An Analysis of Sovereign Wealth Funds and International Real Estate Investments

By

Pulkit Sharma
B.E., Civil Engineering, 2006
Delhi College of Engineering, University of Delhi

And

Yoohoon Jeon
B.S., Business Administration, 1992
Yonsei University

Submitted to the Program in Real Estate Development in Conjunction with the Center for Real Estate in Partial Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development

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Signature of Authors_________________________________________________________

Center for Real Estate

July 23, 2010

Certified by_______________________________________________________________

William C. Wheaton
Professor of Economics
Thesis Supervisor

Accepted by______________________________________________________________

David M. Geltner
Chairman, Interdepartmental Degree Program in Real Estate Development
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ABSTRACT

In recent times Sovereign Wealth Funds (SWFs) have become an important source of international real estate investments. A number of reports predict the swelling of SWF combined assets from its current figure of $3-4 trillion to $8-12 trillion by 2015. It is also expected that a continuous growth in fiscal surpluses and accumulation of wealth by SWF nations may soon make the combined size of SWFs bigger than other capital market segments such as mutual funds and pension funds. This phenomenal projected growth in SWF assets has created an indispensable need to create and manage a diversified and robust international mixed-asset portfolio. This thesis investigates the relevance of real estate in the SWF portfolio from an execution strategy and portfolio hedging perspective.

The real estate strategy section introduces SWFs and their real estate investment behavior and trends. The authors collected execution strategy data by conducting open-ended interviews with real estate leaders of four major SWFs that invest in real estate and nine senior executives representing global real estate investment management and consulting firms. The interview responses are used to understand several topics ranging from the investment objectives and risk spectrum to future trends in SWF real estate investments. The thesis findings reveal the synergies and differences in the views of the two communities and also describe the execution preferences of SWF investors from the purview of their international real estate portfolio.

The portfolio-hedging section uses a macro-economic time series model based on long-term asset returns to determine the best hedges for four SWFs (Oil-based, China, Singapore and Korea) in three foreign destinations namely the UK, the US and Japan considering real estate and stocks as the two asset classes. The vector auto-regression (VAR) model presents an extended time series analysis that tests correlations, Granger causality and impulse responses between different home asset and foreign destination pairs. The thesis further illustrates through a simple stylized sub-portfolio analysis the optimal asset allocation between stocks, long-term bonds and real estate for the above combinations. The results show evidence that foreign real estate is an effective hedge against the changes in the home source of wealth for most SWFs. The time series hedging model is fed by long-term asset return data and can be replicated for other SWFs to determine their unique investment strategy. Further, the findings challenge the low allocations given by SWFs to real estate in their global portfolio.

Thesis Advisor: William C. Wheaton
Title: Professor of Economics
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- Pulkit Sharma

This thesis is dedicated to my parents, my wife, daughter and son, whose unwavering support and sacrifices throughout the year has made this an experience to cherish forever.

- Yoohoon Jeon
TABLE OF CONTENTS

Chapter 1 Introduction ......................................................................................................... 11
  1.1 Introduction ............................................................................................................... 11
  1.2 Research Outline ....................................................................................................... 12
  1.3 Thesis flow ................................................................................................................ 14
Chapter 2 Sovereign Wealth Funds (SWFs): Definition and Asset Distribution ............ 15
  2.1 Definition .................................................................................................................. 15
  2.2 SWF Categorization .................................................................................................. 16
  2.3 Growth of SWF Assets and Source of Wealth ........................................................ 21
  2.4 Transparency ............................................................................................................. 23
Chapter 3 SWFs and International Real Estate Investments ............................................ 25
  3.1 International Real Estate ........................................................................................... 25
  3.2 SWFs and Real Estate Investments ........................................................................... 26
  3.3 Examples of Investment Strategies ........................................................................... 27
  3.4 SWF Real Estate Market Size: Future Scenario ........................................................ 29
Chapter 4 Real Estate Investment Strategies I (SWF Perspective) ................................. 31
  4.1 Objective ................................................................................................................... 31
  4.2 Interviewee Profile and Selection ............................................................................. 31
  4.3 Research Methodology .............................................................................................. 31
  4.4 Questionnaire ............................................................................................................ 33
  4.5 Interviewee Responses .............................................................................................. 34
  4.6 Conclusions ............................................................................................................... 43
Chapter 5 Real Estate Investment Strategies II (Investment Manager’s Perspective) ....... 45
  5.1 Objective ................................................................................................................... 45
  5.2 Interviewee Profile and Selection ............................................................................. 45
  5.3 Research Methodology .............................................................................................. 47
  5.4 Questionnaire ............................................................................................................ 48
  5.5 Interviewee Responses .............................................................................................. 49
  5.6 Conclusions ............................................................................................................... 61
Chapter 6 Time Series Analysis: Hedging Ability of Real Estate and Stocks ................. 63
  6.1 Introduction ............................................................................................................... 63
  6.2 Literature Review ...................................................................................................... 63
  6.3 Data Description ....................................................................................................... 65
  6.4 Description of Time Series Analysis ....................................................................... 68
6.4.1 Unit Root Tests ........................................................................................................ 68
6.4.2 Correlation Analysis ............................................................................................... 71
6.4.3 Granger Causality ................................................................................................. 72
6.4.4 Vector Auto-regression (VAR) and Impulse Response Tests ......................... 75
6.5 Conclusions and Discussion of Results ................................................................. 79

Chapter 7 Sub-Portfolio Analysis ............................................................................... 83
7.1 Introduction .............................................................................................................. 83
7.2 Literature Review ................................................................................................. 84
7.3 Sub-Portfolios ....................................................................................................... 84
7.4 Methodology .......................................................................................................... 85
7.5 Data Description .................................................................................................... 86
7.6 Efficient Frontiers and Market Portfolios ......................................................... 87
7.7 Conclusions and Discussion of Results ............................................................... 89
7.8 Overall Trends ...................................................................................................... 91

Chapter 8 Final Comments ....................................................................................... 95

Bibliography ..................................................................................................................... 98

Appendix Chapter 2 ..................................................................................................... 103
Appendix Chapter 5 ..................................................................................................... 104
Appendix Chapter 6 ..................................................................................................... 106
Appendix Chapter 7 ..................................................................................................... 120
Appendix Chapter 8 ..................................................................................................... 128
TABLE OF EXHIBITS

Exhibit 1-1 Segments of Global Capital Markets ................................................................. 12
Exhibit 1-2 Thesis Framework .............................................................................................. 13
Exhibit 2-1 Top 20 SWFs by Value ..................................................................................... 16
Exhibit 2-2 SWF Classification .......................................................................................... 17
Exhibit 2-3 Assets Under Management (AuM) by Source Type .......................................... 18
Exhibit 2-4 Assets Under Management by Continent ........................................................ 18
Exhibit 2-5 SWF Distribution by Size ................................................................................ 19
Exhibit 2-6 Major SWF Home Nations ............................................................................. 19
Exhibit 2-7 SWF Transaction Leaders ............................................................................. 20
Exhibit 2-8 Growth in Global Sovereign Wealth (2007-2010) .......................................... 21
Exhibit 2-9 Growth of SWF Sources Over Time ............................................................... 22
Exhibit 2-10 SWF Size Forecast ....................................................................................... 22
Exhibit 2-11 Truman Scores for Different Sovereign Fund Groupings ............................... 23
Exhibit 3-1 Continental vs. Global Real Estate Investments ............................................. 25
Exhibit 3-2 Global Cross-Border Sources of Capital by Region ......................................... 25
Exhibit 3-3 Major SWF Real Estate Transactions .............................................................. 27
Exhibit 3-4 SWFs Real Estate Market Size Forecast- Approach 1 .................................... 29
Exhibit 3-5 SWFs Real Estate Market Size Forecast- Approach 2 .................................... 30
Exhibit 4-1 Interviewee Profile (SWFs) .......................................................................... 32
Exhibit 4-2 Reasons for Investing in Real Estate ............................................................... 34
Exhibit 4-3 Criterion Used by SWFs for Selecting Partners ............................................. 38
Exhibit 4-4 Liquidity and SWFs ....................................................................................... 41
Exhibit 5-1 List of Participating Real Estate Investment Management Institutions ............ 46
Exhibit 5-2 Interviewee Details ....................................................................................... 47
Exhibit 5-3 Recent Trends in SWFs Risk Spectrum ......................................................... 52
Exhibit 5-4 Future Trends in SWF Real Estate Investments ............................................. 56
Exhibit 6-1 Data Sources Summary .................................................................................. 65
Exhibit 6-2 Historic Crude Oil Prices ............................................................................. 66
Exhibit 6-3 Extended CPPI ............................................................................................. 68
Exhibit 6-4 Unit Root Test Result Summary .................................................................... 70
Exhibit 6-5 Correlation Analysis Summary ..................................................................... 71
Exhibit 6-6 Correlation Graph between Oil Return and UK Real Estate Return .................. 72
Exhibit 6-7 Granger Causality Summary for Oil Return and UK Real Estate Return ......... 73
Exhibit 6-8 Granger Causality Tests Results .................................................................... 74
Exhibit 6-9 Vector Auto-regression Test Result for Oil and UK Real Estate ...................... 76
Exhibit 6-10 Impulse Response Test between Oil and UK Real Estate .............................. 78
Exhibit 7-1 Additional Sources of Data .......................................................................... 86
Exhibit 7-2 TBI vs. NCREIF in the US Market .................................................................. 87
Exhibit 7-3 Efficient Frontier and Market Portfolios ......................................................... 88
Exhibit 7-4 Area Chart for Different Values of Expected Return (Y-axis) ......................... 88
Exhibit 7-5 Sub-Portfolio Result Summary (Empirical) .................................................... 93
Exhibit 7-6 Portfolio Analysis Detailed Results ............................................................... 94
Chapter 1 Introduction

1.1 Introduction

Sovereign Wealth Funds (SWFs) are state-owned investment funds composed of financial assets such as stocks, bonds, real estate, precious metals or other financial instruments. They invest globally, have very limited liabilities and are managed separately from official reserves. The history of SWFs dates to at least 1953 when the Kuwait Investment Board was set up with the aim of investing surplus oil revenues to reduce the reliance of Kuwait on its finite oil resources.¹

The SWF universe can be divided into two broad categories:

Commodity-based SWFs: These funds have generated wealth due to non-renewable natural commodities such as oil, precious metals etc. Abu Dhabi (oil), Qatar (oil and gas), Kuwait (oil), Chile (metals) and Saudi Arabia (oil) are some examples.

Non-Commodity-based SWFs: These funds are comprised of countries with excess trade surpluses such as Singapore, China and South Korea. Most of these countries use the SWFs as conduits to manage the excess funds accumulated by their respective central banks.

In recent times SWFs have become an important source of international real estate investments. The purchase of the Chrysler Building and a stake in MGM Mirage in 2008 in the US, the purchase of Harrod’s and a stake in Songbird Real Estate (Canary Wharf) in 2010 in the UK, the purchase of Raffles Hotel in Singapore (2010) and a stake in Prologis (2008) in Japan and China are some well known examples of SWF investments in real estate. A wide spectrum of SWFs are increasingly investing in all forms of real estate, be it the direct buyouts or investments in separate accounts or debt financing to gain real estate exposure in their international portfolios. It is clear that this is the beginning of a continuing trend. Various analyst reports most notably by Morgan Stanley² have predicted the swelling of

SWFs combined assets under management from its current figure of $3-4 trillion to $10-12 trillion by 2015.

As shown by Exhibit 1-1, although SWFs still represent a relatively small fraction of the overall capital markets, ‘Sustained accumulation of foreign assets could transform several SWFs into important market players as their financial assets under management could soon exceed those of the largest private asset managers and pension funds.’

Exhibit 1-1 Segments of Global Capital Markets

<table>
<thead>
<tr>
<th>Segment</th>
<th>Assets Under Management ($ trillion, end 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension Funds</td>
<td>29.5</td>
</tr>
<tr>
<td>Mutual Funds</td>
<td>23</td>
</tr>
<tr>
<td>Insurance Funds</td>
<td>20</td>
</tr>
<tr>
<td>Sovereign Wealth Funds</td>
<td>3.8</td>
</tr>
<tr>
<td>Private Equity</td>
<td>2.6</td>
</tr>
<tr>
<td>Hedge Funds</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Source: IFSL Estimates. (Re-produced)

This growth will make them increasingly exposed to capital market risks; it is in this realm that alternative investments such as real estate assume increasing significance for SWFs.

1.2 Research Outline

This thesis delves deeply into real estate execution strategy and portfolio hedging issues concerning international real estate investments of SWFs. The authors tackle the topic from two distinct research paths.

The first path looks at how SWFs execute the set asset allocation for real estate. The authors pose a set of similar open-ended investment strategy questions to real estate leaders of SWFs as well as senior executives of the real estate investment management and advisory community. The authors report their cumulative responses and highlight the investment
strategies and future trends in international real estate investments of SWFs. Following are some of the issues addressed in this section.

- What will be the near-term trends in Sovereign Wealth Fund investments in real estate both within the US and globally?
- What are the investment goals and return objectives of SWF real estate investments?
- What is the product-wise allocation strategy and product preference in the SWF real estate portfolio?

Exhibit 1-2 Thesis Framework

The second path looks at the transfer of wealth from home assets to foreign assets (the basic premise for the existence of SWFs) and attempts to model the significance of real estate in the foreign asset portfolio of both commodity and non-commodity-based SWFs. The
objective is to determine the efficacy of the diversification and hedging potential offered by real estate in comparison to equities. The authors use quantitative time-series analysis and test correlations, causality and impulse/shock responses between home and foreign asset pairs. As an additional analysis the authors construct and analyze twenty-four pair-wise sub-portfolios for home countries (SWFs) using long term asset return data (stocks, long-term government bonds and real estate) for three for foreign destinations namely the US, the UK and Japan.

1.3 Thesis flow

Chapter 2 looks at the finer aspects of SWFs and their growth patterns. Chapter 3 delves into the recent trends in SWF real estate investments. Chapter 4 discusses the real estate investment strategies and interview responses of SWFs and chapter 5 describes a similar discussion on strategies and future trends from the purview of investment managers.

Chapter 6 transitions into a detailed time series analysis and determines the significance of real estate in the SWF portfolio. Chapter 7 illustrates a pair-wise sub-portfolio analysis under a set of constraints and assumptions.

Chapter 8 summarizes the significance of the qualitative and quantitative strategic analysis in light of the research findings.
Chapter 2 Sovereign Wealth Funds (SWFs): Definition and Asset Distribution

2.1 Definition

The authors quote the definition\(^3\) of SWFs adapted by the International Working Group\(^4\) on Sovereign Wealth Funds:

“SWFs are defined as special purpose investment funds or arrangements, owned by the general government. Created by the general government for macroeconomic purposes, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets. The SWFs are commonly established out of balance of payment surpluses, official foreign currency operations, the proceeds of privatizations, fiscal surpluses, and/or receipts resulting from commodity exports. This definition excludes, \textit{inter alia}, foreign currency reserve assets held by monetary authorities for the traditional balance of payments or monetary policy purposes, operations of state-owned enterprises in the traditional sense, government-employee pension funds, or assets managed for the benefit of individuals.

Three key elements define a SWF:

\textbf{Ownership}: SWFs are \textit{owned} by the \textit{general government}, which includes both central government and sub-national governments.

\textbf{Investments}: The investment strategies include investments in \textit{foreign financial assets}, so it excludes those funds that solely invest in domestic assets.\(^5\)

\textbf{Purposes and Objectives}: Established by the general government for macroeconomic purposes, SWFs are created to invest government funds to achieve \textit{financial objectives}, and (may) have liabilities that are only broadly defined, thus allowing SWFs to employ a wide range of investment strategies with a medium to long-term times frame. SWFs are created to


\(^4\) The International Working Group of Sovereign Wealth Funds (IWG) was established at a meeting of countries with SWFs on April 30–May 1, 2008, in Washington, D.C. The IWG comprises 26 IMF member countries with SWFs. The IWG met on three occasions in Washington, D.C., Singapore, and Santiago (Chile)—to identify and draft a set of generally accepted principles and practices (GAPP) that properly reflects their investment practices and objectives, and agreed on the Santiago Principles at its third meeting. Source: GAPP page 1.

\(^5\) Some SWFs like Khazanah (Malaysia) and Temasek (Singapore) hold substantial domestic assets.
serve a different objective than, for example, reserve portfolios held only for traditional balance of payments purposes. While SWFs may include reserve assets, the intention is not to regard all reserve assets as SWFs." Exhibit 2-1 lists the top 20 SWFs by total assets under management.

