Sovereign Wealth Funds:
Policy Issues & Recommendations
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1. Introduction

Recently, there has been a growing and increasingly public debate concerning the size, growth and activities of Sovereign Wealth Funds (SWFs) for host country recipients and for the global financial system. SWFs are attracting attention from policy makers, market participants, financial analysts and commentators.

SWFs are increasingly being perceived as a potential source of imbalance to the global financial system. US Treasury Secretary Henry Paulson and finance ministers of the G7 met in Washington DC on the occasion of the IMF-World Bank Annual Meetings at an "outreach dinner" with representatives of eight nations with SWFs, including the UAE, Saudi Arabia, Qatar and Kuwait. Following the meeting, Paulson stated that: "Best practices would provide multilateral guidance to new funds on how to make sound decisions on how to structure themselves, mitigate any potential systemic risk, and help demonstrate to critics that SWFs can be constructive, responsible participants in the international financial system". A few days later SEC Chairman Christopher Cox [1] stated that the growth and activities of SWFs and State Owned Enterprises (SOEs), "call into question the adequacy of our enforcement and regulatory regime." Further, that there is an "inherent conflict of interest that arises when government is both the regulator and the regulated,", and that "A corollary of the inherent conflict of interest that arises when government is both the regulator and the regulated is that the opportunity for political corruption increases." "What effect will these new government participants in our markets have on our markets?" Cox asked. "At the SEC, our concern is that these activities not harm the investors we work to protect every day ... and that they not compromise the maintenance of fair and orderly markets." Yet other observers and policy makers have raised concerns about the potential impact of SWFs on international financial stability.

Hence SWFs and the activities of SOES have raised concerns and issues on several grounds: (a) regulatory: SWFs are non-regulated entities in their countries of origin; (b) political and strategic/national security; (c) systemic risk and international financial stability.

There are voices within the global financial system that have called for some form of intervention on SWFs leading potentially to controls on either or both direct and portfolio investment. The clear danger is creeping investment and financial protectionism. Any policy response or recommendations regarding SWFs must respect and support the openness of the global financial system and investment regime. SWFs qualify as foreign investors under most Bilateral Investment Treaties (BITs) and other international investment agreements, including OECD investment instruments.

The purpose of this brief is to provide an objective, balanced and informed analysis on SWFs and develop a policy alternatives and recommendations for the DIFC, Dubai and UAE policy makers in view of the importance of SWF and SOEs as foreign investment vehicles for the UAE and the GCC countries. It is important that countries with SWFs and internationally active SOEs act to preempt

[1] 'The Role of Government in Markets' Keynote Address and Robert R. Glauber Lecture at the John F. Kennedy School of Government, Harvard University Cambridge, Massachusetts October 24, 2007

regulatory or other restrictive or protectionist policy measures that would impede or obstruct their foreign investment strategies and objectives.

The paper discusses the estimated size of SWFs and the factors that have contributed to the growth of SWFs. The brief also discusses the investment approach of SWFs and concludes with a number of policy recommendations.

2. Definitions & Size

Global international reserves currently stand at about $5.6 trillion (including gold) and have been growing at a rate of 20% p.a. over the past five years. The Asian countries running current account surpluses hold in excess of two thirds of international reserves and China alone holding some $1.4 trillion in international reserve assets.
There are various estimates of the total value of SWFs with different sources providing different 'guess estimates'. The IMF [2] estimates of foreign assets held by sovereigns at between $1.9 trillion and $2.9 trillion in various types of sovereign wealth fund arrangements. These amount to about 10 times less than the assets under management of mature market institutional investors ($53 trillion) and modestly higher than those managed by hedge funds ($1 trillion to $1.5 trillion) (Financial Stability Forum, 2007)[3]. Current IMF projections are that sovereigns (predominantly emerging markets) will continue to accumulate international assets at the rate of $800 billion to $900 billion per year, which could bring the aggregate foreign assets under sovereign management, in the form of international reserves and SWFs, to about $12 trillion by 2012. This estimated size of SWFs is not huge compared to other assets globally: the total value of traded securities (debt and equity) denominated in U.S. dollars is estimated to be more than $50 trillion, and the global value of traded securities is about $165 trillion.[4]

SWFs are state owned and managed, comprising of financial assets such as stocks, bonds, real estate and other assets. The standard definition of SWFs is divided into two types:

- *Commodity Funds*: Commodity funds are established by diverting excess revenues from commodity exports. Commodity based funds are normally from petroleum revenues but not always, as is the case for Chile's US$3.9 billion *Copper Stabilization Fund*. It is relevant to note that the IMF has long advocated that countries establish such commodity stabilization funds in order to smooth the macroeconomic and budgetary impact of volatility in commodity export prices.

