banks can be defended on the ground that the failure of banks or their malfunctioning can freeze credit and cause systemic risk. Interventions to support domestic non financial firms are much more debatable, as the failure of non financial firms entails much less systemic risk than the failure of a bank. However, supporting banks is not always sufficient to defreeze credit and restore the access of non financial firms to external financing. It takes some time to bring back business confidence. Meanwhile, non financial companies can be irreversibly damaged and closed, while with a normal access to markets and credit they would have continued operating. Fears of such damages, together with the lobbying of investors and firms, have persuaded the Russian government to use one of its Sovereign Wealth Funds to take stakes in domestic non financial firms during the last crisis. However the freeze of credit is not the only motive put forward for such interventions of SWFs. Following the example set by France, governments may be tempted to use SWFs as their investment arms to prevent foreign takeovers of companies deemed of strategic relevance for the domestic economy. And when the Sovereign Wealth Fund is managed by the Central Bank, as it is the case in Hong Kong, it can also be used to intervene on the Stock Exchange to counter speculative attacks on the FX Regime and the financial markets.

Recent interventions of SWFs as shareholders of last resort for non financial firms: the cases of Russia and France

After the aggravation of the crisis in September 2008 several countries used their existing SWFs or established new ones – in the case of France – to recapitalize non financial domestic firms. Since September 2008, there have been at least three acknowledged rescue interventions of Sovereign Wealth Funds on their home Stock markets: in Kuwait, Russia and France. The interventions of the Kuwaiti SWF will be reviewed and assessed in section 4. In the following paragraphs, we will therefore turn first to the intervention of a Russian SWF as a shareholder of last resort during the crisis, then to the case of France.

In 2004 Russia established its Sovereign Wealth Fund, the Oil Stabilization Fund, to save in the long term some of its oil exports receipts and to insulate in the short term its economy from transitory shocks on Oil Price. In February 2008, before the aggravation of the crisis, this SWF was split into two funds: the Reserve Fund and the National Welfare Fund. The Reserve Fund plays the part of a stabilization fund: when oil price increases, the Russian government saves its fiscal surplus in the Reserve Fund, whereas when there is a negative shock on oil price, the Reserve Fund finances the federal budget deficit. The Reserve Fund can only be invested in safe foreign assets. On the contrary, the National Welfare Fund is a long term Saving Fund and therefore is allowed to invest in risky assets - such as corporate bonds and equities. It has about US$ 89 billion of assets under management.

The National Welfare Fund was first designed to be invested abroad, but since the aggravation of the crisis in September 2008 it was largely redesigned to participate in the State plan to rescue Russia's financial markets and banks. On October 31 the Russian Prime Minister Vladimir Putin signed a ruling to allow the government to invest the National Wealth Fund on the Russian Stock market. According to the finance minister, the objective was to support the country's financial markets by buying shares in Russian companies. The Russian state bank VEB got US$ 5.9 billion from the National Wealth Fund on deposit to support the Stock market. The efficiency of this move is difficult to assess, as not much is known about the amount spent on the Stock market and the timing of the purchases. This financial

support was available from October 2008 to December 2009: in December 2009 the deposit was closed ahead of schedule and some remaining money of this plan was transferred to be lent to banks (Section 5.2).

The move of France to support local firms, after the aggravation of the crisis in September 2008, was rather of a dramatic sort, as it entailed the establishment of a new Sovereign Wealth Fund - the Strategic Investment Fund (FSI) - specially designed to recapitalize firms operating in France. The establishment of the FSI was announced by the French President on October 23, 2008. Though it holds only domestic assets and therefore does not fit the IMF definition of a Sovereign Wealth Fund, it was announced as one. The purpose put forward by the President was to protect strategic French firms from foreign takeovers. Existing stakes of the State in French companies and the Fund *France Investissement* - which provides financing for small to medium firms - were included in the FSI. It was initially endowed with EUR 20 billion, of which EUR 14 billion were existing stakes of the French State. The FSI started operating in December 2008. It communicates continuously on its deals through its website. In practice, most of the capital provided by the FSI is granted after a request of the firm, either to increase an insufficient capital ratio or to finance the growth of the company. So far, no risk of foreign takeover bid has ever been mentioned as a motive for a stake taken by the FSI. The FSI helps firms of very different sizes, ranging from small family businesses to major companies, such as Veolia. Their business lines are various and often do not seem very sensitive in terms of new technologies transfers or of National safety. The FSI insists on its website on the workforce these firms employ in France. Preserving employment in France is hence indirectly put forward as an important strategic motivation for helping these firms. The other criteria - mentioned in reported deals - include the firm's capacity to innovate, its growth projects and its future prospects.

An older case of intervention: the 1998 intervention of the Hong Kong Monetary Authority on its home Stock Market

Sovereign Wealth Funds interventions as domestic shareholders of last resort are not an innovation ascribable to the crisis of 2008-2009: in 1998, during the Asian crisis the SWF of Hong Kong was used for a dramatic emergency intervention on the home Stock market. The Kuwaiti Sovereign Wealth Fund KIA was also used a few years ago (2006) to support its home stock market. But, as the home interventions of Gulf SWFs as "shareholders of last resort" will be the subject of a separate empirical study in section 4, we turn in the following paragraphs to the case of the Sovereign Wealth Fund of Hong Kong during the Asian crisis.

The Hong Kong Monetary Authority (HKMA) was established in 1993. It is the authority responsible for maintaining monetary and banking stability in Hong Kong: in other words it is the Central Bank of Honk Kong. But as Hong Kong's Foreign Exchange Regime is a currency board, the monetary policy is not independent. Therefore the main function of the HKMA is to manage Hong Kong's official Reserves and to "maintain currency stability, within the framework of the linked exchange rate system, through sound management of the Exchange Fund, monetary policy operations and other means deemed necessary".[9] The Exchange Fund managed by HKMA is divided into three distinct portfolios: the Backing Portfolio, the Strategic Portfolio and the Investment Portfolio. The Backing Portfolio provides full backing of Foreign Assets to the Monetary Base, as required under the Currency Board arrangements. It fits the usual definition of FX Reserves as it is invested in highly

[9] Extract of the HKMA official website in April 2010.

liquid US dollar-denominated securities. The Strategic Portfolio holds shares in Hong-Kong Exchanges and Clearing Limited acquired for "strategic purposes", to be kept in the long term. The balance of the Fund's assets constitutes the Investment Portfolio, which is considered as Hong Kong's Sovereign Wealth Fund. In 2006 there was no strategic Portfolio and the Investment Portfolio was invested primarily in the bond and equity markets of OECD countries. The Investment Portfolio and the Strategic Portfolio are much less liquid than the Backing Portfolio and do not really fit the definition of FX Reserves. The Investment Portfolio is used to invest in the long term the excess of FX Reserves (over what is necessary to back the Monetary Base), in order to earn a higher yield. Accordingly, the Investment Portfolio of the HKMA is considered as a Sovereign Wealth Fund (Truman, 2008). As the amount of the Strategic portfolio is relatively marginal and is not disclosed separately, the size of the Sovereign Wealth Fund of Hong-Kong can be approximated as the total size of the investment portfolio and the strategic portfolio of the HKMA, which is US$ 144 in March 2010, of which 32% are equities. The size of this Sovereign Investment Fund allows Hong Kong to rank amongst the ten main SWFs, not very far from China and Russia.

In August 1998 Hong Kong was under a speculative attack, during which speculators bet on the delinking of the Hong Kong dollar from the US$ and massively shorted the Hang Seng Stock Index. The bet was that the bubbles in the Stock and property markets would burst out under the pressure of speculators and that the crash of Stock prices and other Hong Kong assets would make it too costly for the government to maintain the linked exchange rate. If delinking from the US$ and devaluation occurred, speculators would win their bet: they could then purchase back the shorted stocks for a much lower price in US$. But, on the 12 August 1998, the HKMA made a surprise move to counter speculation: it launched a massive intervention on the Stock Exchange, which lasted two weeks. It spent a total of US$ 15 billion on Hong Kong blue chips. In the short run, the intervention succeeded in raising the Stock price index by 8.5% and inflicted heavy losses on some speculators (Nip, 2007). It reversed the declining trend of the stock market and reduced its volatility (Su *et al.* 2002). In the longer term, Hong Kong managed to preserve its currency board. However, this rather unusual mean of intervention for a Central Bank was criticized on the ground that it interfered with the free functioning of the Stock market. Then there was also the question of the management of the portfolio of the acquired stakes. There seemed to be no point in keeping them in a free market economy, but selling them too abruptly would produce a Stock market crash (Cruz, 1998). The Hong Kong Monetary Authority committed to sell them progressively and effectively succeeded to do so … up to a point.

In fact, the Sovereign Wealth Fund of Hong Kong still holds a relatively high percentage of Hong Kong equities: 40% of its Equity portfolio are Hong Kong equities. And even if, to our knowledge, there have been no other reported interventions of the same kind, they are far from being waived. On the 12th October 2008 a government official threatened to use once more the Exchange Fund to stabilize Hong Kong's financial markets (Leung, 2008). The stress on economic and financial conditions was again very high: the Hong Kong Stock market plummeted 29 percent since September 2008 and there had been a brief bank run on the Bank of East Asia. To our knowledge, the Hong Kong Monetary Authority did not carry out this threat of intervention. But, interestingly, the intervention of the Sovereign Wealth Fund on Hong Kong's Stock Market stays an option to confront speculation during crises, even if it is very seldom used.

Section 3: Testing for the effectiveness of Gulf SWFs interventions as shareholders of last resort: the methodology

In this section paper we focus on SWFs from Gulf countries as home "shareholders of last resort" and present in detail the methodology used later in section 4 to assess the short term effectiveness of these interventions on the domestic Stock markets. The economic significance of Gulf Sovereign Wealth Funds (table A1, appendix) bears out our choice of their interventions for these quantitative "case studies". Gulf countries have been amongst the first to set up SWFs and account for about 40% of the total assets under SWFs' management; they have also been amongst the first to use their SWFs as rescue funds during crises.

The reported interventions of Gulf Sovereign Wealth Funds to buy Stocks on their home Stock markets during crises involve Qatar and Kuwait. The Qatari intervention is a recent one: the Sovereign Wealth Fund QIA intervened in October 2008 to buy the stocks of Qatari banks, an intervention that was sustained in the long run through repeated acquisitions. The Kuwaiti SWF KIA has a longer record of interventions on its home Stock markets: before its last intervention in the aftermath of the news of Lehman Brothers' failure, it had already intervened to support the Kuwaiti Stock market during its 2006 crash. Neither of these two interventions of KIA was specifically targeted on banks: their stated objective was to support Stock prices in general. Despite the differences in these three episodes during which the Qatar Investment Authority (QIA) or the Kuwait Investment Authority (KIA) intervened, they share three important common features: (i) They can be precisely dated, as they were immediately reported by press agencies and acknowledged by Government officials; (ii) These interventions all occurred during a crash of the home Stock market and were clearly designed to fight the Stock prices collapse. It is therefore legitimate to assess the efficiency of these three interventions by quantifying their effects on the returns and volatility of the home Stock market; (iii) The Stock markets of Qatar and Kuwait share some specificities that may impinge upon their reactions to SWFs' interventions.

The rest of the section is organized as follows: subsection 3.1 reviews the main specificities of Gulf Stock markets; subsection 3.2 presents the methodology used to assess the effects of the SWFs' interventions, taking into account the main specificities mentioned in section 3.1.