Exhibit 2-1 Top 20 SWFs by Value

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Name of the SWF Fund</th>
<th>Value in Billions</th>
<th>Year of Inception</th>
<th>Type</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UAE – Abu Dhabi</td>
<td>Abu Dhabi Investment Authority</td>
<td>627</td>
<td>1976</td>
<td>Oil</td>
<td>Middle East</td>
</tr>
<tr>
<td>2</td>
<td>Norway</td>
<td>Government Pension Fund – Global</td>
<td>443</td>
<td>1990</td>
<td>Oil</td>
<td>Europe</td>
</tr>
<tr>
<td>3</td>
<td>Saudi Arabia</td>
<td>SAMA Foreign Holdings</td>
<td>415</td>
<td>n/a</td>
<td>Oil</td>
<td>Middle East</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>SAFE Investment Company</td>
<td>347</td>
<td>1997</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>5</td>
<td>China</td>
<td>China Investment Corporation</td>
<td>289</td>
<td>2007</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>6</td>
<td>Singapore</td>
<td>GIC Singapore</td>
<td>248</td>
<td>1981</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>7</td>
<td>China – Hong Kong</td>
<td>Hong Kong Monetary Authority</td>
<td>228</td>
<td>1993</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>8</td>
<td>Kuwait</td>
<td>Kuwait Investment Authority</td>
<td>203</td>
<td>1953</td>
<td>Oil</td>
<td>Middle East</td>
</tr>
<tr>
<td>9</td>
<td>China</td>
<td>National Social Security Fund</td>
<td>147</td>
<td>2000</td>
<td>Non-commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>10</td>
<td>Russia</td>
<td>National Welfare Fund</td>
<td>143</td>
<td>2008</td>
<td>Oil</td>
<td>Asia</td>
</tr>
<tr>
<td>11</td>
<td>Singapore</td>
<td>Temasek Holdings</td>
<td>133</td>
<td>1974</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>12</td>
<td>Libya</td>
<td>Libyan Investment Authority</td>
<td>70</td>
<td>2006</td>
<td>Oil</td>
<td>Africa</td>
</tr>
<tr>
<td>13</td>
<td>Qatar</td>
<td>Qatar Investment Authority</td>
<td>65</td>
<td>2005</td>
<td>Oil</td>
<td>Middle East</td>
</tr>
<tr>
<td>14</td>
<td>Australia</td>
<td>Australian Future Fund</td>
<td>59</td>
<td>2004</td>
<td>Non-Commodity</td>
<td>Australasia</td>
</tr>
<tr>
<td>15</td>
<td>Algeria</td>
<td>Revenue Regulation Fund</td>
<td>55</td>
<td>2000</td>
<td>Oil</td>
<td>Africa</td>
</tr>
<tr>
<td>16</td>
<td>Kazakhstan</td>
<td>Kazakhstan National Fund</td>
<td>38</td>
<td>2000</td>
<td>Oil</td>
<td>Asia</td>
</tr>
<tr>
<td>17</td>
<td>US – Alaska</td>
<td>Alaska Permanent Fund</td>
<td>36</td>
<td>1976</td>
<td>Oil</td>
<td>North America</td>
</tr>
<tr>
<td>18</td>
<td>Ireland</td>
<td>National Pensions Reserve Fund</td>
<td>33</td>
<td>2001</td>
<td>Non-Commodity</td>
<td>Europe</td>
</tr>
<tr>
<td>19</td>
<td>South Korea</td>
<td>Korea Investment Corporation</td>
<td>30</td>
<td>2005</td>
<td>Non-Commodity</td>
<td>Asia</td>
</tr>
<tr>
<td>20</td>
<td>Brunei</td>
<td>Brunei Investment Agency</td>
<td>30</td>
<td>1983</td>
<td>Oil</td>
<td>Asia</td>
</tr>
</tbody>
</table>

Source: SWF Institute-June 2010 (‘Region’ inserted by the authors).

See Appendix Chapter 2 for the complete table.

2.2 SWF Categorization

By Purpose

“The classification of SWFs, based on their purpose, can usually be broken down into four types:

- **Revenue stabilization funds** are designed to cushion the impact of volatile commodity revenues on the government’s fiscal balance and the overall economy.
- **Future generation (savings) funds** are meant to invest revenues or wealth over longer time periods for future needs. The sources of these funds are typically commodity based or fiscal. In some cases, these funds are earmarked for particular purposes, such as covering future public pension liabilities.
- **Holding funds** manage their governments’ direct investments in companies. These may be domestic state-owned enterprises and private companies as well as private companies abroad. Holding funds typically support the government’s overall development strategy.

- **Generic SWFs** often cover one or several of the previous three purposes, but their size tends to be so large that the main objective becomes optimizing the overall risk-return profile of the existing wealth. These funds often manage part of the ‘excess’ foreign reserves.”

Exhibit 2-2 SWF Classification

<table>
<thead>
<tr>
<th>Purposes/sources</th>
<th>Commodity revenues</th>
<th>Fiscal sources</th>
<th>Foreign reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue stabilization</td>
<td>Russia: Reserve Fund</td>
<td>Australia: Future Fund</td>
<td>China: Bank holdings</td>
</tr>
<tr>
<td></td>
<td>Kuwait: Reserve Fund</td>
<td>Now Zealand: Super Fund</td>
<td>managed by CIC</td>
</tr>
<tr>
<td></td>
<td>Mexico: Oil Stabilization Fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future generations /</td>
<td>Russia: National Prosperity Fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>public pensions</td>
<td>Kuwait: Future Generation Fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Norway: Government Pension Fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of government</td>
<td>Mubadala</td>
<td>Singapore: Temasek</td>
<td>Singapore: Foreign reserves</td>
</tr>
<tr>
<td>holdings</td>
<td>Saudi Arabia: Public Investment Fund</td>
<td>Malaysia: Khazanah</td>
<td>managed by GIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vietnam: State Capital Investment Corporation</td>
<td>Korea: Foreign reserves</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>managed by KIC</td>
</tr>
<tr>
<td>Wealth or risk/return</td>
<td>Abu Dhabi Investment Authority (ADIA)</td>
<td>Singapore: Government Investment Corporation</td>
<td>China: Foreign reserves</td>
</tr>
<tr>
<td>optimization</td>
<td>Brunei Investment Authority (BIA)</td>
<td>(GIC)</td>
<td>managed by CIC</td>
</tr>
<tr>
<td></td>
<td>Qatar Investment Authority (QIA)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: JPMorgan

By Wealth Source

Exhibit 2-3 shows the SWF distribution by wealth source. It is evident that in terms of commodities, oil dominates as the sources of wealth of SWFs. Oil-based funds have a bigger total value of assets under management than the non-commodity funds. The authors thus use oil as a proxy wealth source for commodity-based SWFs in further analysis.

---

Exhibit 2-3 Assets Under Management (AuM) by Source Type

![Pie chart showing oil, other commodity, and non-commodity assets]

Source: Derived from SWF Institute data, June 2010.

**By Continent**

Exhibit 2-4 illustrates that the bulk of sovereign wealth originates from Asia (44%). Middle East and Asia together account for 79% of the total global sovereign wealth assets.

Exhibit 2-4 Assets Under Management by Continent

![Pie chart showing continent-wise distribution of assets]

Source: Derived from SWF Institute data, June 2010.
By Size

Exhibit 2-5 illustrates the SWF distribution by size. Based on the SWF institute data, the authors found that just 4% of the SWFs (size above $250 billion) hold around 67% of the global sovereign wealth. Furthermore, the top 10 SWFs by size hold 79% of the total SWF assets. It is interesting to see Exhibit 2-6 that shows the top 5 countries with SWF assets. China and the United Arab Emirates are clear leaders in terms of the size of the assets under management in their respective SWFs.

Exhibit 2-5 SWF Distribution by Size

Exhibit 2-6 Major SWF Home Nations

<table>
<thead>
<tr>
<th>Top 5 Sources</th>
<th>Value ($B)</th>
<th>% age of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1015</td>
<td>26.1%</td>
</tr>
<tr>
<td>UAE</td>
<td>675</td>
<td>17.4%</td>
</tr>
<tr>
<td>Norway</td>
<td>443</td>
<td>11.4%</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>420</td>
<td>10.8%</td>
</tr>
<tr>
<td>Singapore</td>
<td>370</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

Source: Derived from SWF Institute data, June 2010.

---

7 Total SWF assets under management that originate from a single country.
By Age

Another way to understand the phenomenal growth of SWFs is their categorization by age. The SWF Institute data shows that 15% of the total SWF assets under management (15 new fund with a total present size of $578 billion) are now held by funds that came into existence in the last 5 years (major ones being Russia, Libya and the China Investment Corporation).

By Transactions

A 2009 study done by the Monitor group using a database comprising 1,158 deals with a reported value of $369.2 billion between 1st January 1981 and 31st December 2008 shows that the leading SWFs in number of transactions are Temasek (comprising 43 percent of the database), GIC (16 percent), and Khazanah (9 percent). China CIC has the largest publicly-reported expenditure of $82 billion, but has carried out only 14 deals. Following CIC, GIC has a reported value of $73 billion and Temasek has $56 billion. Among the MENA-based funds, Istithmar, Mubadala, and QIA are the leading investors by number and value. Exhibit 2-7 reports the findings of that study.

Exhibit 2-7 SWF Transaction Leaders

---

9 Monitor-FEEM SWF Transaction Database. Asia-Pacific-based funds comprise the majority of this data by number (70 percent) and value (62 percent).
2.3 Growth of SWF Assets and Source of Wealth

Exhibit 2-8 shows that the sharp rise in Sovereign Wealth from September 2007 to July 2008 was followed by a drop in the first quarter of 2009. This trend is in-line with the performance of the global financial markets during this period of recession.

Exhibit 2-9 shows the growth in the sources of sovereign wealth over time. It is evident that both the oil-based SWFs as well as the export based funds based in developing Asia have been growing rapidly in recent times and consequently fueling the growth of their respective assets under management.

Exhibit 2-8 Growth in Global Sovereign Wealth (2007-2010)

Source: Derived from SWF Institute Data, September 2007 to June 2010.
Various analyst reports have put different numbers on the future total market size of SWFs (Current size is 3.8 trillion\(^{11}\)). The authors summarize the analyst forecasts in Exhibit 2-10.

### Exhibit 2-10 SWF Size Forecast

<table>
<thead>
<tr>
<th>SWF Size Forecast</th>
<th>By Year</th>
<th>Trillion $’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP Morgan Report(^{12})</td>
<td>2012</td>
<td>5-9.3</td>
</tr>
<tr>
<td>Morgan Stanley(^{13})</td>
<td>2015</td>
<td>12</td>
</tr>
<tr>
<td>Standard Chartered(^{14})</td>
<td>2017</td>
<td>13.4</td>
</tr>
<tr>
<td>IMF Survey(^{15})</td>
<td>2013</td>
<td>6-10</td>
</tr>
</tbody>
</table>

\(^{11}\) SWF Institute data, June 2010.
2.4 Transparency

The main objection to SWF investments that is often raised by experts and politicians in the United States and Europe is the lack of disclosure of many of the SWFs regarding their objectives and their investment strategies\textsuperscript{16} (Banque de France 2008).

As a major step to address these concerns of the international community, representatives of 26 SWFs reached an agreement on a set of Generally Accepted Principles and Practices (Santiago Principles) that aim to create voluntary best practices on governance, risk management and policy. As the most noticeable example of the move towards greater transparency the Abu Dhabi Investment Authority (ADIA), which had never publicly declared the value of its assets under management, published its annual report in March 2010.

A recent paper on GCC SWFs (El-Kharouf, Al Qudsi and Obeid 2010) concluded that SWFs should open up a bit more and reveal their investment profiles showing both gains and losses. In chapters 4 and 5 the authors present the responses of SWFs and investment managers on the relevance of transparency as a policy objective from the purview of real estate investments. Exhibit 2-11 shows an empirical scorecard developed by Truman\textsuperscript{17} for assessing the transparency of SWF groupings.

Exhibit 2-11 Truman Scores for Different Sovereign Fund Groupings

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Exhibit2-11.png}
\caption{Truman Scores for Different Sovereign Fund Groupings}
\end{figure}

Source: Truman (2008)


Changing Perceptions

The authors quote from a recent article by Mohamed A. El Erian,18 “SWFs experienced a significant change in how they were perceived in many industrial countries. Most notably, countries that had once warned these funds against taking a direct stake in their domestic companies began actively seeking sovereign wealth fund investments to counter the highly disruptive impact of private sector deleveraging (asset shedding) at home. The tables had turned. SWFs were being wooed to help recapitalize struggling companies either through new cash injections or by exchanging more senior claims on those companies for instruments lower down in the companies’ capital structure.”

It is evident that SWF will play a greater role in the financial markets in the years to come. The next chapter takes a closer look at the recent trends in SWF real estate investments.

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Chapter 3 SWFs and International Real Estate Investments

3.1 International Real Estate

Property markets the world over have seen tumultuous times. The peak of the market in 2006-2007 saw tremendous cross-border and continental property activity. Transaction activity waned in 2008-2009 as international property prices tumbled. 2009-2010 has seen some positive movement. Exhibit 3-1 shows the continental versus global property activity in the last 3 years.

Exhibit 3-1 Continental vs. Global Real Estate Investments

Exhibit 3-2 illustrates that buyers originating from the Americas have cut-back on their global property acquisitions. Buyers from Asia-Pacific have dominated the international property acquisitions followed by the Middle-East. These buyers are predominantly the SWFs of fiscal surplus economies from the Asia Pacific and SWFs of oil-exporting countries from the Middle-East.

Exhibit 3-2 Global Cross-Border Sources of Capital by Region
3.2 SWFs and Real Estate Investments

Real estate as an asset class has a lot of synergies with the objectives of SWFs. It is a portfolio diversifier, an inflation hedge and matches the objectives of investors with a long-term investment horizon. In developing economies, real estate can be used as an alpha generator.

However, the unique, local and physical nature of the un-securitized real estate asset class poses many inherent challenges. It is imperative that foreign investors like SWFs not only have the requisite human capital/management expertise but also access, outreach and knowledge in their target markets. Thus SWF investment deployment is not as simple as it may be in the case of treasuries, bonds or foreign equities.

Big institutional investors like pension funds and real estate private equity firms are known to use a gamut of strategies for gaining real estate exposure in their country-based or global portfolios. Some common strategies used by them are directly buying the property, development of real estate projects, investments in commingled real estate funds with other investors, REITs and investments in real estate debt.

SWFs, in a similar way, follow a mixture of direct and indirect investment strategies to achieve their portfolio objectives for real estate. “While 51% of SWFs invest in property, this is dominated by the larger SWFs (80% of those SWFs with > $100 billion) compared to the smaller SWFs (30% of those SWFs with < $10 billion).” 19 The last 3-5 years have seen an increase in the transaction activity of SWFs in real estate.

Exhibit 3-3 lists some of the major transactions made by SWFs in real estate in the period spanning September 2007 to April 2010.

---

Exhibit 3-3 Major SWF Real Estate Transactions

<table>
<thead>
<tr>
<th>Sovereign Wealth Funds</th>
<th>Target</th>
<th>Country</th>
<th>Investment (Smm/%)</th>
<th>Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>State General Reserve Fund (Oman)</td>
<td>Heron Tower (London)</td>
<td>UK</td>
<td>900</td>
<td>Office</td>
<td>Sep-07</td>
</tr>
<tr>
<td>Infinity World Investments</td>
<td>Holiday Inn City Center</td>
<td>USA</td>
<td>85</td>
<td>Hotel</td>
<td>Nov-07</td>
</tr>
<tr>
<td>Mubadala Development Company, Olayan Group and other unidentified SWFs</td>
<td>Related Companies</td>
<td>USA</td>
<td>1000</td>
<td>Capital Infusion</td>
<td>Dec-07</td>
</tr>
<tr>
<td>Dubai World</td>
<td>MGM Mirage Inc./ City Center Holdings</td>
<td>USA</td>
<td>2700</td>
<td>Hotel</td>
<td>Feb-08</td>
</tr>
<tr>
<td>Mubadala Development</td>
<td>John Buck Co.</td>
<td>USA</td>
<td>24.9%</td>
<td>Real Estate</td>
<td>Mar-08</td>
</tr>
<tr>
<td>Nakheel Co PJSC (Dubai)</td>
<td>Fountainbleau Resorts</td>
<td>USA</td>
<td>375</td>
<td>Hotel</td>
<td>Apr-08</td>
</tr>
<tr>
<td>Kuwait Investment Authority</td>
<td>Wills Building</td>
<td>UK</td>
<td>582</td>
<td>Office</td>
<td>May-08</td>
</tr>
<tr>
<td>Boston Property, Meraas Capital, Kuwait Inv. Authority and Qatar Inv. Authority, Goldman Sachs</td>
<td>NY General Motors Building</td>
<td>USA</td>
<td>2800</td>
<td>Office</td>
<td>June-08</td>
</tr>
<tr>
<td>Abu Dhabi Investment Authority</td>
<td>Chrysler Building</td>
<td>USA</td>
<td>800</td>
<td>Office</td>
<td>June-08</td>
</tr>
<tr>
<td>Dubai Investment Group, J V Kennedy-Wilson</td>
<td>Avalon Bay</td>
<td>USA</td>
<td>81.2</td>
<td>Apt</td>
<td>June-08</td>
</tr>
<tr>
<td>Kuwait Investment Authority, J V with Boston Properties</td>
<td>540 Madison Avenue, N.Y.</td>
<td>USA</td>
<td>277.1</td>
<td>Office</td>
<td>Aug-08</td>
</tr>
<tr>
<td>Kuwait Investment Authority, J V with Boston Properties</td>
<td>2 Grand Central Tower, N.Y.</td>
<td>USA</td>
<td>427.9</td>
<td>Office</td>
<td>Aug-08</td>
</tr>
<tr>
<td>Kuwait Investment Authority, J V with Boston Properties</td>
<td>125 West 55th St., N.Y.</td>
<td>USA</td>
<td>444</td>
<td>Office</td>
<td>Aug-08</td>
</tr>
<tr>
<td>Dubai World</td>
<td>MGM Mirage</td>
<td>USA</td>
<td>20%</td>
<td>Hotel</td>
<td>Aug-08</td>
</tr>
<tr>
<td>Mubadala Development</td>
<td>Ker Hotel Group</td>
<td>USA</td>
<td>50%</td>
<td>Hotel</td>
<td>Sep-08</td>
</tr>
<tr>
<td>Government of Singapore Investment Corporation</td>
<td>Prologis</td>
<td>Jpn/China</td>
<td>1,300</td>
<td>Logistics</td>
<td>Dec-08</td>
</tr>
<tr>
<td>China Investment Corporation</td>
<td>Morgan Stanley REF VII</td>
<td>Global</td>
<td>800</td>
<td>Real Estate Fund</td>
<td>Mar-09</td>
</tr>
<tr>
<td>China Investment Corporation</td>
<td>Goodman Group</td>
<td>Australia</td>
<td>159</td>
<td>Convertible debt</td>
<td>Jun-09</td>
</tr>
<tr>
<td>CIC, Qatar Investors, some investors</td>
<td>Songbird Estates</td>
<td>UK</td>
<td>1216</td>
<td>Shares</td>
<td>Aug-09</td>
</tr>
<tr>
<td>Government of Singapore Investment Corporation</td>
<td>Cy基本原则 Commercial Properties</td>
<td>Brazil, US</td>
<td>150</td>
<td>Shares</td>
<td>Aug-09</td>
</tr>
<tr>
<td>Oman Investment Fund</td>
<td>Becton Property Group</td>
<td>Australia</td>
<td>160</td>
<td>Shares</td>
<td>Apr-09</td>
</tr>
<tr>
<td>Abu Dhabi Investment Authority</td>
<td>Two Towers, Rio de Janeiro</td>
<td>Brazil</td>
<td>-</td>
<td>Real Estate</td>
<td>Oct-09</td>
</tr>
<tr>
<td>Qatari Investors</td>
<td>US Embassy, Mayfair</td>
<td>UK</td>
<td>664</td>
<td>Embassy Bldg</td>
<td>Nov-09</td>
</tr>
<tr>
<td>Abu Dhabi Investment Authority</td>
<td>Hyatt Hotel</td>
<td>Global</td>
<td>10.9%</td>
<td>Hotel</td>
<td>Dec-09</td>
</tr>
<tr>
<td>Qatari Investment Authority</td>
<td>Harrod's</td>
<td>UK</td>
<td>2,280</td>
<td>Department Store</td>
<td>May-10</td>
</tr>
<tr>
<td>Abu Dhabi Investment Authority</td>
<td>Gatwick</td>
<td>UK</td>
<td>190</td>
<td>Airport</td>
<td>Feb-10</td>
</tr>
<tr>
<td>Qatari Investment Authority</td>
<td>Raffles Hotel</td>
<td>Singapore</td>
<td>275</td>
<td>Hotel</td>
<td>Apr-10</td>
</tr>
</tbody>
</table>

* $ Value USD million or % stake.