- *Non-Commodity Funds*: Non-Commodity funds are established through transfers of assets from official foreign exchange reserves. The purpose is to invest foreign resources that are not required for liquidity or precautionary purposes into higher yielding assets.

An analytically more interesting distinction is between *Stabilization Funds* and *Intergenerational Funds*, which have different investment objectives and strategies.

- *Stabilization Funds:* The general justification for such funds is that some share of government revenues derived from natural resources or non-commodities should be

[2] IMF, Global Financial Stability Report, October 2007, Annex 1.2 on Sovereign Wealth Funds; http://www.imf.org/external/pubs/ft/gfsr/2007/02/pdf/chap1.pdf
[3] See Financial Stability Forum, Update of the FSF's 2000 Report on Highly Leveraged Institutions: http://www.fsforum.org/publications/HLI_Update-finalwithoutembargo19May07.pdf
[4] See IMF, "The Rise of Sovereign Wealth Funds", Finance & Development, September 2007 Volume 44, Number 3. http://www.imf.org/external/pubs/ft/fandd/2007/09/index.htm

set aside to smooth out the effects on economic activity, inflation and government expenditure and budgets of volatility in export earnings. The objective is to address cyclical and budgetary issues.

- *Intergenerational Funds:* These types of funds are created as a store of wealth for future generations by using the revenues from non-renewable natural resources (oil, gas, precious metals, diamonds and other commodities) within a policy of inter-generational equity. The concept is that such revenues result from a transformation of natural resource wealth into financial wealth and that only a fraction of the income from investing the financial wealth should be considered as 'revenue' available for spending. The establishment of natural resource intergenerational funds would smooth fluctuations in spending due to natural resource price changes, leading to an improvement in long term planning, address generational equity concerns and institutionalize natural resource financial management.

An additional distinction should also be made with State-Owned Enterprises (SOEs) that are active in providing infrastructure services, transport, telecommunications, energy and public utilities in many of the GCC countries. The term SOEs refers to enterprises where the state has significant control, through full, majority, or significant minority ownership.[5] Increasingly these entities are also important players when it comes to investment, locally or an international basis. States can be indirect owners of financial assets through SOEs which in turn take stakes in private companies.

Annex 1 contains a table on the size and structure of major SWFs. While the current focus of international attention relating to SWFs is on the Middle Eastern economies, it is notable that China, Russia, the US (Alaska), Canada (Alberta), Norway and Singapore all have SWFs. SWFs have been around since decades such as the Kuwait Investment Agency established in 1953, with 3 major waves coinciding with commodity price booms in the 1970s, 1980s and 2000s: Temasek (1974), Alaska (1976), ADIA (1976), Alberta (1976); with a new wave in current decade: QIA (2000), Kazakhstan (2000). Typically, natural resource and commodity exporters have chosen SWFs, while the Asian surplus countries have chosen international reserves as the form to hold international assets. There are however, exceptions. Singapore established the Government of Singapore Investment Corp. in 1981, while Russia created its oil stabilization fund in 2003, currently standing at US$ 32 billion. Russia has also accumulated the central bank international reserves of $430 billion since 2002.

3. Fundamentals Factors driving growth of SWFs

A number of factors have been driving the growth of and international activities of the SWFs since 2002:

- The recent surge in the size and growth of SWFs is largely attributable to high commodity prices resulting in large current account and balance of payments surpluses. Countries with surpluses have either accumulated international reserves held by central banks or channeled the surpluses into various types of SWFs. Large capital inflows can be disruptive of macroeconomic stability in the surplus countries leading to real exchange rate appreciation, price inflation, and asset price and credit booms. Attempts at sterilization with central banks issuing domestic debt through open market operations to reduce the domestic component of the monetary base can be costly and ineffective.
- The other side of the increase in the size of the SWFs and their accumulation of US$ denominated assets are the large and sustained current account deficits of the U.S. which have been averaging some 6% of GDP since 2002. Indeed the US is absorbing some 70% of all net savings by the

[5] See OECD Guidelines on the Corporate Governance of State Owned Enterprises, http://www.oecd.org/document/33/0,3343,en_2649_37439_34046561_1_1_1_37439,00.html

current account surpluses countries (China, Japan, Germany and the oil exporters)[6]. This has led to foreign investors holding over $14 trillion in US assets.