3.1 The specificities of Gulf Stock markets

Despite the fact that one of the first Gulf Stock market - the Kuwait Stock Exchange - was established back in the early sixties, the liberalization and development of Gulf Stock markets is far more recent and the literature analyzing their functioning and their economic role is rapidly growing. As the present study is focused on interventions of SWFs on their home Stock markets, the following paragraphs will be limited to a brief synthesis of the main specificities of Gulf Stock markets that can bear some consequences for the case studies of these interventions. As we will see below, Gulf stock markets can be broadly characterized by an imperfect international integration, preeminent roles of the Government and of the financial sector and a limited influence of exchange rate fluctuations.

The imperfect international integration of Gulf Stock markets

Despite the endeavor of the Gulf Corporation Council (GCC) [10] to promote economic and financial liberalization Gulf Stock markets have long remained remain largely segmented and partly stay so, even at a regional level.

According to Hammoudeh and Choi (2007) the regional integration of Gulf Stock markets was limited over the period 1994 -2004 and the correlations between stock returns were accordingly low: around only 12% between Saudi Arabia, Kuwait and the UAE, measured on weekly data. Since then integration improved in the Gulf area: correlations rose between the stock markets of Saudi Arabia, Kuwait and the UAE and reached 40%-50% over the period 2005/6/14 – 2007/5/22 (Table 1, panel A). However the correlations of the Qatari Stock markets with the three main Gulf Stock markets (Kuwait, Saudi Arabia, the UAE) stayed relatively low over the same period: between only 7.9% and 22%. Recently, correlations between Gulf Stock markets – including Qatar- have risen further, as is testified by panel B of table 1. But part of this increase is ascribable to the transitory effect of the 2008-2009 crisis.[11]

The global integration of the Gulf stock markets is also far from perfect: until recently, most of the Gulf stock returns variance could be explained by local factors (Hammoudeh and Eleisa, 2004; Hammoudeh and Choi, 2006 and 2007). Over the period 1994 -2004 the correlations between the MSCI world Stock return and Gulf Stock returns were below 11.1% and even negative for the UAE (Hammoudeh and Choi, 2007). Despite the role of GCC countries as major oil exporters the correlations between their stock markets returns and the oil price growth have long stayed surprisingly low: they were well below 10% over the period 1994 -2004, except for Saudi Arabia for which the correlation reached 18% (Hammoudeh and Choi, 2007).[12] Our calculations over the period 2005/6/7 – 2007/5/22 (table 1, panel A) confirm the low correlations between the Gulf Stock markets and both the Oil price and the MSCI World index. Over this period the correlations with the oil price growth are close to zero or even negative (for the Kuwaiti Stock market). Over the same period the correlations of the Gulf Stock market with the MSCI world stock index are negative, except for Qatar (15.4%). These negative correlations between the MSCI and some Gulf stock indices mirror the imperfect integration of these markets with the World Stock market and the effect of the March 2006 Stock market crash, which was restricted to Gulf markets. However, the calculations of the same correlations over the more recent period 2006/6/27 – 2008/12/2008 (table 1, panel B) reveal a dramatic change: all the correlations of Gulf stock markets with the oil price and the MSCI world index turn largely positive, reflecting both a higher degree of international integration and the transitory impact of the global crisis in 2008.

[10] The members States of the GCC are: the United Arab Emirates, the Kingdom of Bahrain, the Kingdom of Saudi Arabia, the Sultanate of Oman, Qatar and Kuwait (source: the GCC website, www.gcc-sg.org).

[11] It is difficult (and beyond the scope of this study) to disentangle the effect of the adoption of the GCC common market in 2008 from the effect of the 2008-2009 crisis. However, the Gulf Stock markets plummeted in a largely synchronized way over the period September 2008-March 2009: this common stock market crash certainly contributed to the rise in the correlations between these markets.

[12] The Saudi Stock market is also the only one to exhibit a bi-directional causality with oil price growth (Hammoudeh and Eleisa, 2004; Arouri and Rault, 2010).

<Insert table 1 about here>

The preeminent role of State and State related investors in GCC economies and Stock Markets

Until the launching of the GCC common market in 2008 and the 2008-2009 global crisis, the interdependence between most GCC Stock markets and oil price shocks was surprisingly limited. This puzzle can be partly explained by the fact that there is almost no oil capitalization in the Gulf Stock indices, the oil industry being largely owned by the government (Hammoudeh and Choi, 2007). Therefore the impact of oil price shocks on Gulf Stock indices is mostly indirect. Besides, the liberalization of Gulf markets is recent and the role of private shareholders is still limited. In 2008, entirely State-owned Saudi entities held together 36% of the Saudi Stock market. This percentage drops to 21% and 12% of the market capitalization for, respectively, Qatar and Kuwait[13]. The total percentage of the market capitalization held by Government controlled entities is however higher, as the above mentioned figures do not take into account the holdings of companies in which the Government has a majority stake below 100%. The large stakes owned by Government related entities in local companies limit the number of listed shares and the turnover on the Gulf Stock exchanges compared with other emerging markets (Bakheet, 1999). It may help to explain the low sensitivities of GCC stocks to global shocks and the limited correlations between Gulf Stock markets until 2007.

The preeminent role of the financial sector in GCC Stock markets

The preeminent role of the financial sector is a common feature of Gulf Stock markets. Hammoudeh et al. (2009) report that at the end of 2008 the financial sector accounts for: 31%, 34%, 55% and 58% of the total stock market capitalization for, respectively, Saudi Arabia, Kuwait, Qatar and the UAE. Together with the decrease in oil price during the second half of 2008, this specificity helps to explain why Gulf Stock markets plummeted after the news of Lehman Brothers failure in September 2008, at a time where Stock indices of banking sectors were collapsing all over the world. In the light of this domination of the financial sector over Gulf Stock markets' capitalization, the difference between the intervention of the Qatari SWF - targeted on the stocks of the banking sector - and the ones of the Kuwaiti SWF is minor. Both SWFs' interventions can be expected to increase the market stock price index.

The limited influence of exchange rate fluctuations

The exchange rate regimes of GCC countries share many common features: they are currency pegs, and most of them are pegged on the USD. In the long run the exchange rate targets of GCC countries should converge, as they have agreed to adopt a single currency. Indeed adopting the US$ as common peg for the currencies of the GCC States was the first step towards the Single GCC Currency. This first step was successfully completed in 2003. The next step of adopting a common currency was scheduled for 2010, but has been delayed: according to a recent statement of the Kuwaiti Foreign Minister it could take 10 more years to be established. The difficulty to establish the GCC currency union in 2010 was foreseeable since 2007, when in May Kuwait abandoned its currency peg on the

[13] Source: The Kuwait Times, April 23, 2008, "SWFs dominate GCC stock markets", available at http://www.kuwaittimes.net/read_news.php?newsid=ODQ5MTk3MjMz.

US$ to adopt a basket peg.[14] This move, followed by two reevaluations of the dinar in July 2007, appreciated the KWD/USD by 2.5% between May and July 2007. It thereby served the Central bank's objective, which was to fight the growing costs of the Kuwaiti imports and the accelerating inflation induced by the depreciation of the US$ (and of the Kuwaiti dinar before it moved from the US$ peg).[15]

Due to both its realignments and its de-pegging from the US$ the Kuwaiti Exchange rate (KUW/USD) has the highest volatility amongst Gulf Exchange rates (table A2, appendix). Its correlation with the Kuwaiti Stock market reaches 26.7% over the period 27/6/2006 – 30/12/2008 (Table 1, panel B), a relatively high level that contrasts with the low correlations observed between the exchange rates growths and the stock market returns of the other Gulf countries. As figure A1 in appendix illustrates, since its de-pegging from the US$, the Kuwaiti dinar fluctuates more and evolves in correlation with the local Stock market. This co-movement between the Stock market and the local currency is consistent in an open economy, where capital inflows appreciate both the stock market prices and the home currency, whereas capital outflows produce the reverse effects. Kuwait is, indeed, one of the most open middle East Economy: it maintains no formal exchange restrictions and is open to foreign investment.[16] However, all foreign investments in Kuwait require government approval, certain sectors are restricted to domestic entities and administrative barriers do exist. Besides, gaps in the supervision and regulation of the Kuwaiti Stock market may deter foreign investors (IMF, 2004).[17] Therefore, the co-movements between the Kuwaiti stock market and the dinar exchange rate over the years 2005-2008 can still largely be traced back to regional capital flows and to local speculative movements (Hammoudeh and Choi, 2007). Concerning the interventions of the Kuwaiti SWF (KIA) and to support the local Stock market in 2006 and 2008, it is worth noting that they are broadly consistent with its pegged exchange rate.[18] When the Stock market of an emerging country crashes, the home currency is generally put under some devaluation pressure. Fighting the stock market collapse, through a change in the investment strategy of the Sovereign Wealth Fund - from investing abroad to investing at home - helps to preserve the value of the home currency. Conversely, reevaluating the home currency decreases the cost of imported inputs for listed firms and thereby is good news for private investors. During the first semester 2006 the interventions of the Kuwaiti central bank to appreciate the home currency, together with the intervention of the SWF to support the home Stock market, managed to appreciate the Dinar (figure A1, appendix), but only slightly slowed down the stock market slump. The greater control exerted on the exchange rate than on the Stock market during this period could explain the puzzling negative correlation between the Kuwaiti Stock market and the exchange rate observed in panel A of table1.

[14] The basket includes the US dollar, the Euro, the British Pound and the Yen. Its composition has not been disclosed but the weight of the US dollar could be around 70%.

[15] One year before, in May 2006, the Kuwaiti central bank had already revalued the dinar against the US$ by 1%, for the same reason.

[16] Trading on the Kuwait Stock Exchange was opened to GCC investors in 1988 and to all foreigners in 2000. In 2010, according to The Heritage Foundation & The Wall Street Journal, investment freedom is still higher in Kuwait than in Qatar.

[17] It is only in 2010 that an independent supervisor – the Capital Market Authority – has been set up with the aim of improving the transparency of the Kuwait Stock Exchange.

[18] The same is true for the Qatari intervention of 2008.

3.2 The methodology

To assess the impact of a SWF's intervention on its home Stock market, we estimate models for the conditional mean and variance of the Stock return.

The conditional mean of the daily Stock return for, successively, Kuwait and Qatar is modeled as follows:

$$r_t^i = c_m + \beta_W r_{t-1}^W + \sum_{j=0}^{p1}\sum_{g=1}^{3}\beta_{g,j}\, r_{t-j}^g + \sum_{j=1}^{p2}\beta_{O,j} r_{t-j}^O + \sum_{j=1}^{p3}\beta_{E,j} r_{t-j}^E + \sum_{1}^{p4}\alpha_j r_{t-j}^i + \mu_m^L\, D^L + \mu_m^i D^i + \varepsilon_t^i \quad (1)$$

With $i \in \{K, Q\}$, $g \in \{K, Q, S, U\}$ and $g \neq i$; where K stands for Kuwait, Q for Qatar, *S* for Saudi Arabia and *U* stands for UAE.