3.3 Examples of Investment Strategies

- **SWF Joint-venture (Market Entry):** In 2008, GIC Singapore entered into a joint-venture with ING real estate for the acquisition of the new Roma Est Shopping Centre in Italy from Italian food-retailing leader Gruppo PAM for a EUR 400 million
transaction value with ING Real Estate and GIC Real Estate having equal stakes in the property.  

- **Expertise Acquisition**: Abu Dhabi state-run Mubadala set up a joint venture with Chicago based John Buck Company in 2008 to garner real estate expertise in the Middle East.

- **Indirect Investment Partner**: State Street Corporation, one of the world's leading providers of financial services to institutional investors was appointed by Norges Bank to provide fund administration services for the real estate portion of the Norwegian Government’s Pension Fund. State Street will provide administration, accounting and director services for the fund’s $20 billion global real estate investments and will also provide reporting and joint venture structuring services.

- **Direct Acquisition**: Abu Dhabi Investment Authority acquired the Chrysler building in New York for a sum of $800 million in 2008.

- **Co-Investment**: As an example of co-investment by two SWFs, Qatar’s SWF (Qatari DIAR) joined China Investment Corporation (CIC) to subscribe to £275 million ($447.9 million) in preference shares issued by Songbird Real Estate, owner of much of London’s Canary Wharf office complex.

- **Indirect Investment Stake**: Dubai World bought a 20% stake in MGM Mirage in 2008 and ADIA bought a 10.9% stake in Hyatt Hotels in 2009.

- **Direct Acquisition with Joint Venture Partner**: Kuwait Investment Authority in 2008 acquired the 125 West 55th Street building in New-York in a joint venture with Boston Properties.

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* Other examples derived from Exhibit 3-3.
3.4 SWF Real Estate Market Size: Future Scenario

The authors performed a simple 5-year scenario analysis using two approaches to calculate the future potential market size of SWF investments in real estate. This analysis takes data inputs from a gamut of publicly available sources.

The first approach (Exhibit 3-4) follows the arithmetic used by Euromoney\(^\text{22}\) and is fed by SWF institute data (June 2010). It is sub-divided into two methods.

The first method takes into account the future flow of new investments into SWFs globally. It uses three future estimates of SWF total wealth projection, a 10% growth from current value, a 20% growth and the estimate predicted by Morgan Stanley of $12 trillion by 2015. The allocation to real estate is assumed as 5%, 10% or 12%. These benchmarks are derived from the current asset allocation towards real estate by major SWFs. For instance\(^\text{23}\), GIC Singapore allocates 12% to real estate and ADIA has a 5-10% allocation. The authors take 5% as a conservative estimate and 12% as an optimistic estimate for the SWF universe. The results show a conservative yearly allocation of $24 billion and an optimistic value of $195 billion with a mean value of $109 billion.

Exhibit 3-4 SWFs Real Estate Market Size Forecast- Approach 1

<table>
<thead>
<tr>
<th>Items</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Current Total SWF Wealth</td>
<td>$3,891</td>
<td>$3,891</td>
<td>$3,891</td>
</tr>
<tr>
<td>b Growth in Total Sovereign Wealth (YOO*)</td>
<td>10%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>b.1 2010</td>
<td>$3,891</td>
<td>$3,891</td>
<td>$3,891</td>
</tr>
<tr>
<td>b.2 2011</td>
<td>$4,281</td>
<td>$4,670</td>
<td></td>
</tr>
<tr>
<td>b.3 2012</td>
<td>$4,709</td>
<td>$5,604</td>
<td></td>
</tr>
<tr>
<td>b.4 2013</td>
<td>$5,179</td>
<td>$6,724</td>
<td>$12,000 by Morgan Stanley</td>
</tr>
<tr>
<td>b.5 2014</td>
<td>$5,697</td>
<td>$8,069</td>
<td></td>
</tr>
<tr>
<td>b.6 2015</td>
<td>$6,267</td>
<td>$9,683</td>
<td></td>
</tr>
<tr>
<td>c Total New Investment per year (2011-2015)</td>
<td>$475 (b.6 - b.1)/5</td>
<td>$1,158 (b.6 - b.1)/5</td>
<td>$1,622 (12,000-a)/5</td>
</tr>
<tr>
<td>d New Investment allocation for real estate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative 5%</td>
<td>$24 c X 5%</td>
<td>$58</td>
<td>$81</td>
</tr>
<tr>
<td>Intermediate 10%</td>
<td>$48 c X 10%</td>
<td>$116</td>
<td>$162</td>
</tr>
<tr>
<td>Optimistic 12%</td>
<td>$57 c X 12%</td>
<td>$139</td>
<td>$195</td>
</tr>
<tr>
<td>e Total assets under management 2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative 5%</td>
<td>$63 (b.6 X 5%)</td>
<td>$97</td>
<td>$120</td>
</tr>
<tr>
<td>Intermediate 10%</td>
<td>$125 (b.6 X 10%)</td>
<td>$194</td>
<td>$240</td>
</tr>
<tr>
<td>Optimistic 12%</td>
<td>$150 (b.6 X 12%)</td>
<td>$232</td>
<td>$288</td>
</tr>
<tr>
<td>f Min per Year Injection in Global Real Estate</td>
<td>$ 24 per Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g Max per Year Injection in Global Real Estate</td>
<td>$ 288 per Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h Average</td>
<td>$ 156 per Year</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


\(^{23}\) Source: Annual report 2009: GIC Singapore and ADIA.
The second method takes into account the stock of wealth. That is, the total assets under management change with the same real estate allocation spectrum. Using similar allocation values of 5%, 10% and 12% the simple arithmetic shows a conservative yearly allocation of $63 billion and an optimistic value of $288 billion with a mean value of $176 billion.

The second approach as shown in Exhibit 3-5 uses the simple arithmetic of multiplying the total present value of all SWFs with the historical allocation by SWFs to real estate and the proportion of SWFs that invest in real estate. Taking a 2015 scenario of 10% growth, 20% growth and $12 trillion, the arithmetic indicates an allocation for real estate to the tune of $26, $64 and $89 billion, respectively, per year.

Exhibit 3-5 SWFs Real Estate Market Size Forecast- Approach 2

<table>
<thead>
<tr>
<th>Items</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Current Total SWFs Wealth</td>
<td>$3,891</td>
</tr>
<tr>
<td>b. Average Investment in Real Estate by SWF (historical)</td>
<td>11%</td>
</tr>
<tr>
<td>c. Proportion of SWFs that Invest in Real Estate</td>
<td>50%</td>
</tr>
<tr>
<td>d. Current Total RE Allocation (Assets under Management)</td>
<td>$214</td>
</tr>
<tr>
<td>e. 2015 Estimate</td>
<td>$12,000</td>
</tr>
<tr>
<td>f. Average Investment Allocation in Real Estate (estimate)</td>
<td>11%</td>
</tr>
<tr>
<td>g. Proportion of SWFs that Invest in Real Estate</td>
<td>50%</td>
</tr>
<tr>
<td>h. Future Total RE AuM (Asset under Management) of 2015</td>
<td>$660</td>
</tr>
<tr>
<td>i. Year over Year (YOY) Real Estate (RE) Investment</td>
<td>$89</td>
</tr>
</tbody>
</table>


With a 10% growth assumption YOY RE = $26 billion and With a 20% growth assumption it is $64 billion.

The two approaches are of course mere forecasts. The highly conservative value of $26 billion and the optimistic value of $288 billion per year though clearly point in the direction where the SWF real estate investment trend is heading.

The next chapter delves with the real estate execution strategies used by SWFs to achieve their portfolio objectives. The authors conduct their research by interviewing the leaders of four major SWFs that invest in real estate.

30
Chapter 4 Real Estate Investment Strategies I (SWF Perspective)

4.1 Objective

In order to determine the investment strategy and execution trends in international real estate investments of Sovereign Wealth Funds (SWFs), the authors conducted open-ended interviews with Senior Executives of four SWFs that currently invest in real estate. The primary objective was to explore why SWFs invest in real estate and their investment goals, allocations, risk spectrum and preferences within real estate as an asset class. In addition, the authors sought to determine the SWFs view of real estate markets, products and investment methodology.

4.2 Interviewee Profile and Selection

Interviewing organizations such as SWFs, some of which are known to be opaque and secretive about their investment strategies and policies, is a challenging task. The authors determined that the best way to seek holistic feedback would be by way of open-ended interviews with managers of a diversified spectrum of funds by size and region. It is clear from chapter 2 that around 79% of SWFs originate from the Middle East and Asia. Also, around 60% of them are commodity based. Thus, in order to get a balanced perspective, the authors sought feedback from two SWFs that are commodity based and two funds that are from the non-commodity spectrum. Similarly two participating funds were from the Middle East and two were from Asia. Exhibit 4-1 summarizes the interviewee profile.

All four SWFs are active investors in real estate and as of mid-2010 had approximately $1 trillion of combined total assets under management.

4.3 Research Methodology

- The data was collected by two in-person and two telephonic interviews;
- The interviewees were at the CEO, Director, and head of real estate investment levels;

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24 All numbers in this sub-section are based on the SWF Institute data: June 2010.
25 SWFs originating from the Middle East and grouped separately from the SWF originating from Asia.
26 Total value of all assets under management.
• The two in-person interviews were conducted in June 2010 outside the United States;
• A typical interview lasted 45 to 60 minutes;
• All interviewees were individuals;
• All questions were asked to all interviewees.

Exhibit 4-1 Interviewee Profile (SWFs)

<table>
<thead>
<tr>
<th>Fund Notation</th>
<th>Wealth Source</th>
<th>Region</th>
<th>Year of Inception</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Non-Commodity</td>
<td>Asia</td>
<td>Pre-2000</td>
</tr>
<tr>
<td>B</td>
<td>Non-Commodity</td>
<td>Asia</td>
<td>Post-2000</td>
</tr>
<tr>
<td>C</td>
<td>Commodity</td>
<td>Middle East</td>
<td>Pre-2000</td>
</tr>
<tr>
<td>D</td>
<td>Commodity</td>
<td>Middle East</td>
<td>Post-2000</td>
</tr>
</tbody>
</table>

Total assets under management > $ 1 Trillion

Note: A/B (Non-Commodity) and C/D (Commodity) represent the responses of the Senior Executives of the respective funds in the body of the chapter. For instance, the response of the Senior Executive representing the Non-Commodity SWF from Asia with the fund inception date of pre-2000 has been cited as response by Executive A.

Confidentiality was promised to the respondents, and thus the information included in this chapter is in aggregate form only and no information identifying the name of the SWF, fund size and portfolio allocation is provided.

Open-ended interview methodology was chosen over the multiple choice questionnaire because of the following reasons:

a) Existence of a limited sample size, in terms of the SWFs that invest in real estate;
b) To explore new issues;
c) To eliminate bias associated with multiple choice surveys.

The questions were designed to capture the investment strategy aspects of SWF real estate investments.27

27 The authors designed the questionnaire by conducting a thorough review (May 2010) of the trends in real estate investments of SWFs by gathering information from various sources-namely, newspaper articles, Internet sources, analyst reports, academic papers, feedback from people in the industry and SWF annual reports.
4.4 Questionnaire

- Why does ‘the subject fund’ invest in real estate?
- What are the investment goals/return objective for real estate investments?
- What are the parameters considered for meeting the diversification requirements within the real estate portfolio?
- What are the investment strategies used to meet the real estate investment objectives?
- What is the preferred investment strategy: direct or indirect and why?
- What is the criterion used for selecting partners in JVs and development deals?
- What are the strategic considerations for indirect investments and commingled funds?
- What is the allocation and portfolio strategy between Core, Value-Added and Opportunistic products?
- What is the product-wise allocation strategy in the real estate portfolio?
- What is your near-term view of investment trends in the US Real Estate market?
- How important is liquidity in investment decision making?
- How important is the availability of local debt when considering investments in target markets?
- How important are the changes in the source of wealth for determining the asset allocation strategy?
- How do you assess the changes in market demand in target markets?
- How important is transparency to the subject fund?
4.5 Interviewee Responses

**Reason for Investing in Real Estate**

Both Executive A and Executive B (representing Asian non-commodity-based SWFs) cited portfolio diversification and inflation hedging as the primary drivers for investing in real estate.

Exhibit 4-2 Reasons for Investing in Real Estate

Both Executive C and Executive D (representing Middle-Eastern commodity-based SWFs) said that apart from diversification, they invest in real estate as they have a long-term investment horizon and real estate investments give them the opportunity to beat the market beta from a long-term perspective. Executive D explained, “We have been historically very comfortable in real estate investments and it acts as a counterbalance to the commodity-based wealth source.”

**Real Estate Investment Return Objective**

Executive A said that beating inflation with a set premium was the return target for their real estate investments. Executive B stated no fixed benchmark or target and added that they consider their targets on a case by-case basis and account for a premium for real estate and country risk in their decision making.

Executive C stated that IPD and NCREIF index average returns were used for benchmarking their US and European real estate portfolio. He added that they use internally set benchmarks
for emerging markets because of lack of underlying market data. Executive D said that they consider internally set benchmarks in their real estate portfolio allocations and added that as a relatively newer SWF they are yet to reach the level of sophistication practiced by big institutional investors like pensions funds in their portfolio-level decision making.

**Global Diversification**

Executive A said that they follow an internally set continental distribution that is frequently adjusted based on the market situation. Executive B explicitly stated regional preferences within continents:

- Europe: 50% allocation to property in the UK and the rest between Germany and France, beginning to allocate in Eastern Europe.
- Asia: Strong preference for property in China, Hong Kong, Singapore and Japan.

Executive C stated that they have a global real estate portfolio with the regional weightings split as per the approximate global investable universe. Executive D said that as a SWF entity they invest in over 30 countries. They are quite active in the UK and mainland Europe and have been considering real estate investments in North America, South America and the emerging markets. He added that government-level relationships help streamline the investment process. The near-term investment pipeline is substantial and is correlated with the commodity production of the home nation.

**Investment Strategies**

Executive A said that joint-venture partnerships with their involvement as the major investor and investments in debt products were the two strategies employed by them for real estate investments. Executive B stated a strong preference for indirect investments (funds of funds) and investments in debt.

Executive C said that use of debt, investment in real estate investment trusts (REITs) and joint venture partnerships were the three primary methods of real estate investments used by them. Executive D said that they have developed a comfort level with the real estate asset
class and that they use joint ventures (JV’s) and direct investments in real estate development as their two primary investment strategies.

**Note:** The broad spectrum of real estate investment managers who manage indirect investments for SWFs, and consultants who advise them on their investment strategy are hereby collectively referred to as “Fiduciaries”.

The authors *define* a few standard terms used in this chapter to describe SWF real estate investments:

**Discretion:** The control given to the fiduciaries by the SWFs for making buy and sell decisions. Commingled funds (indirect investments) by definition give full discretion to the fiduciary. A direct investment offers varying level of discretion. The current global financial recession has led to a rethinking in SWF circles on the level of discretion they should give to the fiduciaries, especially with the misalignment in interests of the fiduciaries that is usually tied to fees from acquisitions and disposition of property.

The property investment industry is replete with complex investment vehicles. An understanding of the near-term investment practices of SWFs can offer invaluable insights into SWF real estate investing patterns. The two broad categories of fiduciary-based investments are separate accounts that offer varying level of discretion to the fiduciaries and commingled funds that grant them virtually full discretion.

**Separate Accounts:** This form of investments implies setting up a separate investment pool by the SWFs that is managed by the fiduciaries. It gives some level of discretion to the fiduciary as long as the investment falls under the guidelines set forth by the SWFs. A SWF may hold sole ownership or may co-invest with other institutional investors or SWFs. Sole ownership of separate accounts gives greater control and flexibility in disposition to the SWF.

**Joint Ventures:** An investment vehicle by which the SWF chooses an operating partner with unique expertise. The partner co-invests an agreed amount with the SWF. The governance is mutually decided based on expertise in specific areas and levels of investment.
**Commingled Funds:** They consist of assets from several accounts that are blended together. Investors in commingled fund investments benefit from economies of scale, which allow for lower costs per dollar of investment, diversification and professional money management.²⁸

**Direct Investments:** This form of investments is indicative of a fund’s belief in its ability and expertise to manage real estate investment on a direct basis or in separately managed accounts. A few SWF’s have developed real estate portfolios on their own account and have also acquired human expertise related to in-house acquisition and asset management. Similarly, as another form of direct investment some SWF’s give their separate account managers full discretion based on a pre-agreed set of guidelines. However, a more direct form of real estate investments would be one where the investment management or advisory firm is acting as a broker i.e., the investment decision making is held solely by the SWF. Direct investments give the SWFs more control and they can tailor their investment objectives with their internal allocation and product strategy. They also require in-house expertise in acquisition, management and disposition which is challenging to accumulate considering the international nature of sovereign wealth fund real estate investments.