- The emerging market economies have become net capital exporters within the global financial system. The entry of the surplus countries into global financial markets has been facilitated by the increased integration and expansion of international financial markets.
- Surplus countries are seeking to increase the returns on their foreign assets from the low returns obtained on central bank managed international reserves which are largely held in low yielding but liquid, US government securities. As the accompanying table shows, the average real, inflation-adjusted, return on a typical central bank portfolio over the period 1946-2004 was 0.98% compared to 5.75% on a typical pension funds portfolio (which typically has a high proportion in bonds) and 7.11% on a US equities portfolio. By investing their foreign assets through SWF investment vehicles, countries can achieve higher real returns consistent with their

Annualised risk and return of investment portfolios

1946-2004

Stylised portfolio	Average real return in % p.a.	Annualised standard deviation of return in %	Probability of negative real return for 10Y holding period in %
Typical central-bank portfolio	0.98	1.24	37.0
Typical pension-funds portfolio	5.75	12.45	12.5
All-US-stocks portfolio	7.11	19.37	13.3

Source: Larry Summers, Central Bank Journal, 2007

- Commodity exporters need to invest their financial holdings into assets on an international basis whose expected return and risk characteristics provide diversification against commodity price volatility and revenue risks, i.e. assets whose returns show low or negative correlation with their natural resource exports. For the oil exporters such as the GCC countries international diversification of assets implies seeking investment opportunities in oil importing countries such as the US, Europe and Asian countries, allowing them to transform current "revenues" into sustainable source of income.
- The GCC countries are now "asset based" economies whose income from international investments is growing to be more significant than income from their energy exports. The role of the SWFs is to enable the GCC countries and other surplus countries to manage their international foreign investment position consistent with their strategic objectives. Specifically, SWFs allow countries to separate the management of their revenues from natural resources from their fiscal and monetary policies.

1. SWF Investment Style, Transparency & Disclosure

Much of the recent discussion and comment regarding SWFs is directed at their investment style and objectives, as well as the lack of information on their activities. Given their size, SWFs are perceived to possess the capacity to destabilize the global financial system through their "irrational" investments. Being government owned, SWFs are accused of having "political;" rather economic motives behind their

[6] See Ken Rogoff, "Foreign Holdings of U.S. Debt: Is Our Economy Vulnerable?", Testimony prepared for U.S. House of Representatives Committee on the Budget, June 26, 2007

investments.[7] However, no evidence has been advanced or adduced to justify the critique that SWFs have been or maybe destabilizing. On the other hand, it is clear that the willingness of surplus countries to accumulate international reserves has been a major contributor to benign global international financial conditions and a stabilizing factor for global imbalances.

As pointed out above, SWFs are typically set-up as intergenerational funds, with a buy and hold, long term investment strategy, with 'balanced portfolios' distributed among alternative asset classes including equity, bonds, real estate and other assets. SWFs are long term investors that typically "farm out" investment to professional external fund managers, with asset allocation and return benchmark objectives. As such, SWFs are similar in their investment style to pension and insurance funds.

By contrast, hedge funds and private equity are more leveraged, more volatile and speculative in nature. *SWFs are increasingly important participants in the international financial system and that {our} economies can benefit from openness to SWF. They are considered stabilizing factor for global imbalances*[8].

2. Policy Response and Recommendations

The capital exporting countries of Asia and the GCC are facing growing investment and financial protectionism, with increased political and some regulatory calls for intervention to limit or otherwise constrain the activities of SWFs and SOEs. The US has strengthened its Committee on Foreign Investments in the US (CFIUS), and passed the Foreign Investment and National Security Act of 2007 (FINSA). A number of European countries are considering reinforcing scrutiny of foreign investments or considering instruments and means of intervention. Recent attempts at acquisitions (e.g. P&O, Unocal) have met with political opposition. Such opposition is likely to grow and be fueled by the activities of China SWFs and SOEs.