In equation (1) r_t^i is the Stock return for the home country of the SWF, defined as the first difference of the logged Stock price index; r_t^W is the World Stock return, lagged one day to account for differences between time zones[19]; r_t^g is the Stock return of a neighboring Gulf country; r_t^o is the variation of the logged oil price; r_t^E is the variation of the logged exchange rate against the US dollar; D^L is a dummy for the announcement of Lehman Brothers' failure on the 15th September 2008; D^i is the dummy for the intervention of the Sovereign Wealth Fund, which is set equal to 1 on the day(s) of the news of the intervention and is set to zero otherwise; ε_t^i is the error term. All the series are expressed in US dollars. The data is described in detail in the appendix.

We try two different variants for the dummy of Lehman's failure: the first variant D^{L1} takes the value 1 on the day of the news of Lehman Brothers' failure and is otherwise set equal to zero, whereas the second variant D^{L2} allows for a lasting change of regime in the conditional variance and/or the conditional mean return and therefore takes a zero value before the 15th September 2008 and the value one from the 15th September and onwards. We also try different proxies of the world stock return: the first difference of the logged MSCI world stock index is a natural candidate, but considering the time zone differences between the Gulf countries and major US stock exchanges we have to lag it, to ensure that it does not contain information released after the closing of Gulf stock markets. Therefore we also tried other proxies, including the difference between the logged open value of the Euronext 100 stock index (observed before the closing of Gulf markets) and the logged close value of the previous day.[20] This last variant reduces greatly the time discrepancy between the Gulf stock index and the proxy of the world stock index. Its limited geographical scope is an obvious drawback, however the high correlation and integration of Euro zone Stock returns with world stock returns makes it an acceptable proxy.

Equation (1) is a simple model for the conditional mean of stocks returns, derived from the well known market model. In its basic form it would only include the constant (c_m) and the World Stock return (r_t^W). Here we add dummies for the failure of Lehman Brothers (D^L) , the intervention of SWF (D^i) and lagged values of the domestic return (r_{t-j}^i) to allow for time dependency. We also add the stock returns of three neighboring Gulf countries (r_t^g) - including Saudi Arabia, the leading Gulf economy - to account for the imperfect integration of the domestic Stock market - and of Gulf Stock

[19] The world stock return is largely influenced by US Stock returns and when the major US stock exchanges open, Gulf Stock markets are closed.

[20] We also tried a variant calculated as the logged first difference of the open or close Euronext value. The Euronext 100 stock index is here converted in USD, using the spot EUR/USD exchange rate.

markets in general - with the rest of the World. We introduce the oil price change (r_t^O) to allow shocks on oil price to affect the stock market of the exporting country. Qatar being a major exporter of gas, we also tried to introduce the gas price in equation (1), but we dropped it as it never came out significant. We also include in equation (1) the variation of the exchange rate against the USD (r_t^E) to allow changes in the Exchange rate to impact the home Stock market. Qatar's Exchange rate regime is a strong peg on the US dollar and there have been no realignments of the peg during the period under review. Therefore this variable is not expected to enter significantly in equation (1) for Qatar. But Kuwait's Exchange rate regime changed in May 2007, from a peg on the USD to a peg on a basket of currencies, and was subjected to a few revaluations during the periods covered by the study of the two Stock market interventions of the Kuwaiti SWF. As detailed in section 3.1 we expect an appreciation of the Kuwaiti Dinar $(r_t^{ER} > 0)$ to reflect good news for the Kuwaiti economy and hence to increase the Kuwaiti Stock return, which means that β_O should be positive. [21]

Testing for the effect of a SWF's intervention on the domestic Stock returns is very simple in the framework of equation (1). It amounts to test if $\mu_m^i = 0$ (no effect), against $\mu_m^i > 0$ (positive effect) or $\mu_m^i < 0$ (negative effect). If $\mu_m^i > 0$ then the intervention succeeds in raising stock prices, at least in the short run.

To assess the impact of SWF's intervention on Stock returns volatility we estimate an Exponential GARCH model (Nelson, 1991). It is well known that daily Stock returns are heteroskedastic and that their conditional variance generally displays an autoregressive pattern with a negative asymmetry. Indeed table A2 in appendix confirms that in most cases Gulf Stock returns are negatively skewed. Another advantage of the EGARCH model - besides allowing for an asymmetric effect – is that the conditional variance is guaranteed to be positive without having to constrain the estimated coefficients. It is also robust to extreme shocks (Zivot, 2008): an interesting feature for a study focusing on periods of crises. Therefore we estimate the following asymmetric EGARCH(p,q)-X model:

$$ln(h_t^i) = c_h + \sum_{j=1}^{q} a_j \frac{|\varepsilon_{t-j}^i|}{\sqrt{h_{t-j}^i}} + \sum_{j=1}^{p} b_j ln(h_{t-j}^i) + \sum_{j=1}^{q} d_j \frac{\varepsilon_{t-j}^i}{\sqrt{h_{t-j}^i}} + \mu_h^L D^L + \mu_h^i D^i, \qquad (2)$$

Equation (2) is a variant of the Exponential GARCH model of Nelson (1991), where h_t^i is the conditional variance. If *d < 0* (which is expected for stocks), then negative lagged errors from equation (1) increase more the conditional variance than positive ones. Here we have an EGARCH-X instead of a simple EGARCH, because we introduce dummies as additional explanatory variables, besides the lagged conditional variance and the (absolute) lagged standardized error.

Testing for the effect of the SWF's intervention on the volatility of the domestic Stock market returns in the framework of equation (2) amounts to test if $\mu_h^i = 0$ (no effect on Stocks volatility), against $\mu_h^i > 0$ (positive effect) or $\mu_h^i < 0$ (negative effect).

We first estimate equation (1) by Least Squares, using Heteroskedasticity-Consistent Eicker-White Standard Errors. The lags on domestic Stock return are selected so as to ensure that the residuals are not auto-correlated. For the same reason, we also allow for lags in the foreign stock returns and the variations in the oil price and the exchange rate. We then retrieve the residuals from the final estimation of equation (1) to use them in equation (2). Equation (2) is estimated using maximum

[21] For instance, an appreciation of the dinar means that the listed companies will pay less for their imports.

likelihood. To ensure convergence we estimate equation (2) without any dummy in a first step. In a second step we introduce progressively the dummies, initializing their coefficients to zero and using the estimates from the first step as starting values for the other coefficients. Then, using the final fitted series of the conditional variance, we check that the standardized residuals are not auto-correlated and we test for remaining GARCH effects on their squares to evaluate if the model adequately fits the data.

Section 4: The interventions of the Qatari and Kuwaiti SWFs to support their home stock markets: three empirical case studies

Using the methodology detailed in section 3, we present in the following subsections three quantitative case studies of the interventions of the Qatari and Kuwaiti SWFs as domestic shareholders of last resort.

4.1 The rescue of Qatari banks by QIA in October 2008: the impact on Qatar's Stock market return and volatility

Qatar's national income relies heavily on its exports of natural gas. The Qatari Sovereign Wealth Fund - Qatar Investment Authority (QIA) - was founded in 2005 to help the country to diversify its sources of income and to isolate its economy from the volatility of gas and oil prices. At the end of 2008 its assets under management amounted to about US$ 60 billion (Table A1, Appendix), which allows QIA to rank amongst the ten first SWFs by size, though far behind the Chinese SWF (CIC). QIA was one of the SWFs which played white knights to distressed Western banks during the Subprime crisis, between July 2007 and July 2008 (Raymond, 2009a). It contributed to the recapitalization of Credit Suisse in February 2008 and of Barclays in June 2008 for, respectively, US$ 600 million and US$ 2800 million, at a time when Gulf countries seemed well preserved from the crisis and the Qatari Stock Index (Figure 1) still boomed. But after the failure of Lehman Brothers in September 2008 the Gulf Stock markets plummeted. The Qatari Stock market price index had begun to recede since June 2008, with the drop in energy prices and the growing expectations of a world recession, but the turmoil set off by the news of Lehman Brothers' failure on September 15th accelerated its descent. The Qatari DSM Stock price index lost 25% over the short period 11/09/2008-12/10/2008 (just before QIA's intervention) and it became quite apparent that Qatar, as well as the others Gulf countries, would not be spared by the crisis.

The Qatari government then took action through its Sovereign Wealth Fund QIA and adopted a US$ 5.3 billion plan to buy up to 20 percent of the capital of local banks on the Doha Securities Market. The plan was launched on Monday the 13th October 2008, with the objective of strengthening confidence in the banking system and fighting the decline in the equity market (IMF, 2009). This action was sustained in the long run: at the end of 2009 QIA was still buying local bank shares. When announced, in October 2008, QIA's intervention was closely coordinated with two monetary policy moves by United Arab Emirates (UAE) and Saudi Arabia. A few hours only before the news of QIA's intervention, the UAE announced a plan to guarantee deposits, including foreign units, and the Saudi Central Bank surprised the markets by cutting its benchmark repo rate by 50 basis points. The three coordinated interventions were targeted on the Gulf banking system. As the crisis originated in the banking sector, the news of rescue measures targeted on this sector could be expected to impact

positively the Gulf Stock markets. This coordinated rescue of Gulf banks was particularly well suited to prop up the Qatari Stock index DSM for three series of reasons: first, because banks account for more than 50% of the capitalization of the DSM index (section 3.1); second, the small size of the Qatari stock market (Table A1, Appendix) makes it relatively easy for a big investor to act upon it; third, this task should be even more easy for a Government arm such as the sovereign wealth fund QIA, considering the relatively large percentage of listed stocks directly or indirectly held by Government-related entities (section 3.1).

<Insert Figure 1 about here>

To assess the impact of QIA's coordinated intervention[22] on its home Stock market in October 2008, we estimate equations (1) and (2). D^Q, the dummy for the intervention of QIA, is set equal to 1 on the first day of the news and on the following day and is zero otherwise.[23]. As short lags are generally sufficient to model the conditional variance of stock returns (Zivot, 2008), we first estimated an EGARCH-X(1,1). But the resulting estimation left significant autocorrelation in the squared standardized residuals, indicating that the EGARCH(1,1) did not fit well the data. Increasing slightly the lag orders p or/and q did not improve the results. As there was a significant autocorrelation of the squared standardized residuals at the tenth lag, we tried an EGARCH(10,1)-X, which successfully removed all remaining autoregressive pattern. The autocorrelation in the residuals of the mean equation cannot be at fault here, since all tests (whether on raw or standardized residuals) conclude that there is none. The exceptional magnitude of the 2008-2009 crisis together with the limited size of the Qatari Stock market (table A1, appendix) and its high volatility (table A2, panel B, appendix) could help to explain the unusual long lag order *p* needed here to account for the autoregressive pattern in stock returns volatility. The result of the final estimation of equation (2) is displayed, together with the results for equation (1), in Table 2.

[22] More exactly we test here for the effect of the common intervention of QIA together with Saudi Arabia and UAE, as the three moves were approximately simultaneous.

[23] Setting this dummy equal to 1 on these two consecutive days allows for a more lasting effect of the news of QIA's move. According to the first releases of the news of the intervention, the market was still expected to react on the day after.