**Direct vs. Indirect (Fiduciary) Investments**

Executive A said that their fund has a strong preference for direct investments in real estate. The in-house expertise accumulated over the years in real estate investing was stated as the reason for this. Executive B representing a newer SWF from Asia said that they invest through separate accounts and use fiduciaries as the primary mode of materializing their real estate investments. However, he added that they have a near term plan of moving towards direct investments.

Executive C stated that they currently maintain a balance in terms of using both direct as well as fiduciary forms of real estate investments. At the same time, they are increasingly moving towards direct investments as it gives them more control. However, he acknowledged that because of the global nature of the business, fiduciaries bring in the much needed skill sets in certain parts of the world. Executive D stated that their SWF has separate organizational structures for materializing direct and indirect real estate investments. They have developed strategic relationships with property companies and have used co-investment vehicles with

²⁸ All are standard definitions (Investopedia.com), date accessed June 2010.
other SWFs for property acquisitions by creating real estate operating platforms. He further stated that they ideally want operating control for their real estate investments.

**Criterion used for Choosing Partners for Joint Ventures and Development Deals**

Executive A stated that reputation, their relationship with the partner and a solid track record were their pre-requisites for considering JV’s and partnerships. Executive B said that for their upcoming investments in real estate they are specifically looking for fiduciaries and partners with no ‘bad legacy’ i.e., a track record of poor performance during the recent financial crisis. He stated that they go at great length to perform a legacy check on the past deals and investments of the partners that they choose to work with.

Exhibit 4-3 Criterion Used by SWFs for Selecting Partners

Executive C stated access and knowledge of underlying markets as the primary drivers. Executive D said that they are primarily looking for local expertise and knowledge from their investments and development partners. He added that relationships in real estate are built over time and as a young SWF they are looking for long-lasting relationships with co-investors and partners.

**Indirect Investments and Commingled funds**

Executive A stated that for their indirect investments the decision to select funds and investment vehicles is solely governed by the reputation of the fiduciary. Executive B said that they had no particular criterion for selecting fiduciaries.
Executive C explained that they previously had a very small investment team and thus investments in commingled funds helped them in meeting their diversification goals at the asset level. He further re-iterated their move towards direct investments away from commingled funds and explained that they were now looking for greater control for their real estate investments and wanted to rely more on their in-house real estate expertise for decision making. Executives A, B and C stated that they have no set portfolio limit for indirect investment vehicles and consider the investments on a case-by-case basis. Executive D said that they currently do not invest in commingled funds.

Before describing the response to the next questions the authors define some basic real estate investment definitions:

**Core**: This is a moderate-risk/moderate-return strategy (8 to 10% hurdle rate of return). These are typically well leased, managed and maintained properties in prime locations with stable credit worthy tenants. They are attractive to investors for their stable income stream.

**Value Added**: This is a medium-to-high-risk/medium-to-high-return strategy. It will involve buying a property, improving it in some way, and selling it at an opportune time for a gain. Properties are considered value added when they exhibit management or operational problems, require physical improvement, and/or suffer from capital constraints. They are typically underwritten to achieve a rate of return between 12 and 18% and employ between 50 and 65% leverage.

**Opportunistic**: This is a high-risk/high-return strategy. The properties will require a high degree of enhancement. This strategy may also involve investments in development, raw land, and niche property sectors. Investments are tactical. They are typically underwritten to achieve a rate of return in excess of 18% and employ leverage in excess of 65%.

**Risk Spectrum: Core, Value-Added and Opportunistic Investment**

Executive A expressed a preference for core with a partial allocation towards value-added. Their opportunistic portfolio was allocated solely to the multifamily residential product. Executive A stated that they typically use < 50% leverage for their investments. Executive B

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similarly expressed their preference for core and value-added with a move towards opportunistic. He added that they use < 50% leverage for core and value-added investments and not more than 70% for their opportunistic basket.

Executive C did not comment on their risk spectrum. Executive D said that they started off with a considerably risky direct development real estate portfolio. They are now looking for a balance by acquiring more core and value-added products in the near future.

**Product Type**

Executive A informed us of a 30% office, 30% retail and a 40% split among apartment, industrial, hotel and other products in their real estate portfolio. Executive B said that they are more inclined towards making investments through commingled funds and thus the discretion for choosing the products usually lies with the fiduciaries.

Executive C said that they base their product-type allocations on return averages of benchmark indices (NCREIF for the US) and did not comment on product preference.

Executive D said that they own a real estate portfolio comprised of residential, mixed use and REIT (Europe) investments. They are also looking into investments in industrial/logistics type products and added that the quality and performance of the asset from a long-term perspective is the primary criterion for product selection and not the widely believed iconic value of the property.

**US Market Trends**

Executive A stated that they feel it is not a good time to invest in US markets; however their investment efforts are focused in the major gateway cities. Executive B said that they are actively looking to invest in the U.S. markets and, similar to Executive A stated their preference for investing in the prime gateway cities such as New York, Los Angeles, Boston, San Francisco and Washington, D.C.

Executive C said that he was not sure if the prices in the US real estate market had bottomed out. He added that US real estate is attractive currently from an acquisitions perspective and added that they are working on developing in-house expertise to look for opportunities in
North America. Executive D stated that they are beginning to look for investments in the US market and are considering venturing into hospitality products and real estate development.

**Liquidity**

Both Executives A and B said that although they were long-term investors, liquidity is an important factor for creating their investment strategy for target markets. Executive B stated their preference for core investments in this realm and added that they are also looking for investments in REITs.

Exhibit 4-4 Liquidity and SWFs

Executive C said that they are long-term investors and price the requirements for liquidity as per the local conditions. Both Executives C and D stated that their size makes the importance of liquidity a minor consideration. Executive D added that market liquidity naturally provides for a good exit strategy and is a reassurance for considering the target market for real estate investments in their decision making.

**Local Debt**

All interviewees agreed that availability of local debt was an important factor in their decision making. Executive C stated that although they can do without it, the availability of local debt indicates transparency and liquidity. Executive D expressed a similar opinion and said that debt is usually considered as an instrument to extend the equity and that a very low level of debt is used by them in their real estate investments.
**Importance of SWF source growth/volatility for distribution between asset classes**

All executives stated that this was not an important factor in their entity-level decision making. Executive D however, stated that their investment pipeline is correlated with the revenue receipts from the source of wealth.

**Market Research**

Both Executives A and B expressed the importance of good quality market research in their investment decision making. While Executive A’s SWF relied fully on its in-house research team Executive B’s SWF worked with third-party professional firms. Executive C commented that they carefully study occupier demand indicators such as GDP, employment and absorption as well as investor demand by monitoring transaction volume, transaction prices and cap rates on a regular basis. Further, they use a combination of in-house proprietary models and forecasting as well as external third-party expertise. Executive D indicated the use of third-party expertise for getting market feedback.

**Transparency**

All respondents agreed on the importance of transparency. Both Executive A and B stated that transparency is a core value as there are a lot of stakeholders involved in their home country, starting from the ministries to the national banks and ultimately the people. Executive C said that they have issued public reports declaring their fund size and allocations and that they are committed to increasing transparency. He added that they are actively working with the International Working Group (IWG) of SWFs on this front. Executive D acknowledged that although transparency in terms of declaring their financial and portfolio information is a best practice, the present low level of transparency is more of a cultural issue that stems from the sentiment of not attracting too much attention. He added that over time their fund will become more transparent.
4.6 Conclusions

It is clear from this chapter that SWFs invest in real estate because they are long-term investors, and real estate as an asset class is a portfolio diversifier and a hedge against inflation. SWFs follow a continental distribution for asset allocation that is based on their internal/third-party research and is adjusted with the market conditions in different parts of the world. However, most SWFs were not forthright in explaining the allocation logic for their regional weightings. It was clear though that the geographical mix has a high allocation for the developed core markets.

The research shows a trend across SWFs wherein they are increasingly moving towards direct forms of real estate investments in order to gain more control over the decision making process. This strategy is a function of the sophistication, in-house expertise and comfort level of the respective SWF with real estate. Newer SWFs mentioned gaining exposure in international real estate by using indirect investment vehicles. Older SWFs, on the other hand use a variety of instruments to achieve their real estate portfolio targets.

Core and value-added side of the risk spectrum was stated as the most favored position on the opportunity frontier. Their long term investment horizon makes liquidity and use of debt a minor consideration. Office, retail and mixed-use asset types were stated as the favored investment products. SWFs expressed a sense of cautious optimism towards investments in the U.S. real estate. Coastal gateway cities were the favorite destinations for buying property. All SWFs understood the importance and benefits associated with a transparent approach toward real estate investments. For some funds it was more of a cultural issue than anything else. It is evident that SWFs have the wherewithal to invest in real estate across cycles. Their fund size makes it easy for them to set-up local partnerships, handle financial market crisis, and navigate international boundaries.

Each SWF is unique because of its investment purpose and source of wealth (home asset). Hedging the changes in the home asset to determine investment policy was mentioned by the interviewees as a minor constraint. The authors assume that this is critical macroeconomic basis of existence of SWFs that may be dealt with by the SWF nation at the Ministry of Finance level. In the quantitative section (chapter 6) the authors investigate the asset classes that are the best hedges for each unique SWF home asset from a long term perspective.
In the next chapter the authors present the investment management and advisory communities view of real estate investment execution patterns of SWFs.
Chapter 5 Real Estate Investment Strategies II (Investment Manager’s Perspective)

5.1 Objective

The investment management and advisory communities’ role has been pivotal in expanding the international outreach and deployment of capital for SWF investments in real estate. There also exists a symbiotic relationship between the two communities that stems from the international diversification objective of SWFs and the local expertise offered by investment managers. This chapter shifts the focus to understanding the perspective of the real estate investment management and advisory community on trends and strategies in the emerging field of SWF real estate investments.

The objective is to explore a different perspective, understand the tensions involved in the relationship, and determine the effects of changing business practices of the SWF clients on the advisory and investment management business. The authors explore several strategy questions such as discretion, mode of investments, risk spectrum and near-term trends in SWF investments from the purview of the investment management community. Finally, the authors explore the implications of the potential shift in real estate strategies of SWFs by seeking critical opinion from the advisory and investment management community on these trends.

5.2 Interviewee Profile and Selection

The authors sought feedback from nine senior executives. In order to get a credible, balanced, and holistic perspective, the selected interviewees were diversified by their firm type, real estate experience pertinent to SWFs and geographic location. Exhibit 5-1 lists the names of the institutions represented by the interviewees.

Profile Summary

- All interviewees belong to the real estate investment management and advisory firms.
- The interviewees were at the CEO, COO, partner, principal, managing director and director level in their respective firms.
- All interviewees have personal experience of working with SWFs on one or several assignments.
• All firms represented by the interviewees have international operations.
• Two interviews were conducted in-person and the rest were by telephone. In-person interviews were conducted in New York.
• A typical interview lasted 45 to 60 minutes.
• Six interviewees were based in the U.S. and three were based in Hong Kong, Shanghai and India.
• All interviewees were individuals.

Exhibit 5-1 List of Participating Real Estate Investment Management Institutions

<table>
<thead>
<tr>
<th>List of Participating Institutions (In alphabetical order)</th>
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<tbody>
<tr>
<td>Blackrock</td>
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<td>Credit Suisse</td>
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<td>Deutsche Bank - RREEF</td>
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<td>Grosvenor Investment Management</td>
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<td>ING Investment Management</td>
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<td>Morgan Stanley</td>
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<td>Oak Hill Investment Management</td>
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<td>The Townsend Group</td>
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<td>Tishman Speyers</td>
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The names of the participating individuals have not been disclosed. Exhibit 5-2 annotates the interviewees and lists, their individual and firm-specific real estate experience pertinent to SWFs, interviewee location, interview date and the nature of their firm. IM1 in Exhibit 5-2 belongs to one of the firms listed in Exhibit 5-1. The information included in this chapter is in aggregate form and uses the annotation provided in this table to present the views expressed by the interviewees.
5.3 Research Methodology

Open-ended interview methodology was chosen over the multiple choice questionnaire because of the following reasons:

- Limited availability of public knowledge on the topic;
- To explore new issues;
- To eliminate bias associated with multiple choice surveys;
- Availability of a limited number of advisors and investment managers that have experience of working with SWFs for their international real estate investments.
5.4 Questionnaire

The questions were designed to capture the investment strategy aspects of SWF real estate investments and were synergized with the questionnaire used for SWF interviews in Chapter 6. Following is the list of the interview questions:

- Have you worked with SWFs on real estate transactions? Please describe and give examples if possible?
- Do you think that SWFs are increasingly investing directly? Why, if yes?
- What is the criterion used by SWFs to select partners (fiduciaries)?
- How does your firm invest the SWF capital allocation for real estate between core, value-added and opportunistic investments? Who specifies the allocation strategy?
- How do you allocate the SWF capital between product types? What is the product preference of SWFs?
- What, according to you, will be the near-term trends in Sovereign Wealth Fund investments in real estate both within the US and globally?
- What is the level of discretion given to your firm by Sovereign Wealth Funds?
- What is your opinion on the entity-level transparency levels of Sovereign Wealth Funds? Should they be more transparent? Why, if yes?
5.5 Interviewee Responses

Move towards Direct Investments

All interviewees unanimously agreed that SWFs are increasingly executing their investments directly and particularly moving away from commingled investment vehicles. The following are the major reasons that came across in the interviews for this phenomenon:

- Their size and scale makes them gravitate towards getting more control for making independent decisions on their investments. IM2, IM4, IM7
- They have been disappointed with the performance of commingled funds and other forms of indirect investing in recent times. IM2
- They can negotiate an attractive fee structure directly. IM2, IM7
- They do not face the added risk of defaulting limited partners by way of pure direct investment. IM2
- Direct investments provide for an easy exit strategy. IM2
- They want to gain more comfort in underwriting large transactions. IM1

An investment manager explained this trend, “Some major SWFs have been staffing up to create in-house teams and they have been looking for real estate deals with bigger sized co-investors that bring in a 20-30% equity contribution for direct investments.” IM3

Clearly this question was a point of tension between SWFs and investment managers. Two-thirds of the interviewees IM1, 4, 5, 6, 8 and 7. pointed out that this is a short-term trend, which is very difficult to accomplish, and an unsustainable business model. The following are some points stated by the interviewees for this reasoning:

- A direct investment strategy gives SWFs little exposure and access to quality transactions. IM1, IM6, IM8
- Direct investments need a lot of local knowledge and resources on the ground, which are very difficult and time consuming to accumulate. IM4, IM5, IM7, IM8
- It is very difficult to train and retain quality staff. IM1, IM5, IM6
- Advisors would take their best deals to other clients (other big investors) if they offer them more freedom. IM1

30 IM1, 4, 5, 6, 8 and 7.
• Advisors and indirect investment vehicles provide access to deals, unique strategy and knowledge of recapitalization and secondary investments especially in emerging markets.\textsuperscript{IM1}

• Direct investments tend to underperform the market over the long run.\textsuperscript{IM6}

GIC Singapore was cited as a SWF that has historically used direct investment vehicles to accomplish its real estate portfolio objectives. Korean Funds (KIC and National Pension Fund\textsuperscript{31}), Qatari DIAR and ADIA were given as examples of firms that are now spearheading the trend towards direct investments.\textsuperscript{IM3}

**Criterion used by SWFs to select Fiduciaries/Investment Managers**

Following is an aggregate list of factors that were pointed out by the interviewees:

a) Large scale of the investment management firm;\textsuperscript{IM1}
b) Geographical outreach and deal sourcing access;\textsuperscript{IM1,IM2,IM3,IM6}
c) Relationships with SWF’s and the broader real estate investment network;\textsuperscript{IM1}
d) Execution capability (above $100 million sized deals) and track record;\textsuperscript{IM1,IM2,IM3,IM8}
e) Reputation: Record of trust and integrity;\textsuperscript{IM2,IM7}
f) Presence in major cities of the world;\textsuperscript{IM3}
g) Competitive fee structure;\textsuperscript{IM3,IM8}
h) Professional behavior and communication;\textsuperscript{IM3}
i) Ethical work practices;\textsuperscript{IM5}
j) Composition of the team.\textsuperscript{IM5,IM8}

**Legacy factor**

The above question on fiduciary selection brought up an interesting discussion on the so called ‘legacy issue’ that refers to the spate of losses incurred by SWFs in deals with some of the most reputed names in the investment management business in the time period from 2008-2010, post the fall of Lehman Brothers and the crash of the housing bubble in the US. Executive B, for instance, in the previous chapter represented one SWF that expressed an explicit concern on this issue and went on to state that they won’t work with advisors and

\textsuperscript{31} Not a SWF.
funds that had legacy issues coming out of the crisis. Following are some responses of the
interviewees to this question:

“No institution has come out untainted from this recession except a few firms that operate in
markets such as India, China and Brazil.” IM1

“There are only a handful of predominantly small firms that have been smart and fortunate
during the financial crisis with respect to their real estate performance. There may be some
big investment firms that SWFs may hesitate to do business with, but blindly following the
legacy parameter in partner selection would firstly imply cutting out on a top partner that can
source them good deals and secondly taking on additional risks.” IM4

“Mid-sized firms that did well during the recession have a high probability of successfully
attracting capital from SWFs in the near term.” IM5

“Legacy issue is an ‘over-reaction’ but it is true that SWFs are now in a very good position to
negotiate strong terms and get enhanced control over their investments.” IM8

Risk Spectrum and Allocation Strategy

In terms of the risk spectrum of SWF investments in real estate, there was a consensus within
the interviewee group that SWFs are looking to invest in high-quality core assets at bargain
prices. Following is a summary of the interviewee responses.