Given the growing danger of protectionism, the surplus countries have to move on two fronts:

- A lobbying and communications campaign relating to the role and activities of SWFs and SOEs from the UAE and the region
- Pro-active participation in the design of voluntary code of conduct/guidelines to be adopted by SWFs and SOEs.

DIFC is well positioned to (a) coordinate a policy response or recommendations regarding SWFs given its strategic interest in maintaining the freedom of capital movements and unfettered access to global markets and to mitigate the risk of investment and financial protectionism; (b) has the Hawkamah Institute for Corporate Governance that can address governance related matters pertaining to SWFs and SOEs.

1. SWFs: the main recommendation is that SWFs adopt a voluntary code of conduct designed to cover the following four issues:

    - *Transparency & Disclosure*: One of the most vocal critiques regarding SWFs is that of transparency and disclosure. The practical approach to deal with the issue of SWFs transparency is to develop financial reporting based on international accounting and auditing principles and good practices. SWFs holders can create a benchmarking network of best practices regarding transparency. Norway can be an example as a starting point for other SWF holders to initiate a best practice analysis.

    - *Investment Strategy*: Any standard or policy recommendation regarding SWF should establish the presumption that the international investment activities by SWFs are based on clear long term objectives. SWFs have access to, and, frequently make use of, well-regarded private fund managers, consultants, administrators, and custodians. SWFs holders may want to

[7] See the Remarks by Acting Under Secretary for International Affairs Clay Lowery on Sovereign Wealth Funds and the International Financial System, June 2007;
[8] G7 Statement, Washington D.C., 2007

disclose their ownership once certain thresholds (e.g. 2%, 5%) have been reached. This would ensure transparency of the SWFs including to the general public in the home or host country.

- *Investment & Financial Protectionism*: It is DIFC's position that the global financial community must avoid supporting any potential regulatory measures on SWFs which permits investment and financial protectionism. A voluntary code/standard adopted by the SWFs would help obviate the call for investment and financial protectionism. SWFs should not be a scapegoat for those in the international financial community who want to create barriers to global capital markets and flows.

- *Governance:* It will be important to address the specific issue of the governance of SWFs. SWFs share a number of common characteristics with pension funds. There are a number of OECD standards that can be adapted for SWFs, including the OECD Guidelines on Pension Fund Asset Management, and the OECD Guidelines on Pension Fund Governance.

For SOEs it is recommended that Dubai and the UAE/GCC:

- Participate in a survey and overview of the corporate governance of SOEs with an analysis of their legal status, size and scale, organisation of the ownership function, relationships with non-state shareholders, the role of stakeholders in corporate governance, transparency and disclosure, board composition and functions, and executive appointment and remuneration policies.
- Develop and adopt Guidelines for the Corporate Governance of SOEs in line with international best practice.[9]
- Consider a privatization and divestment programme of SOEs with the aim of separating the ownership and management of the SOEs from public administration and government.

[9] See the OECD Guidelines for CG of SOEs that were adopted in April 2005. http://www.oecd.org/document/33/0,3343,en_2649_34847_34046561_1_1_1_1,00.html

Annex 1:
Size and Structure of Major Sovereign Wealth Funds (IMF, GFS Report, October 2007)