<Insert table 2 about here>

According to the results of estimation of the mean equation, displayed in the first columns of Table 2, the news of the intervention of QIA in October 2008 had a positive and significant effect of about +4.23% on Qatar's stock return. The coordinated moves of Saudi Arabia and the UAE, together with the credibility of QIA's long term commitment to support the local banks, may explain the success of this intervention. The restricted size and liquidity of the Qatari Stock market also helps to understand the stock price increase in reaction to these coordinated moves. The other coefficients in the mean equation all display the expected signs and are different from zero at 10% or 1% significance levels. The only exception involves the coefficient on the lagged Qatari return. We left it in the regression because its marginal significance level is 12% and to make sure that the slight autocorrelation in stock returns is taken into account. As expected, the Qatari stock return is positively linked with the world return ($\beta_W = 0.183$) and with the returns of the neighboring Gulf countries ($\beta_S = 0.1026, \beta_K = 0.295, \beta_U = 0.4741$). A rise in oil price also increases slightly the Qatari Stock return, whereas the news of Lehman's Brothers failure depressed them by approximately 3%. The exchange rate was dropped as it did not enter significantly in the regression, which was to be expected, considering the strict peg of the Qatari dinar on the USD over the period. The R^2 of 0.46 is rather high for a series of stock returns and is consistent with a good fit of the data. The Ljung-Box Statistics ($Q^{LB}_{\varepsilon,20}$) - reported here for an autocorrelation of order 20, e.g. approximately one month - confirms that there is no remaining autocorrelation in the residuals. However, as is usual, the squared residuals display a long term autocorrelation, testified by the Ljung-Box and LM Statistics ($Q^{LB}_{\varepsilon^2,20}$ and $LM_{\varepsilon^2,20}$)[24]. Therefore a GARCH model is more appropriate than a simple ARCH model. For the reasons mentioned in section 3.2 and above we opt for an EGARCH(10,1) model.

The results of the estimation of the EGARCH equation are displayed in the last columns of table 2. The coefficients of the lagged logged variance are mostly significant, including the last two lags. Their sum ($\sum_{j=1}^{10} b_i$) is equal to 0.9189, which fulfills the condition for the EGARCH to be covariance stationary (Zivot, 2008) and is consistent with the high order autoregressive pattern in the squared residuals. As the asymmetric effect was not significant here we dropped it in the final equation of the conditional variance.[25] The Ljung-Box and LM Statistics on the squared standardized residuals ($Q^{LB}_{\varepsilon_S^2,20}$ and $LM_{\varepsilon_S^2,20}$) confirm that this EGARCH(10,1) fits adequately the data, so that there is no remaining autoregressive heteroskedasticity. As expected, the news of Lehman Brothers' failure increases strongly and significantly the volatility.[26] On the contrary, the news of the coordinated intervention of QIA in October 2008 does not increase significantly the volatility, despite the fact that it succeeds in pushing up the returns. This last result could be explained by the already very high volatility observed in October 2008, before QIA intervened to fight the collapse in the stock prices of the banking sector. As the intervention helped temporarily to calm down the bear tendency of the

[24] See for instance Zivot (2008) for a definition of these statistics.

[25] The insignificance of the asymmetry effect in the EGARCH is not surprising here, considering the low correlation of -0,08 between the squared residuals and the lagged negative returns. We checked the squared standardized residuals for any remaining asymmetry effect, using the *sign bias*, *negative size bias* and *positive size bias* tests of Engle and Ng (1993). The three tests reject any remaining asymmetric effect.

[26] The estimation of the EGARCH without dummies is available upon request for the three case studies. Interestingly, only the introduction of a significant dummy brings some changes to the estimates (in the case of Qatar the sum of *b* is decreased after the introduction of D^L) and increases the log-likelihood.

market, it reduced one of the main sources of volatility at the time and this temporary reduction may have compensated the volatility caused by the intervention itself.

<Insert figure 2 about here>

4.2 The interventions of KIA on its home Stock market in 2006 and October 2008: the impact on Kuwait's Stock market return and volatility

The Kuwait Investment Authority (KIA), established in the 1950s, is the most senior Sovereign Wealth Fund. It is a saving fund designed to invest proceeds of oil exports in the long term, for future generations. In 2008 its size was about US$ 200 (Table A1, Appendix), close to the size of the Chinese SWF. The intervention of KIA to support its home market after the aggravation of the crisis in September 2008 was foreseeable, as it had previously intervened during the Gulf Stock market crash of 2006.

The 2006 intervention of the Kuwait Investment Authority on its home Stock Market: the impact on Kuwait's Stock market return and volatility

In March 2006 Gulf Stock markets plummeted, after a six- to seven-fold rise since 2001. Following a protest by hundreds of small investors, the Kuwait Investment Authority promised to inject cash into the Stock market. According to the market news the immediate effect was positive, but small and short-lived. A few days later there was an intervention to support the Saudi Stock Market, but Saudi authorities did not acknowledge any part in it.[27]

To quantify the effect of KIA's intervention on Kuwait Stock market in March 2006, we estimate models for the conditional mean and the conditional variance of the daily Stock return following the methodology presented in section 3.2 and already applied to Qatar. In addition to the dummy for KIA's intervention, we introduce a dummy for the intervention in Saudi Arabia, as it may have had an effect on Kuwait's Stock Exchange. The results of the final estimations are displayed in Table 3.

According to the results displayed in Table 3, KIA's intervention has a slightly positive effect – significant at a 10% significance level - on the conditional mean return ($\mu_m^K > 0$), but its magnitude (+0.025%) is a hundredfold less than the one observed previously for QIA's intervention. Judging by this almost negligible effect, the efficiency of KIA's intervention is very limited. The Saudi intervention has a more sizable positive significant effect ($\mu_m^S = 4{,}74\%$) on Kuwaiti Stock returns; besides some of the effect of the Saudi intervention might also be transmitted through the positive dependence of the Kuwaiti market on the Saudi market.[28] The direct dependence of Kuwaiti Stock market on the Suadi one's –measured by the sum of the coefficients $\beta_{S,0}$ and $\beta_{S,1}$ - reaches 0.14 and

[27] On the 14 March 2006 the Saudi minister of Finance refused a demand by Shoura council of an intervention to support the Stock market. However, the next day a relative of the royal family (prince Alwaleed) announced that he was going to intervene to buy Saudi stocks and the Saudi Press Agency revealed that resident foreigners might be allowed to invest directly in Saudi shares.

[28] As this intervention is not acknowledged by Saudi authorities and does not clearly entail the intervention of a SWF we do not try to check its impact on the Saudi Stock Market.

is therefore in the same range than the level previously observed for Qatar. The direct dependence of Kuwaiti stocks on UAE stocks, measured by the sum of the coefficients β_U is around 0.10, this time far below the coefficient of 0.4741 previously obtained for Qatar. As for Qatar's stock returns they were dropped from equation (1), as neither their contemporaneous values, nor their lagged values were significant. The beta of the world stock market (β_W) is around 0.12, a range consistent both with limited international integration and with the estimate previously for Qatar.[29] As could be expected (panel A, Table 1, Section 3.1), the variation of oil price was not significant: it was therefore dropped from equation (1). On the contrary, the exchange rate variation enters significantly at 10 % in equation (1) with a relatively high sum of β_E of 0.22. It is probably mainly due to the impact of the May 2006 and May 2007 reevaluations of the Kuwaiti dinar. As expected, these reevaluations had a positive effect on stocks. Overall equation (1) fits satisfyingly the data with a R^2 of 0.209, which is still relatively high for an equation explaining stock returns. The Ljung-Box statistic ($Q^{LB}_{\varepsilon,20}$) confirms that the residuals are not autocorrelated. On the contrary, the squared residuals appear autocorrelated (statistics $Q^{LB}_{\varepsilon^2,20}$ and $LM_{\varepsilon^2,20}$) a usual testimony of ARCH effects in the conditional variance.

<Insert table 3 about here>

The conditional variance is modeled with an EGARCH(1,1)-X that - according to statistics $Q^{LB}_{\varepsilon_S^2,20}$ and $LM_{\varepsilon_S^2,20}$- is here sufficient to leave no remaining ARCH effects in the squared standardized residuals. The results of the estimation of equation (2), reported in the last columns of table 3, show that both the Kuwaiti and the Saudi interventions have no perceptible effects on the volatility of Kuwaiti stocks, which is not quite surprising for the Kuwaiti intervention, considering its very limited impact on the returns.

The limited impact of its 2006 intervention did not deter KIA from intervening openly again in 2008 on its home Stock market.

The 2008 intervention of the Kuwait Investment Authority on its home Stock Market: the impact on Kuwait's Stock market return and volatility

In September 2008, following a request from the government, the Sovereign Wealth Fund KIA announced it would invest as much as US$ 1 billion to support sinking Kuwait Stock prices. The objectives put forward by the government were to protect small investors (as in 2006) and take action to save the Stock Exchange. KIA took stakes of as much as 20% in numerous investment funds to support the Kuwaiti Stock prices. A few days after, the United Arab Emirates Central Bank announced it may inject as much as Dh50 billion into the money markets of the UAE to ease liquidity concerns.

[29] The two coefficients are not quite comparable as they rely on different proxies of the world market portfolio. For Qatar in 2007-2008 we use the MSCI world stock return lagged one day to allow for differences in time zones. For Kuwait in 2005-2006 we use the variant proxy based on the open and close value of Euronext 100. However using the same proxy of the world market portfolio for Kuwait, than for Qatar yields a slightly negative and insignificant value for β_W without changing the results for the dummy of KIA's intervention.

To quantify the effect of KIA's intervention on Kuwait's Stock market in September 2008, we estimate models for the conditional mean and the conditional variance of the daily Stock return following again the same methodology as previously. Here we use the two variants of the dummy for Lehman Brothers failure - defined in section 3.2 – as they both enter significantly in the mean equation. In the variance equation we use only the second variant of the dummy for Lehman Brother's failure (D^{L2}), as this choice is supported by the data. In addition to the dummy for KIA's intervention, we introduce a dummy for the intervention of the United Arab Emirates, which might have an effect on Kuwait's Stock Exchange. The results of the final estimation are displayed in Table 4.

According to the results displayed in Table 4, the 2008 intervention of KIA's has a significant effect of +1,27% on the stock returns. The dummy for this intervention enters positively in the equation of the conditional volatility but it is not significant even at a 10% significance level. The UAE's intervention has no statistically significant effect on the conditional mean ($\mu_m^U = 0$) or on the conditional variance ($\mu_h^U = 0$). The beta of the world return is not significantly different from 0[30]. The sum of the coefficients on the Saudi stock return is about 0.08 and is statistically significant. But neither the Qatari return, nor the oil price or the exchange rate variations have any lasting effects: in each case the sum of their coefficients does not differ from zero. However, the failure of Lehman Brothers has both a transitory negative effect (through μ_m^{L1}) and a lasting negative effect (through μ_m^{L2}) on the conditional Stock mean. It has also a lasting positive effect on the conditional variance ($\mu_h^{L2} = 0.1321$). The R^2 of 0.365 is rather high for a series of stock returns and, together with the Ljung-Box Statistics $Q_{\varepsilon,20}^{LB}$ (no remaining autocorrelation in the residuals), is consistent with a good fit of the data. As is usual the squared residuals exhibit a long term autocorrelation ($Q_{\varepsilon^2,20}^{LB}$ and $LM_{\varepsilon^2,20}$) consistent with a GARCH effect. The conditional variance was therefore modeled with an EGARCH(1,1)-X: according to statistics $Q_{\varepsilon_s^2,20}^{LB}$ and $LM_{\varepsilon_s^2,20}$ it is here sufficient to leave no remaining ARCH effects in the squared standardized residuals.