- The sharp drop in the real estate prices in developed core markets has led to a shift in
  the real estate strategy of major SWFs in that they are now looking to invest in core
  assets aggressively. IM5, IM8
- The typical size of core deals that SWFs are looking for is in the range of $200 to
  $500 million, SWFs are more concerned with the stable income stream than capital
  appreciation because of their long-term investment horizon. IM1
- For core products, the staple destinations for SWF investments are New York,
- Some major SWFs have been looking at opportunities arising out of structured debt
  with loan to value ratio (LTV) in the range of 75%. IM1
Recently, SWFs have been scouting for large distressed deals in core markets, but there are limited numbers of such deals available and it is difficult to find them. IM1 One interviewee stated that he has observed very little transaction activity from SWFs in the distressed asset market. IM7

Two interviewees, both based in Asia, had opposing views on the trends in SWF opportunistic (opp) investments. (IM7-No-opp, IM8-Mostly opp)

An investment advisor explained, “By default, because of the associated risks, investments in some of the high growth emerging economies of the world can be labeled as partially opportunistic.” IM4

An investment manager based in Asia stated, “In Asia the SWFs categorize Japan, Australia and Singapore as a core asset market. He added that SWFs are creating platforms to invest in real estate debt in opportunistic markets such as India and China on the real estate development side of the business.” IM9
**Decision making for Risk Spectrum Allocation**

There was consensus within the interviewee group that the final decision on the real estate portfolio-level risk spectrum allocations lies solely with the SWFs. However, they work closely with investment managers and consultants. An investment manager said that “The three primary sources for aiding SWF decision making on asset allocation were pension fund advisors, fiduciary managers and their own in-house research teams.”\textsuperscript{IM7}

**Product Preference**

The common theme that emerged out of all interviewee responses was that SWFs are most interested in office product, particularly iconic or *trophy* assets in central business districts of prime cities. An investment manager explained, “Office is one product that most SWFs are most comfortable with and understand well.”\textsuperscript{IM7}

There was a fragmented response for other product types.

**Hospitality**: SWFs have a good appetite for buying hotel and other hospitality products\textsuperscript{IM3, IM5, IM8} (One opposing view\textsuperscript{IM7}).

**Retail**: Big regional malls particularly in the US/Europe\textsuperscript{IM1, IM4}.

**Industrial**: Following are the interviewee responses that capture the viewpoints on industrial product:

“Industrial is hard to buy in a large size and is thus not attractive for SWFs.”\textsuperscript{IM4}

“Although industrial has shown good yields in recent times it is not certain if SWFs will show interest in investing in industrial real estate.”\textsuperscript{IM6}

“My experience suggests that industrial parks are not appealing to SWFs.”\textsuperscript{IM7}

**Multi-family**: Following are the interviewee responses that capture the viewpoints on multi-family product:

“Multi-family residential can offer a good return in certain US markets (such as Atlanta and Charlotte) but this is one product that SWFs have stayed away from.”\textsuperscript{IM3}
“The reason for low interest shown by SWFs to multi-family product could be the very regional and property specific nature of residential investments.”\textsuperscript{IM7}

“Multifamily offers attractive returns but is not a choice for SWFs primarily because of the lack of education and familiarity with that product, especially in the US.”\textsuperscript{IM1}

Product allocation decisions: Interviewees stated that generally the investment managers and partners had no say in selecting the products for SWF investments and that the product allocation was not necessarily scientific.

“Allocation strategies between product types are decided by the SWF investment committees.”\textsuperscript{IM1}

“Allocation between product types done by SWFs is not necessarily scientific.”\textsuperscript{IM8}

**Near-term trends in SWF investments in Real Estate**

This was one question that brought up a lot of interesting observations from the advisory community. The authors have summarized the interviewee outlook in these fourteen points:

1. SWFs may increasingly invest directly. They may move away from commingled funds and discretionary separate accounts. Furthermore, SWFs that are bigger in size may increase their staff to execute direct investment strategies.\textsuperscript{IM2,IM8,IM5}

2. In the US, they will invest in core assets in gateway cities.\textsuperscript{32} Preferred products will be office, large regional retail centers and hotels with a low allocation to multifamily residential and industrial.\textsuperscript{IM1} Sophisticated SWF’s may invest in very specialized products such as senior and student housing.\textsuperscript{IM2} US markets are very attractive from a real estate investment point of view but there are very few large-sized deals available. The SWFs will be on the lookout for deals and the investment flow will improve as the transaction activity picks up.\textsuperscript{IM9}

3. An interesting trend to follow will be the SWF move into real estate operating platforms such as REITs at a global level.\textsuperscript{IM1,IM9} SWFs are now actively looking into the REIT markets especially after the recent rally in REIT prices in the US in 2010.\textsuperscript{IM6}

4. SWFs may acquire Investment Management firms in certain geographies to bring local expertise and manage their real estate investments.\textsuperscript{IM1}

\textsuperscript{32}IM1 suggested that *prime* real estate markets are the first ones to come back after a recession.
5. **Agglomeration and Co-Investment:** SWFs may form an alliance that can be a regional, country or deal-based agglomeration. They will increase inter-SWF dialogue and join hands to co-invest in attractive deals. They are looking for groups or organizations that can match their size and can be compatible co-investment partners for their future investments. The best example of this is the recent (2010) support for Brookfield’s bid for the buyout of General Growth Properties (GGP). They may invent co-investment vehicles on the lines of Sidecar investments. (Caveat: An investment advisor explained, “This strategy is not a good way forward. Such alliances usually have a non-discretionary decision making structure that gives a vote out option to each board member. In most cases there might be a conflict of interest involved especially as most SWFs work with big investment management firms. This may lead to SWFs missing out on good opportunities”.

6. **Advisory/Investment Management Fee:** SWF managers are getting very aggressive in negotiating low fees for advisory services. (Caveat: “Sometimes SWFs are overly optimistic in their expectations and aggressive negotiation with unreasonable fee reductions may lead to spoilt working relationships”.

7. To get initial exposure and comfort levels in real estate investments newer SWF’s may start looking into investment in debt. (Debt – Some sophisticated SWFs have used debt (up to 50% LTV) as a tactical investment strategy for currency hedging).

8. The general allocation towards real estate in the SWF overall portfolio moving forward will be 10% (maximum of 20%).

9. The SWFs will focus on deploying capital for real estate investments in the US, Europe, Asia (India, China), Brazil and Australia.

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33 “Canada-based Brookfield Asset Management set up a $5 billion distressed real estate opportunity fund to tap on opportunities such as General Growth Properties (GGP). GGP is the bankrupt owner of some of the most high-profile shopping malls in the US (200 malls). The distressed fund’s investors, each of which contributed a minimum of $500 million include China Investment Corporation, the Australian Fund for the Future, Government Investment Corp of Singapore and the Canadian Pension Plan Investment (Contd) Board, a quasi-SWF.” Source: http://www.transitioning.org/2010/03/15/gic-commits-at-least-500-million-to-brookfields-distressed-us-real-estate-opportunity-fund-financial-times-15-mar/, accessed June 2010.

34 An investment strategy wherein one investor allows a second investor to take control. The sidecar investment will usually be used when one of the parties lacks the ability or confidence to invest for themselves. The strategy will place trust in someone else's ability to gain profits. Source: Investopedia.com, accessed June 2010.
10. There is a possibility of newer SWFs cropping up (from Asia in particular) and also more SWFs allocating funds for real estate in their global portfolios.\textsuperscript{IM4}

11. There will be intense competition for deal sourcing with other bigger investors such as pension funds and between SWFs themselves.\textsuperscript{IM4}

12. SWFs will continue to increase their acquisition of trophy assets in prime cities of the world.\textsuperscript{IM5}

13. They will become more aggressive and nimble in sourcing deals and new opportunities.\textsuperscript{IM4}

14. Asian markets will offer SWFs tremendous liquidity. They may allocate 10\% of their global real estate portfolio to Asia. Attractive markets in Asia for SWFs will be Singapore, Tokyo (distress), China (although very competitive) and India.\textsuperscript{IM7} India and China are both high-growth real estate markets that will attract SWF capital in the near term.\textsuperscript{IM9}

Exhibit 5-4 Future Trends in SWF Real Estate Investments

![Future Trends in SWF Real Estate Investments](image)
**Level of Discretion given by SWFs to Investment Managers**

Discretion as described in the previous chapter is a function of the fund structure. Commingled funds by definition offer the maximum discretion. The interviewees agreed that SWFs for separate accounts and direct investments offer little or no discretion to investment managers. Following are some comments that capture their responses:

“SWFs typically follow a top down approach, i.e., SWFs set up a portfolio allocation towards real estate in their overall portfolio and get advice from consultants on further granularity.”\textsuperscript{IM4}

“There is no discretion in decision making given to investment managers in most cases.”\textsuperscript{IM2}

An interviewee representing a big global financial services firm stated that “Although SWFs have been looking for more control in recent times, their firm, because of its reputation and size needs to have discretion when working with SWFs on JVs and direct co-investments.”\textsuperscript{IM7}

“Discretion in investment decision making is very difficult to negotiate if you do not represent a top investment management firm.”\textsuperscript{IM9}

**Transparency**

Transparency of SWFs has been a topic of aggressive debate among academics.\textsuperscript{35} The authors sought to explore the topic from the purview of the significance of transparency in the realm of real estate investments. From the previous chapter (Real Estate Strategies I) it was evident that SWFs were working towards becoming more transparent at the entity level. The authors asked this question to the investment management and the advisory community and received a gamut of responses on what the transparency level of SWFs means to them.

Some interviewees explained that lack of transparency may be a cultural issue\textsuperscript{IM1, IM2} and that the issue of transparency may hold a different meaning for each stakeholder. The authors observed opposing viewpoints (a and b vs. c and d) from the respondents:

a) “SWFs have no obligation to disclose information as they have no shareholders.”\textsuperscript{IM2}

b) “There is no need for them to be transparent and at the deal-level transparency is irrelevant, it is the relationships between the two parties that matter the most.”\textsuperscript{IM6}

c) “SWFs should ultimately be answerable to their tax payers and the citizens of their home country.”

d) “There is no deliberate obfuscation of facts or strategic objective behind SWF real estate investments.”

However, almost all investment managers were unanimous in their advocacy for more SWF transparency, particularly in their real estate operations. They explained that SWF transparency can be beneficial because:

- More transparency implies better corporate governance that ultimately leads to better decision making.
- It will make it easier for investment managers and the advisory community to reach out to them and apprise them of deals.
- It will make it easier for the sell side to underwrite deals effectively especially in a competitive scenario.
- It will remove the level of discomfort that may exist among stakeholders in a secretive transaction.
- It will lead SWFs towards greater nimbleness and aid them in responding quickly to the competition.

A few, very related and interesting trends and characteristics were revealed by the interviewees during the conversations that add to the broader context of this chapter. The following is a summary of those points:

**Slow and Bureaucratic Decision Making**

An interviewee commented: “A commodity based SWF had worked with consultants for formulating its real estate investment strategy three years back. As of 2010 the SWF has still not executed a single real estate transaction. I am not clear whether the slow process is tantamount to them being prudent and careful or overly cautious in their real estate investments.”

---

36 IM1 said that the March 2010 annual report by Abu Dhabi Investment Authority (First Annual report in its 34-year history) is the *highest* entity-level transparency he has *ever seen* in the history of Middle Eastern SWFs!
Another interviewee gave the example of an Asian SWF whose internal processes, internal decision making guidelines and senior management (real estate) had changed many times in the past few years, adding further that some SWFs have an incredibly long and bureaucratic decision-making process mired in internal politics in addition to the lack of overall transparency.\textsuperscript{IM4}

**Investment Across cycles**

An investment manager who has worked with SWFs on consulting assignments explained, “SWFs, who invest continually across the real estate cycle tend to do well in the long run than those which have an investment stop after market cycles.”\textsuperscript{IM1}

**Importance of SWF source growth/volatility for distribution between asset classes**

In the light of the fact that the discretion and decision making power for portfolio allocation between asset classes lies usually with the SWFs, most (8 out of 9) investment managers believed that SWFs generally consider the changes in their source of wealth as a factor in their decision making. An interviewee explained “This is the ‘premise for their existence’ and stated that a fund like GIC exists in Singapore because they want to take their economic exposure away from Singapore and the same is true for oil-based SWFs.”\textsuperscript{IM7}

**Liquidity**

An interviewee stated that “Liquidity is generally not an important criterion for SWFs because of their sheer size.”\textsuperscript{IM1} Another interviewee explained “For SWFs short-term income gain and capital appreciation were secondary motives because of their scale and long-term investment horizon.”\textsuperscript{IM4}

**Some observed barriers to entry for SWFs in foreign destinations**

- Lack of understanding of tax structures, language and cultural issues are major barrier for SWF managers in executing transactions.\textsuperscript{IM4}
- Benchmarking portfolio-level performance was a major roadblock faced by SWFs in most regions particularly the emerging economies. There are no good indices with a statistically significant history outside of the US, the UK and Japan. The
current benchmarking was done by rough idea and use of internally derived country risk premiums.\textsuperscript{IM4}

- Tax\textsuperscript{37}. For the US real estate market FRIPTA\textsuperscript{38} is very punitive for SWFs.\textsuperscript{IM1,IM4}

\textsuperscript{37} See Appendix Chapter 5 for a short note on international tax and FIRPTA.

\textsuperscript{38} The Foreign Investment in Real Property Tax Act of 1980 (FIRPTA) is a law of the United States of America that applies to the sale of interests held by nonresident aliens and foreign corporations in real property located within the United States—Wikipedia, accessed June 2010.
5.6 Conclusions

The research findings show that the real estate investment management and advisory community is cognizant of the relevance of the role that SWFs will play in international real estate investments in the time to come. The interviewees agreed that SWFs are looking to take more control of their investments at the micro-level by moving towards direct investments.

Their views on the SWF risk spectrum, product preference, liquidity and partner selection were quite aligned with those of SWF real estate investment managers. The interviewees offered insights into their perception of the upcoming trends in SWF real estate investments. Their collective viewpoint was that of optimism mixed with a little skepticism. The interviewees view of the SWF direct investment, legacy-based partner selection, transparency, SWFs aggressive stance on fees and co-investment trends with bigger funds were the major points of disagreement.

Other important findings were that for real estate investments, SWFs hold most of the discretion in decision-making and that the asset allocation along the opportunity frontier or within products and asset classes may not be scientific. Furthermore, eight out of the nine real estate investment managers expressed that studying the movement of asset classes with the SWF’s source of wealth and incorporating the same in their micro-level decisions is something that SWF must be pursuing actively. Interestingly, this was not clear from the previous chapter.

In the next chapter the authors illustrate a strategic time series analysis to determine the asset classes that offer the best hedging potential for four SWF categories: Oil-based SWFs, China, Korea and Singapore.
Chapter 6 Time Series Analysis: Hedging Ability of Real Estate and Stocks

6.1 Introduction

Most SWFs are formed by nations to reinvest profits and have new sources of income once the commodity production stops, or in case of non-commodity funds, once the explosive growth gets slower. This is intended to not only provide an endowment for their future generations but also a constant source of income flow. The profits are invested in assets that provide them long-term risk-adjusted returns. SWFs are also looking to maximize their returns by holding assets that provide low and negative correlation with their sources of wealth. So for oil producing SWFs it makes sense to hold assets that offer low or negative correlation when there are periods of oil shocks. This hypothesis also applies to funds that have explosive growth in their GDP fueled by exports and fiscal surpluses.

SWFs achieve this objective by investing in stocks, bonds and alternatives globally. Real estate is placed in the alternative pie in the SWF portfolio.

Real estate has been well documented in academic works as a hedge against inflation. If SWFs can hold foreign assets that not only provide a hedge against inflation but also against their home asset changes, then their portfolio will tend to become more robust from a long-term perspective.

It is in this context that the authors explore the time series behavior of real estate and equities (stocks) with the SWF source of wealth.

6.2 Literature Review

For the past few decades there have been many works compiled on the hedging ability of real estate. Fama and Schwert (1977) studied the hedging ability of asset classes including residential property type and show that real estate is an effective hedge against both unexpected and expected inflation. This approach was applied by Hartzell, Hekman and Miles (1987) with commercial property instead of residential property, and similar results were drawn. Similarly, Murphy and Keiman (1989) examined the same topic with a REIT index. However, as REITs are publicly traded, it is not clear if REITs reflects the property markets. Matysiak et al. (1996) studied British real estate and concluded that it offers hedging
potential in the long-term while short-term hedging ability is questionable. Simon Stevenson and Louis Murray (1999) examined the hedging ability of Irish real estate against inflation by performing co-integration and causality tests and showed that Irish real estate is not a good hedge against inflation, a conclusion that is different from those of the previous studies. William N. Goetzmann and Eduardas Valaitis (2006) reviewed the autocorrelation of real estate returns and inflation indices and found that real estate returns are likely to hedge inflation well by performing vector auto-regression analysis.

Compared to the hedging ability of real estate to inflation in the studies above, Andreas Gintschel and Bernd Scherer (2008) studied the optimal asset allocation of SWFs for hedging the market risk of oil, which is a major wealth source for most SWFs.

**Time Series Analysis**

Through the first analysis the authors intend to identify and understand the historic correlation and time series relationship among the sources of sovereign wealth, real estate returns and stock returns in international markets. The objective is to ascertain the effectiveness of real estate as a hedge against Sovereign wealth source volatility from a macroeconomic perspective. The authors carry out unit root testing to determine the robustness of the data and then undertake granger causality and vector-auto-regression (VAR) to determine the efficacy of real estate in the SWF portfolio.