Country	Fund Name	Assets	Source of Funds	Ownership and Investment Management	Investment Strategy and Strategic Asset Allocation (SAA)
United Arab Emirates	Abu Dhabi Investment Authority (ADIA)/ Abu Dhabi Investment Council (ADIC)	\$250 billion to \$875 billion[1]	Oil	Owned by the emirate of Abu Dhabi, ADIA has been the primary conduit for investing oil surpluses in overseas assets since 1976. Recently a separate legal entity, the ADIC, was established to encourage competition with the ADIA. Abu Dhabi's surpluses will now be allocated to both the ADIA and ADIC.	Major global investor. Investment strategy and asset allocation is unknown.
Norway	Government Pension Fund—Global	\$308 billion (as of March 31, 2007)	Oil	Owned by the government and managed by Norges Bank Investment Management.	Global asset allocation with 40 percent in equities and 60 percent in global fixed income.
Saudi Arabia	No designated name	\$250+ billion[2]	Oil	Saudi Arabia Monetary Agency manages the foreign assets: \$225 billion is held on its own balance sheet, a portion of which is designated as reserves, and \$51 billion is managed on behalf of various government agencies.	Major global investor. Although the size of assets is known, the investment strategy and SAA is not known beyond broad indications.
Kuwait	Kuwait Investment Authority (KIA) General Reserve Fund (GRF) and Future Generations Fund (FGF)	\$160 billion to \$250 billion[1]	Oil	The KIA is an autonomous government body responsible for the management of the GRF and FGF, as well as any other funds entrusted to it on behalf of the government of Kuwait.	The GRF is invested in the local, Arab, and international financial markets. The FGF has a global asset allocation based on investment guidelines approved by the FGF board.
Singapore	Government Investment Corporation (GIC)	\$100+ billion	Other	Separate investment corporation established in 1981, fully owned by the government.	Global asset allocation (not made public). Invests in all major asset classes.
	Temasek Holdings	\$100+ billion	Other	Temasek Holdings is a private company, set up in 1974 to hold and manage investment previously held by the principal shareholder, the Ministry of Finance.	SAA weights unknown. Geographical distribution as of March 2006 was 38 percent Singapore assets, 40 percent in rest of Asia, 20 percent in the Organization for Economic Cooperation and Development, and 2 percent in "other" countries.
China	State Foreign Exchange Investment Corporation[3]	\$200 billion	Other	To be determined.	To be determined.
Russia	Oil Stabilization Fund[4]	\$127 billion (as of August 1, 2007)	Oil	Owned by the government and managed by the Russian Central Bank.	Invests largely in fixed-income assets, with 44 percent in U.S. dollars, 46 percent in euros, and 10 percent in pound sterling.

Size and Structure of Major Sovereign Wealth Funds (continued)

Australia	Australian Future Fund	$42 billion (as of May 1, 2007)	Other	Established in 2006. Owned by the government and managed by the Future Fund Management Agency. The aim is to underwrite the government's future superannuation liabilities.	Australia
United States (Alaska)	Alaska Permanent Reserve Fund	$35 billion (as of June 30, 2007)	Oil and minerals	Owned by the state of Alaska, established in 1976, and managed by the state-owned Alaska Permanent Fund Corporation.	SAA consists of 53 percent equities, 29 percent fixed income, 10 percent real estate, and 8 percent alternative assets.
Brunei	Brunei Investment Authority General Reserve Fund[1]	$30 billion	Oil	Owned by the government and managed by the Brunei Investment Agency.	Invests in a large global portfolio of financial and real assets. SAA not made public.
Korea	Korea Investment Corporation	$20 billion	Other	Launched in 2005 to manage $20 billion of entrusted foreign exchange reserves, of which $17 billion is from Bank of Korea and $3 billion from the government.	Plans to invest in a global asset allocation. SAA not yet available.
Canada	Alberta Heritage Savings Trust Fund	$15 billion (as of March 31, 2007)	Oil	Owned by the government of the Province of Alberta, managed by Alberta Finance.	Invests in a global SAA with 30 percent fixed income, 45 percent equities, 10 percent real estate, and 15 percent alternative assets.
Chile	Economic and Social Stabilization Fund	$9.83 billion (as of July 31, 2007)	Copper	Established in 2006. Owned by the government and managed by the Central Bank of Chile as a fiscal agent.	SAA consists of 72 percent government bonds and 28 percent money market instruments in U.S. dollars, euros, and yen.
	Pension Reserve Fund	$1.37 billion (as of July 31, 2007)	Copper	Established in 2006. Owned by the government and managed by the Central Bank of Chile as a fiscal agent.	SAA consists of 79 percent government bonds and 21 percent money market instruments in U.S. dollars, euros, and yen.
Botswana	Pula Fund[2]	$5+ billion	Diamonds	Owned jointly by the government and the Bank of Botswana. The government's share of the Pula Fund is accounted for on the balance sheet of the Bank of Botswana.	The fund invests in public equity and fixed-income instruments in industrialized economies. The fund does not invest in emerging markets, as they may be highly dependent on commodities.

Sources: Public information from websites; IMF; and Morgan Stanley Research.

Note: Other countries with known sovereign wealth funds include Azerbaijan, Kingdom of Bahrain, Chad, Ecuador, Equatorial Guinea, Gabon, Islamic Republic of Iran, Ireland, Kazakhstan, Kiribati, Libya, Malaysia, Mauritania, Mexico, Oman, Qatar, Sudan, Taiwan Province of China, Timor-Leste, Trinidad and Tobago, Uganda, and Venezuela.