<Insert table 4 about here>

The three case studies of the interventions of the Qatari and Kuwaiti SWFs to support their home stock markets during crises conclude that these interventions had at some short term positive effects (though nearly negligible in the case of Kuwait in March 2006) on the Stock markets. In the short run these two Gulf SWFs contributed to the financial stabilization of their home economies by halting temporarily the drop in the local stock markets, without raising significantly the volatility. The conclusion is therefore that the home rescue investments of SWFs have been conducive to financial stability, at least in the short term. But the positive short term impact of the intervention can be very limited (Kuwait, 2006) and the long term effects remain questionable: the interventions of KIA and QIA were not sufficient to put a definite stop to the stock markets crashes and, if the interventions exhaust the funds of the SWF and compromise its future, the long term cost could well outweigh the short term benefit. Interestingly, the 2008 intervention of QIA had a greater effect on the Doha Stock

[30] The results displayed here are obtained with the lagged MSCI world stock return lagged one day, but the use of the other proxies yield similar results.

market than the 2006 and 2008 interventions of the Kuwaiti SWF on its stock market. This difference could be expected, considering the small size of the Qatari Stock market, the domination of Government-linked investors and the sizeable amount that QIA committed to invest in the long run. Besides, the Qatari intervention was targeted on the support of Banks' stocks and its launching was closely coordinated with monetary policy moves of Saudi Arabia and the UAE. Considering both the domination of the banking sector on Qatari listed firms and the origination of the 2008 crisis in this sector, a relatively strong positive reaction of the Qatari stock prices to the news of the intervention is not surprising.

Section 5: Sovereign Wealth Funds as lenders of last resort and insurance funds during crises

At first sight a Sovereign Wealth Fund does not seem fit to play the part of the lender of last resort or to be used as an insurance fund during crises. Contrary to Central Banks and Foreign Exchange Reserves funds, SWFs invest in the long run. Their long term illiquid assets might be difficult to cash in during crises: they are not tailored to react quickly in case of bank runs or foreign capital outflows. But when there is a worldwide systemic crisis of the magnitude of the turmoil experienced after September 2008, the Central Bank's intervention is not enough to restore liquidity. Sovereign Wealth Funds interventions as lenders of last resort or insurance funds might then help to provide the long term financing needed by the economy, without direct monetary creation. In practice there have been several interventions of SWFs as domestic lenders or insurers of last resort during the last crisis.

5.1 The March 2009 intervention of Saudi SWFs as lenders of last resort … and substitutes to banks

In March 2009 the Saudi government announced the use of State investment funds to extend credit to local companies. The Public Investment Fund (PIF) - a huge State investment vehicle that controls shares in some of the leading Saudi companies - stepped up its level of lending, extended the maturing of its loans and provided borrowers with a five-year grace period. As the PIF can lend only to companies in which it owns shares, the Industrial Development Fund and a government-owned bank also increased their funding for small and medium-sized companies. The objective put forward for this plan was to make up for banks' reluctance to lend and stimulate the economy. This move came in addition of a US$ 400 billion five-year investment programme and a record budget deficit in 2009. It allowed the finance Minister to claim that Saudi Arabia had the "largest" stimulus package among G20 countries (Khalaf, 2009).

The status of the Public Investment Fund (PIF) is unclear. It was originally established in 1971 to help the development of the Saudi economy. Like the French FSI, the PIF is only invested domestically and therefore does not fit the IMF definition of a Sovereign Wealth Fund. Until recently most foreign assets of the Saudi Arabian State were held by the Central Bank (the SAMA) and it was difficult to differentiate the Sovereign Wealth Fund from the FX Reserves. But in 2008 Saudi Arabia announced the establishment of a separate Sovereign Wealth Fund to be managed by the PIF. The crisis seems to have delayed that project and the SAMA still holds the bulk of Saudi Sovereign foreign assets: about US$ 430 billion. However, the PIF can already invest abroad, indirectly, through the Saudi companies it owns.

5.2 Cases of SWFs acting as home lenders of last resort for local banks

In December 2009 the Russian government closed ahead of schedule a deposit at the Russian VEB bank, through which some money of its Sovereign Wealth Fund (the National Welfare Fund) was spent to support the Stock market (section 2.2). Instead, it took action to finance Russian banks by lending them money from the National Welfare Fund. In January 2010 a foreign currency deposit was opened at the VEB bank, on which the government deposited US$ 2 billion from the National Welfare Fund, at an interest rate of LIBOR +2.75%. This loan must be returned by the VEB on the 1st July 2011. The objective put forward for this loan is to finance the infrastructure projects of the Russian bank VEB and at the same time to make a profitable investment. It is difficult to assess the reasons behind this policy change, from using the Russian National Welfare Fund as a "shareholder of last resort" (section 2.2), to using it, now, as "lender of last resort" to banks. But according to a former Finance Ministry official the motivation is non commercial[31]. The loan from the SWF looks therefore like a kind of lending of last resort as, apparently, the VEB had been complaining about a lack of resources for some time.

Emerging countries are not the only ones to use their SWFs as lenders of last resort. According to Ziemba (2008) and some newspapers reports, Australia's Sovereign Wealth Fund also intervened to support the Australian banking system. In March-April 2007, as liquidity dried up in the wake of the collapse of Bear Stearns, some major Australian Banks obtained lending for as long as ten years from the Australian SWF. This intervention of the Australian SWF to provide medium - long term funding to the local banking sector is confirmed by the 2007-2008 Annual Report of Australia's Future Fund, which states that "a little over AU$ 1,803 million has been invested in various longer term debt securities of Australian banking institutions (beyond short term bank bills)". The objective of supporting the Australian banks is not acknowledged in the Report, as the motives put forward are the attractive commercial terms and the exceptional health of the Australian banking sector. But the deals were sufficiently out of the ordinary to require the approval of the Australian banking regulator and they attracted some claims from smaller banks to allow all Australian banks access to lending by the Future Fund[32].

In these two cases (Russia and Australia) the Sovereign Wealth Fund is used to provide lending to local banks during a crisis. This move is consistent with the view developed in section 2, according to which the banking system may deserve a specific support from a lender of last resort to counter systemic risk. It is, however, very different from the motivation put forward by the Saudi government (section 5.1) for the intervention of its SWFs as a lenders of last resort. The Saudi move was not designed to increase lending to local banks (which had already be done by the Central Bank), but to lend directly to non financial firms. The Saudi Arabian Sovereign Wealth Fund acted as a substitute to a malfunctioning banking system.

5.3 Sovereign Wealth Funds as insurance funds against major crises

It is not unusual for Sovereign Wealth Funds to play the part of insurance funds. The Sovereign Stabilization Funds (IMF, 2008) are designed to that purpose. As explained in section 2.2 in the presentation of Russia's Sovereign Wealth Funds, stabilization funds act to smooth down the economic effects of price shocks on exported commodities. Sovereign Wealth Funds which are stabilization funds insure commodity exporting countries against negative shocks on the price of the

[31] Source: The Moscow Times, 1/13/2010.
[32] Source: The Australian, 7/10/2008, "Banks turn to Future Fund for Cash".

exported commodity. To achieve this goal, when the price of the exported commodity is high, the government must be able to save a part of the exports proceeds in the SWF.

It is however very different for a SWF to act as an insurance fund against a systemic crisis. Stabilization funds are not designed to that purpose. When the cost of borrowing the money needed for a recovery package exceeds the cost of using money from the Stabilization Fund, it may be rational to tap the fund. But, there is always a risk of spending too much of the Stabilization fund and then having to close it later (Davis *et alii*, 2001). Indeed, in April 2009 the Finance Minister of Russia warned that the Reserve Fund would be "practically exhausted" in 2010. According to the information released by Russia this not yet the case, as its current size is still about US$ 50 billion. But the Russian budget deficit was around 7.4% in 2009 and the continuation of such a deficit would quickly exhaust the Reserve Fund.

Some Asian Sovereign Wealth Funds, backed by large FX and liquid Reserves, might be more adequate insurance funds during crises than Stabilization Funds. According to Clark and Monk (2009), the Singaporean Sovereign Wealth Fund (GIC) is rather well designed to finance a recovery package or other emergency measures during a major crisis. The Government of Singapore Investment Corporation (GIC) was founded in 1981 to invest the rapidly growing Foreign Exchange Reserves of Singapore in more high-yielding foreign assets. GIC has about US$ 240 billion of assets under management, comprising foreign Treasury bills and bonds, along with a variety of riskier assets, including equities. Singapore's Constitution allows the government to draw down on only the Foreign Exchange Reserves accumulated during its term of office. Singapore's past FX Reserves - managed by the Sovereign Wealth Fund GIC - can however be spent in exceptional circumstances, if both the government and the President agree to do so. "Reserves cannot be used in any situation that is not a "dire circumstance," requiring Reserves to ward-off catastrophe or prevent irreparable damage to the economy" (Clark and Monk, 2009). In January 2009, drawing on past Singaporean Reserves was decided for the first time since the foundation of GIC. It took only a few days to reach that decision: an informal proposal to tap past FX Reserves to finance a recovery package in 2009 was discussed the 9th January and the final approval was given the 21st January. On the 22nd January 2009 the Singaporean minister of finance announced a recovery package of US$ 13 billion to confront the worst economic recession the country ever faced. This large recovery plan was designed to support employment and investment, but also lending and liquidity in Singapore's economy.

Section 6: Conclusion

This paper gives an overview of the expanding role of Sovereign Wealth Funds as domestic "investors of last resort" during crises.

Usual definitions of Sovereign Wealth Funds put emphasis on their foreign investments. Sovereign Wealth Funds' growth, between 2000 and 2008, relied on the accumulation of Foreign Assets by governments of Asian countries and Oil exporting countries. But after September 2008, some Sovereign Wealth Funds refrained from foreign investments and invested at home. Contrary to their foreign investments, these investments were not based on their risk-return prospects, but were intended to support the SWFs' home economies during the crisis. The interventions of Sovereign Wealth Funds as domestic "investors of last resort" are far from marginal. They concern Sovereign Wealth Funds from Qatar, Kuwait, Saudi Arabia, China, Singapore, Russia, Australia and France. They probably involve also a few other Sovereign Wealth Funds, which managed less publicized interventions.

The interventions of SWFs to support their home economies are not a passing innovation of the last global crisis. There have been similar interventions during the Asian crisis of 1997-1998 and during the Gulf Stock market crash of 2006. Besides, following Clark and Monk (2009), some Sovereign Wealth Funds have been designed from the beginning to allow them to provide exceptional support to their home economy during major crises. At least this seems to be the case for the Singaporean Sovereign Wealth Fund GIC.