The authors make the following assumptions for modeling their analysis:

- Oil price change is taken as the commodity-based funds home asset.
- GDP growth\(^{39}\) is taken as a proxy for the non-commodity-based funds home asset.
- Three countries: \(^{40}\) China, Singapore and Korea, are chosen for the non-commodity-based analysis.
- Real estate and stocks are taken as the foreign assets.
- The US, the UK and Japan are chosen as foreign destinations. This was done for two reasons:

\(^{39}\) GDP growth fuels the export surpluses that in turn create reserves that are transferred to SWFs for global investments.

\(^{40}\) All three hold substantial wealth in their SWFs.
The US, the UK and Japan are developed economies and have been recipients of SWF investments in both real estate and stocks in the past.

All three have robust data sources for long-range stocks and real estate returns.

### 6.3 Data Description

The Exhibit 6-1 summarizes the sources of data used for the analysis.

#### Exhibit 6-1 Data Sources Summary

<table>
<thead>
<tr>
<th>Data Category</th>
<th>Data Type</th>
<th>Unit Comment</th>
<th>Start Year</th>
<th>End Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Price</td>
<td>Illinois Crude</td>
<td>Percent change</td>
<td>1946</td>
<td>2009</td>
</tr>
<tr>
<td>Real Estate*</td>
<td>US NCREIF</td>
<td>Total Return</td>
<td>1978</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>UK IPD</td>
<td>Total Return</td>
<td>1981</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Japan CBRE</td>
<td>Total Return</td>
<td>1970</td>
<td>2009</td>
</tr>
<tr>
<td>GDP Growth**</td>
<td>China</td>
<td>GDP Growth</td>
<td>1971</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>GDP Growth</td>
<td>1971</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Korea</td>
<td>GDP Growth</td>
<td>1971</td>
<td>2009</td>
</tr>
<tr>
<td>Stocks***</td>
<td>S&amp;P 500</td>
<td>Annual Index Change</td>
<td>1957</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>FTSE 100</td>
<td>Annual Index Change</td>
<td>1984</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>NIKKEI 225</td>
<td>Annual Index Change</td>
<td>1951</td>
<td>2009</td>
</tr>
</tbody>
</table>

* Each data type represents nations-wide total return.

For modeling the source of wealth of the oil-based SWFs the authors used the historic oil price data in dollars per barrel from 1946 to 2009\(^41\) (Exhibit 6-2). Oil price change\(^42\) represents a proxy for the source of wealth of the commodity-based SWFs\(^43\). Exhibit 6-2 illustrates the historic trends in oil price. It is easy to note the sharp rise in oil prices in the 70’s, high volatility of the 80’s and 90’s and the recent spike in global oil prices in 2008 followed by a fall and rise again. In general, wars, price controls, production fluctuations imposed by OPEC, major environmental disasters and the movements in the US dollar have historically caused sharp volatility in oil prices. (Thus one of the primary reasons why SWFs exists in the GCC and other oil producing nations such as Norway and Russia is to stabilize

\(^{41}\) The prices are based on historical free market (strip) price of Illinois Crude as presented by the Illinois Oil and Gas Association (IOGA). Source: http://inflationdata.com, accessed June 2010.

\(^{42}\) Oil return implies the year over year percent change in crude oil price.

\(^{43}\) Exceptions would be the precious metal based SWFs like Chile. (However, commodity based funds, when the source is not oil represent <1% of the global SWF assets under management).
the effects of this high volatility in oil prices, by diversifying the wealth into uncorrelated foreign assets).

Exhibit 6-2 Historic Crude Oil Prices

![Dollars per Barrel vs. Year Graph](source)

The authors obtained the GDP growth data from 1971 to 2008 for China, Singapore and South Korea from the UN Statistics Division database. The authors added the GDP growth statistic for 2009 from the CIA World Factbook 2009.

The real estate return time series data were obtained from a variety of sources. The authors used total returns encompassing both income return and capital appreciation components.

**US Real Estate Returns**

The authors use annual total return data from NCREIF as a proxy for US real estate returns (base year =1978). “The NCREIF Property Index (NPI) is a quarterly time series composite total rate of return measure of investment performance of a very large pool of individual commercial real estate properties acquired in the private market for investment purposes only. All properties in the NPI have been acquired, at least in part, on behalf of tax-exempt institutional investors, the great majority being pension funds. As such, all properties are held
in a fiduciary environment.\textsuperscript{44} The index is constructed as a weighted average of the property appraisals. As the appraisals are done annually, the return data may not be synchronized with time. This may lead to \textit{stale} data with low volatility. This phenomenon is commonly referred to as smoothing.\textsuperscript{45}

To correct for this discrepancy in the stylized second moment comparative analysis described in this chapter the authors also use the long-range CPPI index for the US real estate market. The Moody’s/REAL commercial property index (CPPI) is a periodic same-property round-trip investment price change index of the U.S. commercial investment property market based on data from MIT Center for Real Estate’s industry partner Real Capital Analytics, Inc (RCA).\textsuperscript{46} The index is designed to track same-property realized round-trip price changes based purely on the documented prices in completed, contemporary property transactions. The index uses no appraisal valuations. The methodology employed to construct the index is a repeat-sales regression (RSR), as described in detail in Geltner and Pollakowski (2007).\textsuperscript{47}

The authors use the extended version of the CPPI that uses TBI\textsuperscript{48} data from 1984 to 2000 and unsmoothed NCREIF prior to that for correlation analysis comparison described later in this chapter. Exhibit 6-3 shows the extended CPPI developed at the MIT Center for Real Estate.

UK and Japanese Real Estate Returns
The authors use the International Property Databank\textsuperscript{49} real estate total returns as a proxy measure for the (UK) market (base year 1981). For the Japanese real estate market the authors obtained data from the MUTB-CBRE Real Estate Investment Index\textsuperscript{50} (base year 1970).

\begin{itemize}
  \item \textsuperscript{44}http://www.ncreif.com/, accessed June 2010.
  \item \textsuperscript{45}Geltner and Goetzmann (2000) omit internal appraisals from the calculations and construct a repeated-measures index from NCREIF data that also included income returns.\textsuperscript{45}
  \item \textsuperscript{46}The methodology for index construction has been developed by the MIT/CRE through a project undertaken in cooperation with a consortium of firms including Real Estate Analytics, LLC.
  \item \textsuperscript{47}MIT Center for Real Estate – Moody’s Real CPPI, Web: http://web.mit.edu/cre/research/credl/rca.html.
  \item \textsuperscript{48}The MIT/CRE data laboratory has developed a Transactions-Based Index (TBI) of Institutional Commercial Property Investment Performance. The purpose of this index is to measure market movements and returns on investment based on transaction prices of properties sold from the NCREIF Index database. Web: http://web.mit.edu/cre/research/credl/tbi.html, accessed June 2010.
  \item \textsuperscript{49}http://www.ipd.com/
  \item \textsuperscript{50}Real estate investment index based on more than 20,000 tenant lease contracts since 1970. A return index jointly developed with Mitsubishi UFJ Trust and Banking Corporation. Source: http://www.cbre.co.jp/EN/Research_Center/Pages/Real_Estate_Investment_Index.aspx, accessed June 2010.
\end{itemize}
6.4 Description of Time Series Analysis

6.4.1 Unit Root Tests

Stationarity of Time Series and Check for robustness of data

A stationary series can be defined as one with a constant mean, constant variance and constant auto-covariance for a given lag. The use of non-stationary data can lead to a “spurious regression.” If two variables are trending over time then a regression of one on the other could have a very high R² even if the two are totally unrelated.

If standard techniques are applied to the regression data then the end result could be a regression that looks good artificially but has no meaning (spurious). Thus it is not possible to validly undertake hypothesis tests on regression parameters if the data are non-stationary. Statistically, if one variable is regressed on the other then for a stationary series 95% of the

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51 The description of the Unit root testing has been referred for this analysis from ‘Introductory Econometrics for Finance’, Chris Brooks, 2008, second edition, page 318-373.
time the t-ratio will lie between ± 2. Unit root tests are the most commonly used statistical
tools to test the stationarity of the time series data.

Unit Root

The time series random walk model with drift can be represented by the equation:

\[ y_t = \mu + \phi y_{t-1} + \epsilon_t \] (where \( \mu \) is the drift, \( \phi \) is the coefficient of \( y_{t-1} \) or the shock coefficient and \( \epsilon_t \) is the noise). Considering a general case without drift and continuously lagging the RHS in
the equation above with \( T \) successive lags we obtain

\[ y_t = \phi^T y_{t-(T+1)} + \phi^2 u_{t-1} + \phi^T u_{t-1} + \epsilon_t \]

If \( \phi < 1 \Rightarrow \phi^T \rightarrow 0 \) as \( T \rightarrow \infty \)

Thus, the shocks in the system die away. This implies a stationary case. If \( \phi = 1 \Rightarrow \phi^T = 1 \); we
obtain \( y_t = y_0 + \sum_{i=0}^{\infty} u_t \)

In other words, the current value of \( y_t \) is just an infinite sum of past shocks plus the initial
value \( y_0 \). This is known as the unit root case as the root of the characteristic equation is unity.

Testing for a unit root

Dickey (1979) and Fuller (1976) proposed a testing procedure for unit root testing. The test
examines a null hypothesis that \( \phi = 1 \) in

\[ y_t = \phi y_{t-1} + \epsilon_t \]. On subtracting \( y_{t-1} \) from both sides we obtain \( \Delta y_t = \psi y_{t-1} + \epsilon_t \). The test of \( \phi = 1 \)
here is equivalent to testing \( \psi = 0 \) (as \( \phi - 1 = \psi \)). The general model for unit root can thus be
written as \( \Delta y_t = \psi y_{t-1} + \mu + \lambda_t + \epsilon_t \). Dickey and Fuller (1981) further calculated test statistic
and critical values from simulation experiments.\(^{52}\) For the purpose of this work it can be
summarized that for unit root testing the null hypothesis of a unit root is rejected in favor of
the stationary alternative in each case if the test statistic is more negative than the critical
value.

\(^{52}\) ‘Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root’, David A. Dickey; Wayne A.
The Dickey and Fuller procedure was further augmented to account for the autocorrelation in the white noise \((u_t)\) component using time lags. This test is commonly known as the ADF or the Augmented Dickey-Fuller test. Determining the optimal number of lags is important. The authors used a lag value of six for the long annual time series data for our analysis. (Using too few lags for annual data may not remove the autocorrelation).

**Analysis of Unit Root test results**

The authors summarize the unit root test results for all data series used in the analysis in Exhibit 6-4 that is organized by base year. It is clear from the results that the ADF test statistic is negative than the ADF critical values in all cases\(^{53}\) for all base years indicating that the long term time series data are stationary and non-spurious. See Appendix 6-1 for sample ADF test output for IPD data (1981-2009) from the Eviews program.

**Exhibit 6-4 Unit Root Test Result Summary**

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>US NCREIF</th>
<th>UK IPD</th>
<th>Japan CBRE</th>
<th>S&amp;P 500</th>
<th>FTSE 100</th>
<th>Nikkei 250</th>
<th>Oil Price (% change)</th>
<th>GDP Growth China</th>
<th>GDP Growth Singapore</th>
<th>GDP Growth Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>0.140</td>
<td>0.140</td>
<td>0.140</td>
<td>0.140</td>
<td>0.140</td>
<td>0.140</td>
<td>0.140</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Base Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>ADF Statistic</td>
<td>-4.822</td>
<td>-4.822</td>
<td>-4.822</td>
<td>-4.822</td>
<td>-4.822</td>
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<td>-4.822</td>
<td>-3.007</td>
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<tr>
<td>Probability</td>
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<td>0.000</td>
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<td>Base Year</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Probability</td>
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<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
</tr>
</tbody>
</table>

* At the 5% level.

\(^{53}\) The highlighted case for US NCREIF data is considered stationary because of the very weak nature of the unit root.
6.4.2 Correlation Analysis

The robustness of the sample data implies that the correlation results on the sample data will be non-spurious. The authors thus perform the pair-wise correlation analysis for the long-range data. Exhibit 6-5 shows the summary of the correlation analysis.

**Exhibit 6-5 Correlation Analysis Summary**

<table>
<thead>
<tr>
<th>Analysis of Correlation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is evident from Exhibit 6-5 that both stocks and real estate returns have low and in some cases negative correlations with oil price and GDPs. UK’s real estate returns/GDP of Singapore and Oil price change/NCREIF returns are two pairs that have exhibited a medium (^{54}) correlation over the long-run. The unsmoothed version of US real estate returns (CPPI) (^{55}) shows almost no correlation with oil. Exhibit 6-6 illustrates the negative correlation between the UK IPD return and the Oil price percentage change.</td>
</tr>
</tbody>
</table>

The graphs similar to Exhibit 6-6 that illustrate the correlations for all other pairs are compiled in Appendix 6-2.

One obvious implication of the low correlation between the foreign assets and home asset of SWFs is that SWFs can maximize the hedging potential by investing in these asset classes.

---

\(^{54}\) For the positive spectrum of the correlation results the authors define correlations from +0.250 to +0.50 as medium; anything below +0.250 is low (negative correlations are stated separately).

\(^{55}\) The MIT CRE/Moody’s extended CPPI returns (unsmoothed) provide a long-term second moment statistic for comparing with NCREIF results. (Used as a long term second moment indicator of US real estate returns)
In particular, the following home assets with real estate as the foreign asset have exhibited negative correlations and may offer attractive hedging potential:

- Oil and UK real estate
- GDP of China and US real estate
- GDP of Korea and US real estate
- GDP of China and Japanese real estate.

**6.4.3 Granger Causality**

After correlation analysis, the authors perform the pair-wise Granger causality tests. The tests are performed between the home assets (Oil/GDP growth) and foreign assets (stocks and real estate). Granger causality implies that there exists correlation or chronological ordering between the current value of one variable and the past value of the other. In other words, Granger causality describes a lead-lag interaction between the time series; it however does not mean that the movements of one variable physically cause the movements of another.\(^\text{57}\)

\(^\text{56}\) Granger (1969; Sims 1972).
Granger Causality Testing

To quantitatively illustrate the Granger causality concept, the authors construct the following bi-variate model for two variables, Oil and UKIPD.

\[
\begin{align*}
\text{Oil}_t &= \alpha_0 + \sum_{i=1}^{p} \alpha_i \text{Oil}_{t-1} + \sum_{i=1}^{p} \beta_i \text{UKIPD}_{t-1} + \varepsilon_t \\
\text{UKIPD}_t &= \beta_0 + \sum_{i=1}^{p} \gamma_i \text{Oil}_{t-1} + \sum_{i=1}^{p} \delta_i \text{UKIPD}_{t-1} + \varepsilon_t 
\end{align*}
\]

The Granger equation implies that the Oil return at time \( t \) Granger causes UKIPD return at time \( t \) if the behavior of the past Oil return can better forecast the movement of UKIPD at time \( t \) than UKIPD’s past alone. The results of Granger causality (Exhibit 6-7) for Oil and UKIPD returns show that Oil return and UK real estate returns (IPD) don’t have any causality.\(^59\)

The results of Granger causality for all the variables are shown in the Exhibit 6-8. This table presents the results of the \( F \) tests and P-values for Granger causality.

Exhibit 6-7 Granger Causality Summary for Oil Return and UK Real Estate Return

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis: \text{OIL does not Granger cause UKRE}</td>
<td>28</td>
<td>0.36663</td>
</tr>
<tr>
<td>\text{UKRE does not Granger cause OIL}</td>
<td>2.17373</td>
<td>0.15287</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis: \text{OIL does not Granger cause UKRE}</td>
<td>27</td>
<td>0.41103</td>
</tr>
<tr>
<td>\text{UKRE does not Granger cause OIL}</td>
<td>2.74088</td>
<td>0.08653</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis: \text{OIL does not Granger cause UKRE}</td>
<td>26</td>
<td>0.56142</td>
</tr>
<tr>
<td>\text{UKRE does not Granger cause OIL}</td>
<td>2.42523</td>
<td>0.09729</td>
</tr>
</tbody>
</table>


\(^{59}\) Statistically significant at the 5 % level.
Exhibit 6-8 Granger Causality Tests Results

<table>
<thead>
<tr>
<th>Data Type and Lags</th>
<th>Oil Price (% change)</th>
<th>GDP Growth China</th>
<th>GDP Growth Singapore</th>
<th>GDP Growth Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-Statistic</td>
<td>P-Value</td>
<td>F-Statistic</td>
<td>P-Value</td>
</tr>
<tr>
<td>Lag1</td>
<td>5.092</td>
<td>0.032</td>
<td>3.547</td>
<td>0.070</td>
</tr>
<tr>
<td>Lag2</td>
<td>0.735</td>
<td>0.399</td>
<td>1.410</td>
<td>0.245</td>
</tr>
<tr>
<td>Lag3</td>
<td>2.909</td>
<td>0.073</td>
<td>1.021</td>
<td>0.375</td>
</tr>
<tr>
<td>Lag4</td>
<td>0.134</td>
<td>0.875</td>
<td>0.619</td>
<td>0.547</td>
</tr>
<tr>
<td>Lag5</td>
<td>1.461</td>
<td>0.252</td>
<td>0.669</td>
<td>0.580</td>
</tr>
<tr>
<td>Lag6</td>
<td>0.117</td>
<td>0.949</td>
<td>0.972</td>
<td>0.424</td>
</tr>
</tbody>
</table>

* Statistically significant at a 5% level.

Analysis of Granger Causality Results\(^{60}\)

The authors analyze the Granger causality results from two perspectives:

Case A: If the home asset determines (Granger causes) a foreign country’s asset returns, then it might indicate that the foreign asset is a bad hedge in the SWF portfolio. If, however, the causality test from home asset to foreign assets fails, then it reinforces the usefulness of adding the foreign asset as a hedge in the portfolio.

---

Case B: Reverse causality is indicative of a specification problem. If the Granger causality test indicates that a foreign asset causes home asset returns then that foreign asset will not be a good hedge in the SWF portfolio.

**Observed Case B pairs:**

- US real estate return (NCREIF) Granger causes Oil return
- UK’s IPD Granger causes the GDP China
- Nikkei 250 Granger causes GDP Korea
- Nikkei 250 Granger causes GDP Singapore

Interestingly, the authors observe no Case A pairs, which may indicate that all other foreign assets (both real estate and stocks) are good additions in the home (SWF) portfolio from a Granger causality perspective.