[1]Estimates by Morgan Stanley Research and PIMCO.

[2]In some countries, such as Saudi Arabia and Botswana, there is no formal sovereign wealth fund but the monetary agency manages foreign assets on behalf of various government agencies.

[3]Announced on March 9, 2007, the fund may be established at the end of 2007.

[4]Starting in February 2008, the Oil Stabilization Fund will be divided into two separate funds with distinct policy objectives (Stabilization Fund versus National Welfare Fund).

E. Truman: Summary Scoreboard for Sovereign Wealth Funds (E. Truman, 2007)

		Structure	Governance	Transparency & Accountability	Behavior	Total
New Zealand	Superannuation Fund	8.00	4.00	12.00	0.00	24.00
Norway	Government Pension Fund – Global	7.50	4.00	10.50	1.00	23.00
Timor-Leste	Petroleum Fund	8.00	2.00	11.75	0.00	21.75
Canada	Alberta Heritage Savings Trust Fund	7.50	3.00	9.00	0.00	19.50
United States	Alaska Permanent Fund	7.50	2.00	8.50	0.00	18.00
Australia	Future Fund	8.00	2.00	7.00	0.00	17.00
Azerbaijan	State Oil Fund of the Republic of Azerbaijan	5.00	2.00	9.50	0.00	16.50
Chile	Economic and Social Stabilization Fund	7.00	2.00	6.50	0.00	15.50
Botswana	Pula Fund	5.50	2.00	7.00	0.00	14.50
Kazakhstan	National Oil Fund	6.00	2.00	6.50	0.00	14.50
Singapore	Temasek Holdings	4.00	1.50	8.00	0.00	13.50
São Tomé and Príncipe	National Oil Account	8.00	2.00	2.25	0.00	12.25
Trinidad and Tobago	Heritage and Stabilization Fund	6.50	2.00	3.75	0.00	12.25
Kuwait	Kuwait Investment Authority	6.00	3.00	3.00	0.00	12.00
Malaysia	Khazanah Nasional	4.00	1.50	4.00	0.00	9.50
Russia	Stabilization Fund of the Russian Federation	4.00	2.00	3.50	0.00	9.50
Korea	Korea Investment Corporation	6.00	2.00	1.00	0.00	9.00
Kiribati	Revenue Equalization Reserve Fund	5.00	2.00	0.50	0.00	7.50
Mexico	Oil Income Stabilization Fund	5.00	0.00	2.00	0.00	7.00
China	Central Huijin Investment Company	5.50	0.00	0.50	0.00	6.00
Venezuela	National Development Fund	1.50	0.50	4.00	0.00	6.00
Iran	Oil Stabilization Fund	4.00	1.00	0.50	0.00	5.50
Venezuela	Macroeconomic Stabilization Fund	3.00	0.50	2.00	0.00	5.50
Oman	State General Reserve Fund	3.00	0.00	2.00	0.00	5.00
Sudan	Oil Revenue Stabilization Account	4.00	0.00	1.00	0.00	5.00
Algeria	Revenue Regulation Fund	3.00	1.00	0.50	0.00	4.50
United Arab Emirates	Istithmar	3.00	0.50	0.25	0.00	3.75
United Arab Emirates	Mubadala Development Company	3.00	0.50	0.00	0.00	3.50
Brunei	Brunei Investment Agency	1.00	0.50	1.00	0.00	2.50
Singapore	Government of Singapore Investment Corporation	1.50	0.00	0.75	0.00	2.25
Qatar	Qatar Investment Authority	2.00	0.00	0.00	0.00	2.00
United Arab Emirates	Abu Dhabi Investment Authority and Corporation	0.50	0.00	0.00	0.00	0.50
Total Possible Points		8.00	4.00	12.00	1.00	25.00
Average Number of Points		4.80	1.42	4.02	0.03	10.27
United States	California Public Employees' Retirement System	8.00	3.00	10.25	0.50	21.75

Source: E. Truman, "A Scoreboard for Sovereign Wealth Funds", Peterson Institute, October, 2007; http://www.iie.com/publications/papers/truman1007swf.pdf