In this paper we review first the interventions of SWFs as "shareholders of last resort". During crises some SWFs take stakes in domestic firms to support the market value of their stocks or to recapitalize them. We differentiate interventions targeted on banks, from more general interventions designed to support non financial firms. We review cases of such interventions and try to quantify the impact of Gulf SWFs' interventions on their home Stock markets. We find that the Qatari and Kuwaiti SWFs contributed in the short term to the financial stabilization of their home economies by halting temporarily the drop in the local stock markets during crises, without raising significantly the volatility. However, the positive effect of these interventions on stock prices can be very limited (Kuwait, March 2006) and their long run effectiveness is questionable. We review then the interventions of SWFs as "lenders of last resort" and insurance funds against major crises. SWFs lend money to support local firms during crises. In some cases (Russia, 2009; Australia, 2007-2008) these interventions are targeted on the banking sector. Indeed, SWFs can provide medium to long term financing to ease the liquidity constraints of banks, whereas Central Banks' loans are mostly at short term. However the intervention of Saudi Arabian SWFs in 2009 was of a different kind, as the lending was targeted on non financial firms to make up for banks' reluctance to lend and stimulate the economy. Lastly we discuss the role of Sovereign Wealth Funds as insurance funds against major crisis. SWFs can (and have been) used to finance recovery plans or exceptional government spending during crises. We conjecture that stabilization funds are not quite fit for this role, as they are tailored to face transitory shocks on commodity prices and not to face systemic shocks. To insure the financing of rescue and stimulus packages during major crises, a SWF must be backed by a large pool of assets, comprising safe assets easy to cash in. The GIC, which manages Singaporean FX Reserves, meets this request and is designed to allow the financing of such rescue packages.

SWFs have existed for a long time, but it is only recently that their importance as institutional investors has been acknowledged and that large database on SWFs stakes have been set up to allow the study of their investment strategies. The bulk of the academic literature on SWFs is recent and has taken as granted that SWFs are designed to invest abroad. It has therefore focused on the impact of the foreign portfolio and direct investments of SWFs on the performance of the target firms. Future research in this field should take into account that SWFs' objectives may change during crises and be reoriented towards the rescue of the home economy. This raises a series of questions: on the ability of SWFs to sustain their long term commitments in foreign firms during crises, it also raises the questions of the long term efficiency of SWFs' domestic rescue interventions and of the coordination of these interventions with monetary and fiscal policies.

References:

Aizenman, J. (2007), "Large Hoarding of International Reserves and the Emerging Global Economic Architecture," NBER Working Paper No. 13277.

Aizenman, J. and R. Glick (2008), "Sovereign Wealth Funds: Stylized Facts about their Determinants and Governance", NBER Working Paper No. 14562, December.

Aizenman, J. and J. Lee (2007), "International Reserves: Precautionary versus Mercantilist Views, Theory and Evidence," Open Economies Review, 18:191–214.

Arouri M.E.H. and Rault C. (2010), "Oil Prices and Stock Markets: What Drives what in the Gulf Corporation Council Countries?", CESIFO working paper No. 2934, January.

Australian Government Future Fund (2008), Annual Report 2007/2008, available on http://www.futurefund.gov.au .

Bakheet, B., (1999), "Developing GCC Stock Markets: The Private Sector Role", Middle East Policy, Volume VI (3), February. Available at: http://www.mepc.org/journal_vol6/9902_bakheet.asp.

Beck, R. and Fidora, M. (2008), "The Impact of Sovereign Wealth Funds on Global Financial Markets", Occasional paper Series, No. 91, July, European Central Bank.

Bernstein S., Lerner J., Schoar A. (2009), "The investment strategies of sovereign wealth funds", NBER working paper, n°14861, avril.

Chao, C. and X. Ping (2009), "The Theoretical Logic of Sovereign Wealth Funds", 16 June 2009, available at SSRN: http://ssrn.com/abstract=1420618.

Chhaochharia V. and L. Laeven (2008), « Sovereign Wealth Funds: Their Investment Strategies and Performance », CEPR Discussion Papers 6959.

Clark, G.L. and A.H.B. Monk (2009), "Government of Singapore Investment Corporation: Insurer of Last Resort and Bulwark of Nation-State Legitimacy", *The Pacific Review*, Forthcoming. Available at SSRN: http://ssrn.com/abstract=1397713.

Cruz, B. (1998), "We will hold on to blue-chip shares", The Standard, August 29.

Davis J., Ossowski R., Daniel J., Barne S. (2001), "Stabilization and savings funds for nonrenewable resources: experience and fiscal policy implications", IMF Occasional Paper, n°205, April.

Diamond, D. W. (2001), "Should Banks Be Recapitalized?", Federal Reserve Bank of Richmond, Economic Quarterly, Volume 87/4, Fall.

Engle, R.F., and Ng, V. (1993), "Measuring and Testing the Impact of News on Volatility", Journal of Finance, 48, 1749-78.

Garcia, G., C. Enoch and V. Sundararajan (2001), "Recapitalizing Banks with Public Funds", IMF Staff Papers, Vol. 48, No. 1.

Feng, F., Q. Sun, W.H.S. Tong (2004), "Do government-linked companies underperform?", Journal of Banking & Finance, 28, 2461–2492.

Fernandes N. (2009), "Sovereign wealth funds: investment choices and implications around the world", available at http://ssrn.com/abstract=1341692, February.

Fotak V., Bortolotti B. and Megginson W. (2008), "The Financial Impact of Sovereign Wealth Fund Investments in Listed Companies", mimeo, June 19.

Hammoudeh S. and Aleisa E. (2004), "Dynamic relationship among GCC stock markets and NYMEX oil futures", Contemporary Economic Policy, 22, 250–269.

Hammoudeh S. and Choi K. (2006), "Behavior of GCC stock markets and impacts of US oil and financial markets", Research in International Business and Finance, 20, 22–44.

Hammoudeh S. and Choi K. (2007), "Characteristics of permanent and transitory returns in oil-sensitive emerging stock markets: The case of GCC countries", International Financial Markets Institutions and Money, 17, 231–245.

Hammoudeh S., Yuan Y. and McAleer M. (2009), "Shock and volatility spillovers among equity sectors of the Gulf Arab stock markets", The Quarterly Review of Economics and Finance, 49, 829–842.

IMF (2004), "Kuwait: Financial System Stability Assessment, including Reports on the Observance of Standards and Codes on the following topics: Banking Supervision, Securities Regulation, Anti-Money Laundering and Combating the Financing of Terrorism", IMF Country Report No. 04/151, May.

IMF (2008), "Sovereign Wealth Funds – A Work Agenda", 29 February.

IMF (2009), "Qatar: 2008 Article IV Consultation—Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion", IMF Country Report No. 09/28, January.

IWG (2008), "Sovereign Wealth Funds Generally Accepted Principles: Santiago Principles", International Working Group of Sovereign Wealth Funds, October, available at: http://www.iwg-swf.org.

Khalaf, R. (2009), "World in recession: Saudis tap state funds to boost lending", Financial Times, 14 March.

Kotter J. and U. Lel (2008), "Friends or Foes? The Stock Price Impact of Sovereign Wealth Fund Investments and the Price of Keeping Secrets", International Finance Discussion Papers, Number 940, Board of Governors of the Federal Reserve System.

Leung, W. (2008), "Hong Kong May Use Foreign Reserves to Prevent Financial Crisis", Bloomberg 10/12. http://www.bloomberg.com/apps/news?pid=20601083&sid=alfYZgGWdOqM&refer=currency

Levintal, O. (2009),"Financial Crisis, Equity Capital and the Liquidity Trap", February 26, 2009, Available at SSRN: http://ssrn.com/abstract=1304548.

Maslakovic, M. (2009). "Sovereign Wealth Funds 2009". International Financial Services London Research Report, March.

Marchick, D. 2008. “Sovereign Wealth Funds and National Security”, OECD & City of London Conference, The Carlyle Group, March 2008.

Mitchell, O.S., J. Pigott, C. Kumru (2008), “Managing public investment funds: best practices and new questions”, Journal of Pension Economics and Finance, 7 : 321-356 Cambridge University Press.

Nelson, D. B. (1991), “Conditional heteroskedasticity in asset returns: A new approach”, Econometrica 59, 347—370.

Nip, A. (2007), “Soros manager regrets attack on HK dollar”, The Standard, July 5.

Raymond (2009a), “Les fonds souverains”, Chapter 5 in « L’économie Mondiale 2010 », Editors: Agnès Bénassy-Quéré and Agnès Chevallier, CEPII, La Découverte, Paris.

Raymond H. (2009b), “The effect of Sovereign Wealth Funds involvement on stock markets”, Débats économiques, n°7, Banque of France.

Rodrik, D. (2006) “The Social Cost of Foreign Exchange Reserves.” International Economic Journal, 20, 3.

Santiso, J. (2009), “Sovereign Development Funds: Key financial actors of the shifting wealth of nations”, Revue d’Economie Financière.

Su, Y., Yip, Y., Wong, R.W., (2002), “The impact of government intervention on stock returns. Evidence from Hong Kong”, International Review of economics and Finance, 11, 277-297.

Truman, E. M. (2008), “A Blueprint for Sovereign Wealth Fund Best Practices”, Policy Brief of the Peterson Institute for International Finance, Number PB08–3, April.

Ziemba, R. (2008),” My Say: Where are the SWFs?”, The Edge Singapore, 22 September.

Zivot, E. (2008), "Practical Issues in the Analysis of GARCH Models". in Handbook of Financial Time Series, Springer-Verlag.

Appendix:

The Data

The Stock Exchanges of Gulf countries are closed on Friday but opened on Sunday. To account for the calendar specificities of Gulf Stock markets we extracted 7 days per week daily series from *Bloomberg* for all Gulf Stock Indices. We then checked for days of zero returns (when the market is closed) and eliminated these days from the database. This eliminates the noise in the estimated relationships deriving from the fact that a Stock return can, of course, not react to news when the market is closed. It concerns Fridays but also Thursdays for some Gulf countries, as well as holidays during which the Stock Exchange can be closed for a few days. As these days differ according to Gulf countries we set up two separate daily databases for Kuwait and Qatar.

The Stock price (close) indices extracted from Bloomberg (in US$) are the Kuwait SE Price Index, the DSM Index for Qatar, the Abu Dhabi ADX index and the Saudi Tadawul index.

The World Stock market (close) price Index series used in the paper is the MSCI World Price Index (in US$) extracted from *Datastream*. To allow for difference in time zones (there is no overlap between the major US Stock markets and Gulf Stock markets) we also try a proxy based on the Euronext 100 open and close price index.

The exchange rate series for the Kuwaiti Dinar (KWD), the Qatari Riyal (QAR), the Saudi Riyal (SAR) and the UAE Dirham (AED) are quoted in US$ and extracted from *Datastream*.

The oil price series is the *Nymex crude oil Future contract 1* price series provided by the US Energy Information Administration.

For the dating of the SWFs interventions we used *Factiva* and the SWF Institute Website. We confronted each day of event with the daily database constructed, to check if the market was opened when the first news of the intervention was released.