### 6.4.4 Vector Auto-regression (VAR) and Impulse Response Tests

Vector auto-regression (VAR) is an econometric model used to capture the evolution and the interdependencies between multiple time series, generalizing the univariate autoregressive models. All the variables in a VAR are treated symmetrically by including for each variable an equation explaining its evolution based on its own lags and the lags of all the other variables in the model. Based on this feature, Christopher Sims (1972, 1980) advocates the use of VAR models as a theory-free method to estimate economic relationships. 61

VAR is widely used in economics to model the evolution of the economy. It has been useful in analyzing the effects of policy choice (Bernanke, Boivin and Eliasz, 2004). 62 The authors use a simple VAR model 63 to examine the pair-wise relationship between SWF home asset and returns of two asset classes namely, real estate and stocks for the US, the UK and Japan. The authors have already shown that the data are robust in terms of stationarity by doing rigorous unit root testing. This implies that the VAR results should be non-spurious.

---

61 Wikipedia, Brooks’s (2008) chapter 6 and Brandt and Williams (Multiple-time series models, 2007), section 1.4.
63 VAR assumes the variables to be endogenous and the authors do an unrestricted VAR analysis, i.e., assumes the same number of lags for the endogenous variables in the equation.
The authors take the example of Oil and UK real estate to illustrate the VAR modeling process by constructing the VAR equations that makes Oil price change a function of its own past value and the past values of UK IPD return plus the error term ($u$).

\[
\begin{align*}
O_i &= \beta_{10} + \beta_{11}O_{i-1} + \alpha_{11}UK_{IPD_{t-1}} + u_{1t} \\
UK_{IPD} &= \beta_{20} + \beta_{21}UK_{IPD_{t-1}} + \alpha_{21}O_{i-1} + u_{2t}
\end{align*}
\]

**Analysis of VAR Results**

The authors run pair-wise VAR models for the 6*4=24 pairs (Oil, GDP China, Singapore, Korea (4) with Real Estate and Stocks in the US, the UK and Japan (6)). Appendix 6-4 shows the result summary for all pairs.\(^6\)

Appendix 6-3 shows the detailed VAR output for the Oil and UK IPD pair. The Exhibit 6-9 summarizes the result:

**Exhibit 6-9 Vector Auto-regression Test Result for Oil and UK Real Estate**

<table>
<thead>
<tr>
<th></th>
<th>OIL</th>
<th>UK IPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL(-1)</td>
<td>0.033567  *-0.046172</td>
<td>-0.07625</td>
</tr>
<tr>
<td></td>
<td>-0.2051   **-0.07625</td>
<td>-0.60550</td>
</tr>
<tr>
<td></td>
<td>[0.16366] ***</td>
<td>[2.36251]</td>
</tr>
<tr>
<td>UK IPD(-1)</td>
<td>0.713909  0.425311</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.48422  -0.18003</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[1.47436] [2.36251]</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>-0.023198 0.054706</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.07078  -0.02632</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-0.32772] [2.07878]</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.080003  0.20366</td>
<td></td>
</tr>
</tbody>
</table>

*Coefficient,**Standard-Error,***t-Statistic

This result shows that the variations in property returns in the UK market cannot be explained by Oil price change (home asset of oil-based SWFs). However, it is significantly influenced by the UK IPD lagged returns themselves (t-stat is significant (>2) for $UK_{IPD_{t}}$ and $UK_{IPD_{t-1}}$). This may imply that property returns in the UK market reflect the property market influences of factors such as rents and yields cap rates and are not influenced by macroeconomic factors such as oil price change or GDP changes in other parts of the world.

\(^6\) Note: The authors use a lag value of 1 that minimizes the AIC parameter (-1.48 with lag 1 and -1.43 with lag2).
Similarly, the authors found that for most of the other cases (Appendix 6-4) the lagged foreign asset returns themselves have the most powerful explanation for determining the foreign asset returns or in some cases none of the returns offers any explanations. This indicates that since the home asset (SWF) and foreign asset returns (pair-wise) cannot be explained by each-other, they may offer good hedging potential.

The clear exceptions to this trend are the following pairs:

a) NCREIF and Oil
b) GDP Singapore and NIKKEI 250
c) GDP Korea and NIKKEI 250

Results b) and c) imply that the GDP growth of Singapore and Korea can be explained by the NIKKEI 250 (stock market movement in Japan). This is a plausible result as there is a high level of bilateral trade between Singapore and Japan, and between Korea and Japan. Thus Japanese stocks are not a hedged investment for SWFs from Singapore and Korea. Result a), in contrast, is somewhat more puzzling. The result implies that the US real estate returns can explain oil returns. This can be attributed to the high correlation between Oil and NCREIF or because of the smoothed nature of NCREIF. This result does not offer an obvious macroeconomic explanation.

**Impulse Response Analysis**

Impulse response is used to trace the responsiveness of the dependent variables in the VAR to shocks to each of the variables. In other words a unit shock is applied to the error term and the effects of the VAR system are noted over time. The impact of the SWF home asset on foreign asset is effectively another way of determining the value of the hedge. The impact of foreign asset on stocks on home asset of SWF is potentially puzzling and needs a macroeconomic interpretation.

As an example illustration see Exhibit 6-10 that shows the impulse response results between Oil (Home Asset) and UK real estate (foreign asset).

---

65 Refer to the (t-stat) results in Appendix 6-4.
67 The dotted line indicates the Innovations or the confidence intervals.
Exhibit 6-10 Impulse Response Test between Oil and UK Real Estate

Analysis of Impulse Response Results

The curves annotated as X and Y are the curves of interest. Curve X shows the response of Oil returns to a unit shock (error term) in UK real estate returns. The shape implies a positive movement that dies down over time. Curve Y, in contrast, shows the response of UK real estate to a unit shock in Oil returns. This curve has an opposite sign and again dies down over time.

This indicates that the shocks generate opposite movement in asset returns and die away fairly quickly, illustrating a fair nature of the hedge. (It can be inferred that impacts on asset pairs that have opposite sign and die away quickly are potentially good hedge pairs whereas asset pairs with the same sign are not good hedges and asset pairs with opposite sign of impact but that take a long period to die down can again be inferred as bad hedges).
Appendix 6-5 illustrates the Impact Analysis output for all asset pairs. Further, pair-wise interpretations have been summarized in the following section.

**6.5 Conclusions and Discussion of Results**

The authors summarize the findings of the time series analysis and provide recommendations for the best hedges for each of the 4 home assets.

**Oil-based SWFs**

Real estate:

- US real estate (NCREIF) has a positive (medium\(^{68}\)) correlation with Oil. CPPI on the other hand has a positive but low correlation. NCREIF Granger causes oil and also explains the oil returns (VAR). It has an unfavorable impulse response.
- UK real estate stands out as an asset class that offers a negative correlation, no Granger causality and a favorable impulse response.\(^{69}\)
- Japanese real estate has a positive but low correlation with oil, no Granger causality and an unfavorable impulse response.

**Recommendation:** It is evident that UK real estate offers the best hedging potential for Oil-based SWFs.

Stocks:

- All three stocks have similar traits in that they have a negative correlation, no Granger causality and a favorable impulse response.

**Recommendation:** S&P 500 is the most un-correlated among the three and may offer the best hedging potential.

---

\(^{68}\) For the positive spectrum of the correlation results the authors define correlations from +0.250 to +0.50 as medium; anything below +0.250 is low (negative correlations are stated separately).

\(^{69}\) The authors generalize that a ‘favorable impulse response’ is one that has opposite sign (home asset / foreign asset movement post shock) and dies quickly with time. See Appendix 6-5 for all pair-wise impulse response illustrations.
**Chinese SWFs**

Real estate:

- US real estate (NCREIF) has a negative correlation, (CPPI has a zero correlation), no Granger causality and an unfavorable impulse response.
- UK real estate has positive but low correlation, has causality in that UK real estate Granger causes Oil and an unfavorable impulse response.
- Japanese real estate has a negative correlation, no Granger causality and an insignificant but long lasting impulse response.

**Recommendation:** From among the three it is evident that Japanese real estate offers the best hedging potential for Chinese SWFs followed by US real estate.

Stocks:

- S&P 500 has a positive but low correlation, no Granger causality and a favorable impulse response.
- FTSE 100 has a positive but low correlation, no Granger causality and a favorable impulse response.
- NIKKEI 250 has a negative correlation, no Granger causality and a favorable impulse response.

**Recommendation:** NIKKEI 250 is the most uncorrelated (negatively so) among the three and may offer the best hedging potential.

**Singapore SWFs**

Real Estate:

- US real estate (NCREIF) has a medium positive correlation, (CPPI has a positive but low correlation), no Granger causality and an unfavorable impulse response.
- UK real estate has a medium positive correlation, no Granger causality and an unfavorable impulse response.
- Japanese real estate has a low correlation, no Granger causality and an insignificant but long lasting impulse response.
**Recommendation**: Japanese real estate offers the best hedging potential for Singapore SWFs followed by US real estate.

**Stocks:**

- S&P 500 has a negative correlation, no Granger causality and a favorable impulse response.
- FTSE 100 has a positive but low correlation, no Granger causality and an unfavorable impulse response.
- NIKKEI 250 has a medium correlation, has causality in that NIKKEI 250 Granger causes GDP Singapore. Additionally the VAR results suggest that GDP Singapore can be explained by NIKKEI 250. The impulse response is not favorable as well. This is a clear case of a poor hedge pair.

**Recommendation**: S&P 500 may offer the best hedging potential for Singapore SWFs and NIKKEI 250 may not be a good hedge.

**Korean SWFs**

**Real Estate:**

- US real estate (NCREIF) has a negative correlation, (CPPI has a positive but low correlation), no Granger causality and an unfavorable impulse response.
- UK real estate has a positive but low correlation, no Granger causality and an unfavorable impulse response.
- Japanese real estate has a positive but low correlation, no Granger causality and an insignificant but long lasting impulse response.

**Recommendation**: US real estate offers the best hedging potential for Korean SWFs followed by UK real estate.
Stocks:

- S&P 500 has a negative correlation, no Granger causality and a favorable impulse response.
- FTSE 100 has a negative correlation, no Granger causality and a favorable impulse response.
- NIKKEI 250 has a positive but low correlation, has causality in that NIKKEI 250 Granger causes GDP Korea. Additionally the VAR results suggest that GDP Korea can be explained by NIKKEI 250. The impulse response is not favorable as well. Similar to Singapore this is a clear case of a poor hedge pair.

**Recommendation:** S&P 500 may offer the best hedging potential for Singapore SWFs. and NIKKEI 250 may not be a good hedge. Exhibit 6-11 summarizes the best hedged destinations for all home assets.

Exhibit 6-11 Best Hedges

<table>
<thead>
<tr>
<th>Source</th>
<th>Real Estate</th>
<th>Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>UK</td>
<td>US</td>
</tr>
<tr>
<td>China</td>
<td>Japan</td>
<td>Japan</td>
</tr>
<tr>
<td>Singapore</td>
<td>Japan</td>
<td>US</td>
</tr>
<tr>
<td>Korea</td>
<td>US</td>
<td>US</td>
</tr>
</tbody>
</table>

In sum, this analysis provides evidence that real estate is a good hedge and consequently a good addition in the SWF portfolio along with stocks. Additionally, the authors point out the best hedges and clear exceptions in both asset classes. However, this analysis to determine effective hedge pairs is a second moment analysis and therefore just considers movement and causality of the asset pairs. For determining the weight of an asset class in the SWF portfolio, it is very important to consider descriptive statistics such as mean and standard deviation of the asset classes. This leads us to the next chapter where the authors consider the long-term returns of the constituent asset classes and attempt to determine the optimal portfolio allocation for each SWF.
Chapter 7 Sub-Portfolio Analysis

7.1 Introduction

The English proverb ‘Don’t put all your eggs in one basket’ is the simplest way of describing portfolio diversification. Modern Portfolio Theory (MPT) traces its roots to the seminal paper written by Harry Markowitz in 1952. MPT rigorously proved that portfolios composed of different asset classes and not correlated with one another reduce the overall standard deviation of the portfolio without reducing its overall expected return. Portfolio theory thus provides an elegant and rigorous framework for decision making and thinking about strategic asset allocation at the level of the investors’ overall wealth.

SWFs may hold assets with negative or low correlation to their wealth source to offset commodity or trade shocks to the home economy. The authors show evidence in the previous chapter that real estate is a good hedge against the source volatility of most SWFs. SWFs also have explicit return objectives and create a portfolio that holds more risky assets than their respective central banks; they typically aim to follow an allocation strategy similar to that of private asset managers, which in turn is broadly mirrored in the market capitalization shares.70

In the 1970’s big pension funds realized that real estate was a good addition to a portfolio composed primarily of stocks and bonds because it offered less volatility and negative or low correlation with the stock markets. SWFs differ from big pension funds in that they have limited or no liabilities and a longer investment horizon. This factor further enhances the attractiveness of real estate as its illiquid nature is masked by the long-term investment horizon of SWFs. It is also evident that SWFs are increasingly becoming more active in their real estate investments as explained in the introduction chapters. It is quite plausible to say that as SWFs get more sophisticated, real estate will be a natural choice for their global portfolio.

This chapter uses the MPT approach and explores, by a simple stylized sub-portfolio analysis, the allocation spectrum\textsuperscript{71} for real estate in the SWF portfolio with long-term bonds and stocks as the other major constituent asset classes.

### 7.2 Literature Review

Several scholars have worked on understanding the weight of real estate in the mixed asset portfolio. Burns and Epley (1982), Miles and McCue (1982), Ennis and Burik (1991) are the early works that contributed on portfolio strategy with the real estate investment in the US. Worzala (1992), Newell and Webb (1996) and Goeztmann and Wachter (1996) studied portfolio diversification specific to real estate investments in the international direct markets. Ross and Webb (1985) found that portfolio benefits can be obtained from real estate investment in the international market by analyzing rent indices from 14 countries.

In the recent years as the borders between international investments have been diminishing at an exponential scale, a very rich body of works has been compiled on international real estate investments as well as on Strategic Asset Allocation (SAA) for Sovereign Wealth funds. Gintschel and Scherer (2008) explore several issues concerning SWF asset allocation. They find that the decision of portfolio allocation needs to consider correlations between oil-wealth and assets with negative correlation to maximize the diversification benefits. Bernd Scherer (2009) shows how asset allocation recommendations change as the time horizon becomes longer.

### 7.3 Sub-Portfolios

The authors construct sixteen (12+4) portfolios\textsuperscript{72} taking four SWFs categories (Oil-based SWFs, China, Singapore and Korea) and the US, the UK, and Japan as the recipient countries. The sub-portfolio comprises of four asset classes: stocks, ten-year long-term treasury bond, real estate, and the source of Sovereign Wealth itself as the fourth asset class. The source is modeled by oil price percent change and GDP growth of non-commodity SWFs

---

\textsuperscript{71} Optimal portfolios using historical returns.

\textsuperscript{72} The authors construct four portfolios with the transaction-based indices (TBI) for the United States.
as described in the previous chapter. The authors call it a sub-portfolio analysis as they use a simplified pair-wise model for constructing the home entity portfolio.

Assumptions

- The “portfolio holder” is assumed to be the holding entity of the country’s reserves and foreign/domestic investments (SWFs).
- The portfolio holder invests 50% in its home country.  

73 This is a simplified assumption and a limitation of the above analysis. Examining each country and comparing the present discounted value of GDP or the estimated value of natural resource reserves relative to the size of the SWF would be a more precise analysis. However 50% is a reasonable assumption as the chosen SWFs (China, Singapore, Korea and the Oil-based SWFs) have a substantial size relative to their home assets.

- MPT assumptions hold true.  

74 Real estate violates MPT assumptions in that, first, un-securitized real estate is not perfectly divisible and, second, it has high transaction costs.

- SWFs can freely borrow and lend risk-free assets.
- UK (IPD) and Japanese real estate (CBRE) may have a smoothing bias.  

75 This lowers the measured volatility and thereby may cause a portfolio bias. The authors correct this for the US market by using TBI data and comparing the results with NCREIF.

- There are no exchange rate fluctuations between the home nation and foreign destination pairs.  

76 The local currency of Middle Eastern oil-based SWF nations is generally pegged against the US dollar. This may have some influence on the allocation results of other types of SWFs.

7.4 Methodology

The sub-portfolio analysis uses the classical MPT methodology for minimizing variance under an additional constraint of 50% allocation to the home entity.

Following is the variance minimization equation:

\[ S_p^2 = \sum_{i=1}^{4} \sum_{j=1}^{4} w_i w_j \text{Cov}_{ij} \]

Optimization constraints:

\[ \sum_{i=1}^{4} w_i = 1; \sum_{i=1}^{4} w_i E(r_i) = E(r_p) \text{ and } w_{\text{home asset}} = 50\% \]

where \( S_p \) is the portfolio variance, \( E(r_i) \) the mean asset return, \( E(r_p) \) the portfolio mean return and \( w \) represents the asset weights. Assuming that the home nation can borrow or lend
riskless\textsuperscript{77} assets, the authors apply the two-fund theorem and optimal portfolio analysis to derive the portfolios that maximize the Sharpe ratio\textsuperscript{78} for each home asset - foreign destination pair.

### 7.5 Data Description

The data sources for returns of stock, oil price percent change and GDP growth were described in Chapter 6. Additionally, the authors collected fixed income (10-year government bond) data from the respective indices of US long-term bonds (1978-2009), the UK (1984-2009), and Japan (1971-2009). The source for this data was the Global Financial Database (GFD). The authors also obtained the risk-free asset average return indices for 3-month Treasury bills for the US (1976-2009), UK (1984-2009), and Japan (1976-2009) from the GFD.