<Insert Table A1 about here>

<Insert Table A2 about here>

<Insert Figure A1 about here>

Table 1: Gulf Stock markets: correlations with local and global factors

Panel A: Correlations over the period 7/6/2005 – 22/5/2007

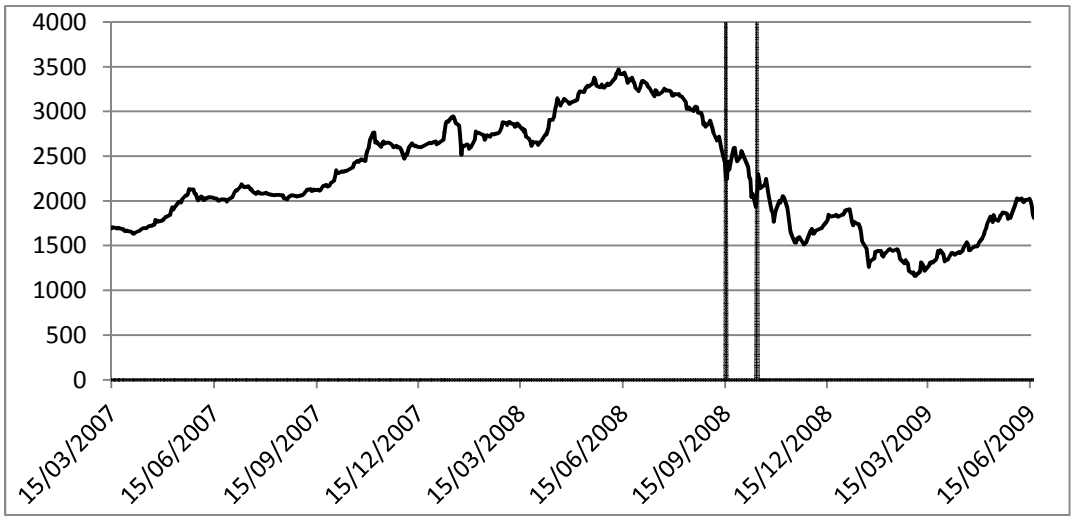
(%)	Oil	MSCI	KWD/USD	QAR/USD	SAR/USD	AED/USD	KSE	DSM	Tad.	ADX
Oil	100									
MSCI	14.6	100								
KWD/USD	-1.5	-15.4	100							
QAR/USD	-19.8	0.8	14.9	100						
SAR/USD	4.3	-16.6	48.9	5.0	100					
AED/USD	-15.3	-6.1	9.7	10.4	1.8	100				
KSE	-11.9	-7.7	-10.5	-7.1	-17.3	0.0	100			
DSM	3.3	15.4	-9.9	15.4	-9.7	-3.0	22.0	100		
Tad.	1.5	-6.8	3.6	-11.2	-2.0	6.8	43.3	7.9	100	
ADX	2.4	-12.0	-9.3	-18.0	-1.5	2.1	44.9	14.6	51.4	100

Panel B: Correlations over the period 27/6/2006 – 30/12/2008

(%)	Oil	MSCI	KWD/USD	QAR/USD	SAR/USD	AED/USD	KSE	DSM	Tad.	ADX
Oil	100									
MSCI	43.8	100								
KWD/USD	33.2	3.0	100							
QAR/USD	1.3	-7.8	-1.2	100						
SAR/USD	-37.4	-22.8	-1.9	23.9	100					
AED/USD	3.7	-7.2	11.8	28.2	14.7	100				
KSE	47.7	39.9	26.7	1.5	-13.7	7.9	100			
DSM	44.3	53.3	1.0	6.1	-21.4	6.1	59.6	100		
Tad.	27.2	37.8	5.0	-6.2	-2.2	4.0	42.8	55.0	100	
ADX	35.0	43.9	7.2	4.9	4.5	3.0	58.6	65.8	55.7	100

Notes: Oil is the NYMEX future contract in US$; MSCI is the world stock index in US$; KWD/USD, QAR/USD, SAR/USD, AED/USD are the exchange rates of resp. Kuwait, Qatar, Saudi Arabia and the UAE quoted in US$; KSE, DSM, Tad., ADX are the stock indices of resp. Kuwait, Qatar, Saudi Arabia and the UAE in US$. All variables are taken in first differences of logarithm. The frequency is here weekly (from Tuesday to Tuesday) to allow comparisons with Hammoudeh and Choi (2007). The two panels match the estimation periods of the case studies of section 4.

Figure 1: Qatar's Stock Price Index (DSM Index)



Source: Bloomberg.

The first Vertical line represents the day of the announcement of Lehman's Brothers Failure. The second vertical line represents the day when QIA's plan was launched.

Table 2: The impact of the intervention of QIA on its home Stock market

This table gives the results of the estimations of the following final equations for the Qatari return r_t^Q:

$$r_t^Q = c_m + \beta_W r_{t-1}^W + \beta_S r_t^S + \beta_K r_t^K + \beta_U r_t^U + \beta_O r_t^O + \alpha_1 r_{t-1}^Q + \mu_m^{L1} D^{L1} + \mu_m^Q D^Q + \varepsilon_t^Q \quad (1)$$

$$ln(h_t^Q) = c_h + a_1 \frac{|\varepsilon_{t-1}^Q|}{\sqrt{h_{t-1}^Q}} + \sum_{j=1}^{10} b_j ln(h_{t-j}^Q) + \mu_h^{L1} D^{L1} + \mu_h^Q D^Q \quad (2)$$

Where r^W is the World Stock return, r^S, r^K, r^U are the Stock returns of, respectively, Saudi Arabia, Kuwait and the UAE, r^O is the oil price growth; D^L is a dummy for Lehman Brothers' failure; D^Q is the dummy for the intervention of the SWF QIA; ε^Q is the error term. All series are in US$ and are calculated as the first difference of their logged levels. Standard errors are given between brackets. The Ljung-Box statistics (*Q20*) is computed for 20 lags, on raw residuals ε from equation (1) and standardized residuals ε_s, as well as on their squares (ε^2 and ε_s^2).

Equation (1), Conditional mean			*Equation (2), Conditional Variance*		
c_m	0.0005	(0.0005)	c_h	-1.1316***	(0.2791)
β_W	0.1830***	(0.0558)	a_1	0.5265***	(0.0632)
β_S	0.1026***	(0.0356)	b_1	0.6692***	(0.0668)
β_K	0.2951***	(0.0959)	b_2	0.1857***	(0.0474)
β_U	0.4741***	(0.0605)	b_3	0.1068**	(0.0429)
β_O	0.0464*	(0.0286)	b_4	-0.1952***	(0.0444)
α_1	0.0631	(0.0412)	b_5	0.2426***	(0.0352)
μ_m^{L1}	-0.0302***	(0.0068)	b_6	-0.3422***	(0.0392)
μ_m^Q	0.0423***	(0.0080)	b_7	-0.0315	(0.0417)
			b_8	-0.0061	(0.0552)
DW	2.004		b_9	0.8041***	(0.0452)
R^2	0.460		b_{10}	-0.5146***	(0.0739)
$Q_{\varepsilon,20}^{LB}$	13.003 (marg. s.l. 88%)		μ_h^{L1}	2.1474***	(0.7482)
$Q_{\varepsilon^2,20}^{LB}$	221.26 (marg. s.l. <1%)		μ_h^Q	0.1456	(0.6068)
$LM_{\varepsilon^2,20}$	105.08 (marg. s.l. <1%)				
			Log L.	1927.94	
N. of obs.	631		$Q_{\varepsilon_s,20}^{LB}$	18.842 (marg. s.l. 53.2%)	
Est. period	29/6/2006 - 31/12/2008		$Q_{\varepsilon_s^2,20}^{LB}$	10.101 (marg. s.l. 96.6%)	
			$LM_{\varepsilon_s^2,20}$	9.921 (marg. s.l. 99.9%	

*Significance level at 10%, ** sign. level at 5%, *** sign. level at 1%

Figure 2: The conditional volatility of Qatar's Stock returns and the intervention of QIA (dotted line)

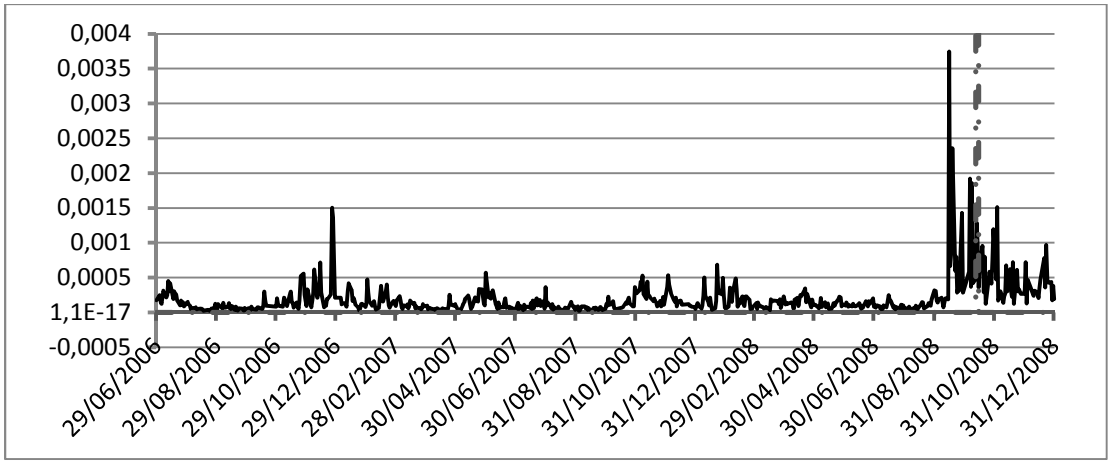


Table 3: The impact of KIA's 2006 intervention on its home Stock market

This table gives the results of the estimations of the following final equations for the Kuwaiti return r_t^K:

$$r_t^K = c_m + \beta_W r_{t-1}^W + \sum_{j=0}^{1} \beta_{S,j}\, r_{t-j}^S + \sum_{j=1}^{3} \beta_{U,j}\, r_{t-j}^U + \beta_{E,0} r_t^E + \beta_{E,4} r_{t-4}^E + \alpha_5 r_{t-5}^K + \mu_m^S D^S + \mu_m^K D^K + \varepsilon_t^K \quad (1)$$

$$ln(h_t^K) = c_h + a\frac{|\varepsilon_{t-1}^K|}{\sqrt{h_{t-1}^K}} + b\, ln(h_{t-1}^K) + d\frac{\varepsilon_{t-1}^K}{\sqrt{h_{t-1}^K}} + \mu_h^S D^S + \mu_h^K D^K \quad (2)$$

Where r^W is the World Stock return, r^S, r^U are the Stock returns of, respectively, Saudi Arabia and the UAE, r^O and r^E are, resp., the oil price and exchange rate growths; D^L is a dummy for Lehman Brothers' failure; D^S is the dummy for the intervention of Saudi Arabia, D^K is the dummy for the intervention of the SWF KIA; ε^K is the error term. All series are in US$ and are calculated as the first difference of their logged levels. Standard errors are given between brackets. The Ljung-Box statistics (*Q20*) is computed for 20 lags, on raw residuals ε from equation (1) and standardized residuals ε_s, as well as on their squares (ε^2 and ε_s^2).

Equation (1), Conditional mean			*Equation(2), Conditional Variance*		
c_m	0.0006	0.0004	c_h	-0.7272***	0.1190
β_W	0.1239*	0.0637	a	0.1695***	0.0466
$\beta_{S,0}$	0.0607***	0.0190	b	0.9392***	0.0117
$\beta_{S,1}$	0.0764***	0.0186	d	-0.1518***	0.0297
$\beta_{U,1}$	0.0644***	0.0234	μ_h^S	0.8597	1.1249
$\beta_{U,2}$	-0.0404*	0.0241	μ_h^K	0.3700	0.8283
$\beta_{U,3}$	0.0754***	0.0290			
$\beta_{E,0}$	1.0041*	0.5524			
$\beta_{E,4}$	-0.7854*	0.4027			
α_5	0.1260	0.0507			
α_{10}	0.1094	0.0703			
μ_m^S	0.0474***	0.0020			
μ_m^K	0.0025*	0.0014			
DW	1.996				
R^2	0.209		*Log L.*	1692.62	
$Q_{\varepsilon,20}^{LB}$	16.01 (marg. s.l. 71.6%)		$Q_{\varepsilon_S,20}^{LB}$	(marg. s.l. %)	
$Q_{\varepsilon^2,20}^{LB}$	141.8 (marg. s.l. <1%)		$Q_{\varepsilon_S^2,20}^{LB}$	14.00 (marg. s.l. 83,0%)	
$LM_{\varepsilon^2,20}$	67.87 (marg. s.l. <1%)		$LM_{\varepsilon_S^2,20}$	14.33 (marg. s.l. 81,3%)	
N. of obs.	487				
Est. period	4/6/2005- 22/5/2007				

*Significance level at 10%, ** Sign. level at 5%, *** Sign. level at 1%.

Table 4: The impact of KIA's 2008 intervention on its home Stock market

This table gives the results of the estimations of the following final equations for the Kuwaiti return r_t^K:

$$r_t^K = c_m + \beta_W r_{t-1}^W + \sum_{j=0}^{1} \beta_{S,j}\, r_{t-j}^S + \beta_{U,0}\, r_t^U + \beta_{Q,0}\, r_t^Q + \beta_{Q,4}\, r_{t-4}^Q + \sum_{j=0}^{2} \beta_{E,j}\, r_{t-j}^E + \beta_{O,1} r_{t-1}^O + \beta_{O,3} r_{t-3}^O + \alpha_1 r_{t-1}^K + \alpha_6 r_{t-6}^K + \alpha_{19} r_{t-19}^K + \mu_m^{L1} D^{L1} + \mu_m^{L2} D^{L2} + \mu_m^U D^U + \mu_m^K D^K + \varepsilon_t^K \quad (1)$$

$$ln(h_t^K) = c_h + a \frac{|\varepsilon_{t-1}^K|}{\sqrt{h_{t-1}^K}} + b\, ln(h_{t-1}^K) + d \frac{\varepsilon_{t-1}^K}{\sqrt{h_{t-1}^K}} + \mu_h^{L2}\, D^{L2} + \mu_h^U\, D^U + \mu_h^K D^K \quad (2)$$

Where r^W is the World Stock return, r^S, r^Q ,r^U are the Stock returns of, respectively, Saudi Arabia, Qatar and the UAE, r^O and r^E are, resp., the oil price and exchange rate growths; D^L is a dummy for Lehman Brothers' failure; D^S is the dummy for the intervention of Saudi Arabia, D^K is the dummy for the intervention of KIA; ε^K is the error term. All series are in US$ and are calculated as the first difference of their logged levels. Standard errors are given between brackets. The Ljung-Box statistics (*Q20*) is computed for 20 lags, on raw residuals ε from equation (1) and standardized residuals ε_s, as well as on their squares (ε^2 and ε_s^2).

Equation (1), Conditional mean			*Equation(2), Conditional Variance*		
c_m	0.0008**	(0.0003)	c_h	-1.1343***	(0.2712)
c_m^S	-0.0020***	(0.0007)	a	0.2377***	(0.0564)
β_W	-0.0275	(0.0328)	b	0.9067***	(0.0250)
$\beta_{S,0}$	0.0505**	(0.0197)	d	-0.0838***	(0.0277)
$\beta_{S,1}$	0.0312*	(0.0169)	μ_h^{L2}	0.1321***	(0.0470)
$\beta_{U,0}$	0.1506***	(0.0317)	μ_h^U	-0.5664	(1.0851)
$\beta_{Q,0}$	0.0689***	(0.0244)	μ_h^K	0.7970	(0.8770)
$\beta_{Q,4}$	-0.0676**	(0.0271)			
$\beta_{E,0}$	0.5888***	(0.1670)			
$\beta_{E,1}$	-0.2344	(0.2155)			
$\beta_{E,2}$	-0.3369	(0.2094)			
$\beta_{O,1}$	0.0406**	(0.0163)			
$\beta_{O,3}$	-0.0327**	(0.0126)			
α_1	0.1093**	(0.0503)			
α_6	0.1317***	(0.0504)			
α_{19}	0.0935**	(0.0428)			
μ_m^{L1}	-0.0124***	(0.0030)			
μ_m^{L2}	-0.0040**	(0.0018)			
μ_m^U	-0.0009	(0.0039)			
μ_m^K	0.0127***	(0.0029)			
DW	2.001				
R^2	0.365		*Log L.*	2227.77	
$Q_{\varepsilon,20}^{LB}$	21.357 (marg. s.l. 37.6%)		$Q_{\varepsilon_s,20}^{LB}$	25.203 (marg. s.l. 19,4%)	
$Q_{\varepsilon^2,20}^{LB}$	204.28 (marg. s.l. <1%)		$Q_{\varepsilon_s^2,20}^{LB}$	21.516 (marg. s.l. 36.7%)	
$LM_{\varepsilon^2,20}$	113.83 (marg. s.l. <1%)		$LM_{\varepsilon_s^2,20}$	10.710 (marg. s.l. 95.3 %)	
N. of obs.	620				
Est. period	30/06/2006- 31/12/2008				

*Significance level at 10%, ** Sign. level at 5%, *** Sign. level at 1%.

Table A1: Countries holding the main SWFs by size (US$ billions, end of 2008)

Commodity SWFs*					(US$ billions)	**Non commodity SWFs ***				(US$ billions)
Country (fund)	**Size** (1)	**GDP** (2)	**Min. Fuels Exp.**(3)	**FX Res.** (4)	**Stock Market cap.** (4)	**Country (fund)**	**Size**(1)	**GDP**(2)	**FX Res.** (4)	**Stock Market cap.** (4)
UAE (ADIA,…)	725	163	106	31.69	97.85	Singapore (GIC,Temasek)	330	182	174.2	268.6
Saudi Arabia (SAMA)	430	468	287	442.8	246.3	China (CIC)	190	4326	1953	2794
Norway (GPF-Global)	320	450	78	50.95	125.9	Hong-Kong (Exch fund)	190	215	182.5	1320
Kuwait (KIA)	200	112	81	17.23	107.2	Australia (Future Fund)	40	1015	32.92	675.6
Russia (RF, NWF)	200	1608	307	426.3	1322					
Qatar (QIA)	60	53	51	10	76.31					

** Commodity SWFs are backed by the revenue of commodity exports (most often oil or gas), whereas most non commodity SWFs are backed by an excess of FX reserves or by fiscal surpluses.*

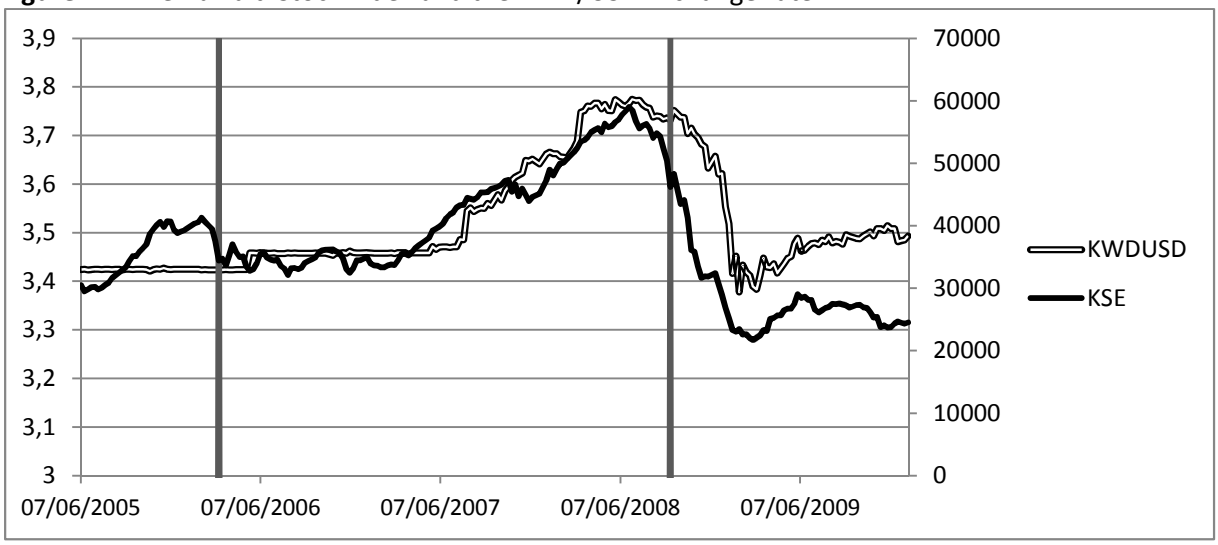
Sources: (1) SWF Institute, April 2009 – Assets under management of SWFs
(2) IMF (data for 2008)
(3) Source: International Trade Center (2008 statistics for Exports of Mineral fuels, oils,..)
(4) CIA - World Fact Book (data for the end of 2008)

Table A2: Descriptive statistics for stock returns, oil price and exchange rates' growths

	Oil	MSCI	KWD/USD	QAR/USD	SAR/USD	AED/USD	KSE	DSM	Tad.	ADX
Panel A: 7/6/2005 - 22/5/2007										
Mean (%)	0.24	0.33**	0.02	<0.01	-0.01<	<0.01	0.22	-0.15	-0.53	-0.54
Std E.(%)	3.78	1.47	0.11	0.02	<0.01	0.01	2.29	3.85	5.75	3.47
Skewn.	0.05	-0.91***	7.14***	-0.01	0.40	-0.51**	-0.85***	0.16	-1.03***	-0.10
Exc. Kur.	-0.13	2.46***	58.9***	2.60***	7.92***	8.29***	1.69***	-0.02	2.06	0.26
JB	0.11	37.3***	14530***	26.7***	251.1***	276.2***	22.7***	0.41	33.4***	0.43
Panel B: 27/6/2006 – 30/12/2008										
Mean (%)	-0.25	-0.14	0.03	-0.01<	<0.01	-0.01<	-0.16	-0.17	-0.72	-0.30
Std E.(%)	5.41	2.66	0.33	0.03	0.06	0.02	2.62	5.13	5.08	3.77
Skewn.	-0.29	-0.18	1.29***	0.98***	3.18***	-0.40*	-1.88***	-1.25***	-0.94***	-1.19***
Exc. Kur.	0.69	5.45***	11.2***	10.6***	18.2***	4.59***	5.69***	5.84***	2.35***	2.69***
JB	4.03	147.1***	652.5***	570.4***	1841.2***	106.6***	228.8***	198.5***	44.8***	63.5***

Notes: Oil is the NYMEX future contract in US$; MSCI is the world stock index in US$; KWD/USD, QAR/USD, SAR/USD, AED/USD are the exchange rates of resp. Kuwait, Qatar, Saudi Arabia and the UAE quoted in US$; KSE, DSM, Tad., ADX are the stock indices of resp. Kuwait, Qatar, Saudi Arabia and the UAE in US$. All variables are taken in first differences of logarithm. The frequency is here weekly (from Tuesday to Tuesday) to allow comparisons with Hammoudeh and Choi (2007). The two panels match the estimation periods of the case studies of section 4.

Figure A1: The Kuwaiti Stock index and the KWD/USD Exchange rate



Notes: KWD/USD is the exchange rate of the Kuwaiti dinar, quoted in US$; KSE is the stock market price index; the first vertical line represents the first intervention of the Kuwaiti SWF (KIA) to buy local stocks in March 2006, the second vertical line represents its second intervention in September 2008.