#### Exhibit 7-1 Additional Sources of Data

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Data Type</th>
<th>Unit</th>
<th>Unit Comment</th>
<th>Start Year</th>
<th>End Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds*</td>
<td>US LT Tbond</td>
<td>% (10yr)</td>
<td>Total Return</td>
<td>1978</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>UK LT Tbond</td>
<td>% (10yr)</td>
<td>Total Return</td>
<td>1984</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>JPN LT Tbond</td>
<td>% (10yr)</td>
<td>Total Return</td>
<td>1971</td>
<td>2009</td>
</tr>
<tr>
<td>Risk Free Rate*</td>
<td>US Tbill</td>
<td>% (3 month)</td>
<td>Average Return</td>
<td>1976</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>UK Tbill</td>
<td>% (3 month)</td>
<td>Average Return</td>
<td>1984</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>JPN Tbill</td>
<td>% (3 month)</td>
<td>Average Return</td>
<td>1976</td>
<td>2009</td>
</tr>
<tr>
<td>Real Estate</td>
<td>US TBI Index**</td>
<td>%</td>
<td>Total Return</td>
<td>1978</td>
<td>2009</td>
</tr>
</tbody>
</table>

* *Global Financial Database, accessed June 2010.*

** TBI (Transaction Based Index) developed by the MIT Center for Real Estate.

The authors perform an additional portfolio analysis for the US market with the TBI index\textsuperscript{79} that reflects the transaction-based data and compare the results with NCREIF.

\textsuperscript{77} For instance short-term US Treasuries (riskless implies zero/low volatility).

\textsuperscript{78} Sharpe ratio (SR) indicates the risk adjusted returns. \( SR = \frac{(r_p - r_f)}{\sigma_p} \) where \( r_p \): return of market portfolio, \( r_f \): risk-free rate, \( \sigma_p \): standard deviation.

7.6 Efficient Frontiers and Market Portfolios

Exhibit 7-3 illustrates the efficient frontier and market portfolios for Oil-based and Chinese SWF investments in the US. The authors use this example to illustrate the effects of transaction-based index returns on the efficient frontier. Exhibit 7-4 illustrates area charts for the optimal shares of constituent asset classes under different return expectations. Due to the limitations of the real estate return data the authors model the long-term sub-portfolio analysis with the following start dates that are based on the year of inception of the respective real estate indices namely, NCREIF (US), IPD (UK) and CBRE (Japan).

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>1978-2009</td>
</tr>
<tr>
<td>UK</td>
<td>1984-2009</td>
</tr>
<tr>
<td>Japan</td>
<td>1971-2009</td>
</tr>
</tbody>
</table>
Exhibit 7-3 Efficient Frontier and Market Portfolios

MEAN-VARIANCE SPACE

China/US (NCREIF)

China/US (TBI)

Exhibit 7-4 Area Chart for Different Values of Expected Return (Y-axis)
NOTE

- Exhibit 7-6 at the end of this chapter summarizes the results and optimal portfolio composition for all combinations and mentions the mean returns and standard deviations of the constituent asset classes.
- See Appendix 7 for efficient frontiers and area charts for all sixteen pairs.

7.7 Conclusions and Discussion of Results

The previous chapter provides recommendations based on the hedging potential offered by the asset classes for various home country-foreign destination pairs. The optimal portfolio analysis takes this a step further by considering the mean returns and by adding long-term bonds as the third asset class. For SWF investors the total return offered by the various asset classes is one statistic that should matter the most. The authors describe the results of the sub-portfolio analysis and its meaning and significance for each home nation.

Home Asset: Oil

Optimal portfolio recommendation (US: Stocks; UK: Bonds; Japan: Bonds)

The 50% home asset constraint (oil) has as a profound influence on the optimal sub-portfolio composition of the foreign destinations. The high volatility of oil shifts the efficient frontier rightwards than the case where one just looks at the optimal portfolio, of a foreign destination in isolation, based on its asset return history.

It is however important to note (Exhibit 7-6) that for US market the mean returns of asset classes have the lowest spread (9.4% for US stocks, 9.1% for long-term bonds, 9.1% for real estate with NCREIF and 9.8% with TBI) over the 31 year history (1978-2009). This makes the allocation on the efficient frontier very sensitive to changes in total returns. The analysis with TBI data allocates 7% to US real estate.

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80 This is done to make the portfolio recommendations tailored to the home source of wealth for each nation. Re-iterating its significance, the 50% assumption here represents the receipts that the oil producing nations would spend in their home country, in other words for every $100 in surplus receipts $50 is kept in the reserves/spent domestically and the rest is spend on a mixture of foreign assets by entities such as SWFs.
The UK market is unique in that, the long-term bonds offer very low volatility and attractive returns: higher returns than the UK stock market (FTSE 100) over its 25 year history! The optimal portfolio shows the full allocation in the long-term bond basket.

Japanese real estate over the 38 year history has exhibited very low mean returns and high volatility. Japanese stocks on the other hand have offered the highest returns over the same period but at the same time they have the highest volatility as well.

The results clearly indicate that the Oil-based SWFs, from an optimal-portfolio perspective, should invest the most amount of capital in the US stock market and buy long-term bonds in UK and Japan.

**Home Asset: China’s GDP**

Optimal portfolio recommendation (US: Real Estate (NCREIF), Bonds (TBI); UK: Bonds; Japan: Bonds)

The growth of the Chinese SWFs has been fueled by their rapidly increasing trade surpluses. The wealth is transferred to the SWFs from the central reserves. The sustained growth is modeled in the analysis by the Chinese GDP that has a low volatility and very high growth. The 50% home asset constraint in this case has the effect of shifting the efficient frontier leftwards than the case where one just looks at the optimal portfolio, of a foreign destination in isolation, based on its asset return history.

The optimal portfolio indicates a substantial allocation towards real estate for all destinations when the capital source originates from China. US market in general has a mixed allocation for Chinese SWF capital. For real estate in-particular, the highest allocation from China should be to US real estate. Interestingly, the results with TBI decrease the real estate allocation by 9%; this may be due to the higher volatility of transaction based indices post the correction of the smoothing error. For the UK and Japanese markets the Chinese SWFs may be better off investing in long-term bonds and some real estate but not in stocks.
Home Asset: Singapore’s GDP

Optimal portfolio recommendation (US: Real Estate (NCREIF), Bond (TBI); UK: Bonds; Japan: Bonds)

The growth of the Singapore SWFs similar to China has been fuelled by their trade surpluses and high GDP. The sustained growth is modeled in the analysis by the Singapore’s GDP that has a low volatility and high growth. The 50% home asset constraint in this case again has the effect of shifting the efficient frontier leftwards than the case where one just looks at the optimal portfolio, of a foreign destination in isolation, based on its asset return history. Interestingly, when compared to China the Singapore GDP has a higher volatility and lower average growth rate. This manifests into a high allocation for Singapore to the US real estate for achieving an optimal mix. The results with TBI decrease the real estate allocation by 7%. For the UK and the Japanese markets the Singapore SWFs may be better off investing in long-term bonds, some real estate and no stocks.

Home Asset: Korea’s GDP

Optimal portfolio recommendation (US: Real Estate (NCREIF), US Real Estate (TBI); UK: Bonds; Japan: Bonds)

The growth of the Korean SWFs similar to China and Singapore has been fuelled by their trade surpluses and high GDP. As compared to China and Singapore, the Korean GDP has the lowest average growth rate over the long run and a volatility that is higher than China but lower than Singapore. This manifests in a high allocation by Korea to US real estate for achieving an optimal mix. The results with TBI decrease the real estate allocation by 4%. Overall Korea has a mixed portfolio for US markets. For the UK and Japanese markets, similar to China and Singapore the Korean SWFs may be better off investing in long-term bonds, real estate and no stocks.

7.8 Overall Trends

- Long-term government bond investment has a substantial allocation in all combinations. This reflects the high risk-adjusted returns offered by long-term bonds than stocks and real estate in most foreign destinations over a similar holding period.
• For the US, the optimal portfolio allocation for Oil-based funds (increases) and non-commodity funds (decreases) when analyzed with smoothed and unsmoothed real estate return data. This may be due to the effects of the correction of the smoothing error. TBI provides slightly lower risk-adjusted returns than NCREIF over the same holding period beginning 1978.

• Real estate has more weight as a strategic portfolio investment for non-commodity funds than the oil-based fund. (Range of 13 to 29% for China, 11-23% for Singapore and 10-28% for Korea and 0-7% for oil-based SWFs for different foreign destinations).

Note: The authors point out here that, apart from the limitation of the 50% constraint as noted before (Assumption, Section 7.3), the other limitation of the above analysis is its pair-wise nature. A better way to construct a portfolio for a home asset would be if the analysis pools the global asset classes of not only the developed economies such as the US, the UK and Japan but also the emerging economies. Unfortunately long term data (>25 years) is not available for the emerging economies and thus the results above may indicate some bias. However, the empirical findings indicating the highest and lowest allocations may still hold true.

It is also interesting to compare the results of the previous chapter on best hedges and the result of the sub-portfolio analysis presented above. After incorporating the return element through MPT, the US stocks prove to be good from both the portfolio and hedging perspective. UK real estate, which was the best hedge for oil-based SWFs, loses out to UK long-term bonds when portfolio allocations are considered using MPT. Similar inferences can also be drawn for other combinations. Exhibit 7-5 summarizes the findings of this chapter in an empirical format. In sum, the simple stylized analysis in this chapter provides evidence that real estate provides high-risk adjusted returns for most SWFs in the overall portfolio.
Exhibit 7-5 Sub-Portfolio Result Summary (Empirical)

<table>
<thead>
<tr>
<th>SWF Type</th>
<th>Allocation</th>
<th>US with NCREIF</th>
<th>US with TBI</th>
<th>UK</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>Highest</td>
<td>Stocks</td>
<td>Stocks</td>
<td>Bonds</td>
<td>Bonds</td>
</tr>
<tr>
<td></td>
<td>Second Highest</td>
<td>Bonds</td>
<td>Bonds</td>
<td>n/a</td>
<td>Stocks</td>
</tr>
<tr>
<td>China</td>
<td>Highest</td>
<td>Real Estate</td>
<td>Bonds</td>
<td>Bonds</td>
<td>Bonds</td>
</tr>
<tr>
<td></td>
<td>Second Highest</td>
<td>Bonds</td>
<td>Real Estate</td>
<td>Real Estate</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Singapore</td>
<td>Highest</td>
<td>Real Estate</td>
<td>Bonds</td>
<td>Bonds</td>
<td>Bonds</td>
</tr>
<tr>
<td></td>
<td>Second Highest</td>
<td>Bonds</td>
<td>Real Estate</td>
<td>Real Estate</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Korea</td>
<td>Highest</td>
<td>Real Estate</td>
<td>Real Estate</td>
<td>Bonds</td>
<td>Bonds</td>
</tr>
<tr>
<td></td>
<td>Second Highest</td>
<td>Bonds</td>
<td>Real Estate</td>
<td>Real Estate</td>
<td>Real Estate</td>
</tr>
</tbody>
</table>

It has been observed that the lack of information efficiency, lack of local expertise for materializing real estate investments, ‘herd behavior’\(^{81}\) and fear of the changes in the real estate market inefficiency are a few reasons why big institutional investors are conservative about their real estate investments.\(^{82}\)

The same reasoning may hold true for SWFs, but the reality of the SWF real estate investment behaviour remains to be seen.

\(^{81}\) Is defined as the tendency of individuals or institutions to mimic the actions (rational or irrational) of a larger group due to social pressure of conformity or the common rationale that its unlikely that such a large group could be wrong. (Derived from the Investopedia definition of Herd Behaviour). Source: Investopedia.com, accessed June 2010.

### Exhibit 7-6 Portfolio Analysis Detailed Results

#### Portfolio Analysis with Oil

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>Oil</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.57%</td>
<td>13.64%</td>
<td>0.13</td>
<td>28%</td>
<td>22%</td>
<td>0%</td>
<td>50%</td>
<td>MEAN</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.28</td>
<td>0.04</td>
<td>SD</td>
<td>16.7%</td>
<td>11.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US TBI</th>
<th>Oil</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.61%</td>
<td>13.90%</td>
<td>0.13</td>
<td>25%</td>
<td>17%</td>
<td>7%</td>
<td>50%</td>
<td>MEAN</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.25</td>
<td>0.04</td>
<td>SD</td>
<td>16.7%</td>
<td>11.2%</td>
<td>12.1%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>FTSE100 UK Tbond LT</th>
<th>UK IPD</th>
<th>Oil</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.08%</td>
<td>12.37%</td>
<td>0.10</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
<td>MEAN</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.07</td>
<td>0.37</td>
<td>0.24</td>
<td>0.04</td>
<td>SD</td>
<td>16.2%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>Nikkei250 JPN Bnd LT</th>
<th>JAPAN CRE</th>
<th>Oil</th>
<th>MEAN</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>8.92%</td>
<td>13.88%</td>
<td>0.44</td>
<td>13%</td>
<td>37%</td>
<td>0%</td>
<td>50%</td>
<td>MEAN</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.18</td>
<td>0.47</td>
<td>0.17</td>
<td>0.28</td>
<td>SD</td>
<td>25.8%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

#### Portfolio Analysis with GDP growth in China

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDPCHN</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.51%</td>
<td>3.36%</td>
<td>0.82</td>
<td>5%</td>
<td>16%</td>
<td>29%</td>
<td>50%</td>
<td>MEAN</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.28</td>
<td>1.15</td>
<td>SD</td>
<td>16.7%</td>
<td>11.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>FTSE100 UK Tbond LT</th>
<th>UK IPD</th>
<th>GDPCHN</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.63%</td>
<td>2.90%</td>
<td>0.95</td>
<td>0%</td>
<td>37%</td>
<td>13%</td>
<td>50%</td>
<td>MEAN</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.07</td>
<td>0.37</td>
<td>0.24</td>
<td>1.19</td>
<td>SD</td>
<td>16.2%</td>
<td>5.8%</td>
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#### Portfolio Analysis with GDP growth in Singapore

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDPCHN</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00%</td>
<td>3.74%</td>
<td>0.33</td>
<td>6%</td>
<td>21%</td>
<td>23%</td>
<td>50%</td>
<td>MEAN</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.28</td>
<td>0.02</td>
<td>SD</td>
<td>16.7%</td>
<td>11.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>FTSE100 UK Tbond LT</th>
<th>UK IPD</th>
<th>GDPCHN</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.76%</td>
<td>3.35%</td>
<td>0.27</td>
<td>0%</td>
<td>39%</td>
<td>11%</td>
<td>50%</td>
<td>MEAN</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.07</td>
<td>0.37</td>
<td>0.24</td>
<td>-0.10</td>
<td>SD</td>
<td>16.2%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

#### Portfolio Analysis with GDP growth in Korea

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDPKOR</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.72%</td>
<td>3.58%</td>
<td>0.27</td>
<td>7%</td>
<td>15%</td>
<td>28%</td>
<td>50%</td>
<td>MEAN</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.28</td>
<td>-0.13</td>
<td>SD</td>
<td>16.7%</td>
<td>11.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rm</th>
<th>SD</th>
<th>SHARPE</th>
<th>FTSE100 UK Tbond LT</th>
<th>UK IPD</th>
<th>GDPKOR</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.68%</td>
<td>3.10%</td>
<td>0.26</td>
<td>0%</td>
<td>36%</td>
<td>14%</td>
<td>50%</td>
<td>MEAN</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.07</td>
<td>0.37</td>
<td>0.24</td>
<td>-0.16</td>
<td>SD</td>
<td>16.2%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

94
Chapter 8 Final Comments

In the final analysis it is important to compare the execution behavior of SWFs with the theory that governs their formation, particularly in the realm of their real estate investments. Each SWF is unique because of its investment purpose and source of wealth (home asset). However, one common feature of all SWFs is their core objective to convert the home source of wealth into diversified assets to achieve a robust portfolio. Thus, ideally portfolio choice from a long-term perspective should encompass the response of the asset classes to the shocks and returns of their sources of wealth.

The authors rigorously demonstrate that real estate is a good asset class from the perspective of causality and hedging against the shocks to the different sources of sovereign wealth. From a portfolio perspective, the authors demonstrate the optimal weights for stocks, long-term government bonds and real estate in sub-portfolios for each SWF type by taking into account long-term asset performance. Although, the results are indicative of the high allocation towards long-term bonds in all combinations, real estate was close and not only provided a good hedge against the shocks to the sources of SWF wealth, but also a good addition in the portfolios of most SWFs.

In reality, however, real estate does not exist as an asset class at all in the portfolios of approximately 50% of all SWFs, and has between 2 and 13% allocations for those funds that do invest in real estate. Exhibit 8-1 illustrates the current asset allocation towards real estate by top SWFs that have declared their asset allocation publicly.

The authors found that the focus of SWF activity across the spectrum of assets is on execution of the set portfolio targets. SWF managers stated that they invest in real estate because they are long-term investors and real estate as an asset class is a portfolio diversifier and a hedge against inflation. It was not clear whether the hedging ability of the asset class to the source of wealth is accounted for in the decision making.

From a purely real estate execution standpoint the authors found that the SWFs follow a variety of execution strategies. Their immense buying power has led most SWFs to look for

---

83 Preqin SWF report, May 2010, figure2, indicates that currently around 51% of SWFs invest in real estate.
Exhibit 8-1.\textsuperscript{84} SWF Allocation\textsuperscript{85} to Real Estate

<table>
<thead>
<tr>
<th>SWF</th>
<th>Real Estate Allocation Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADIA</td>
<td>5 to 10%</td>
</tr>
<tr>
<td>GIC Singapore</td>
<td>12%</td>
</tr>
<tr>
<td>Korea Investment Corporation</td>
<td>2%</td>
</tr>
<tr>
<td>Mubadala</td>
<td>13%</td>
</tr>
<tr>
<td>Norway: NBIM</td>
<td>5%</td>
</tr>
<tr>
<td>Temasek</td>
<td>7%</td>
</tr>
</tbody>
</table>

more control over their investments at the micro-level. The authors also found that the investment management and advisory communities are highly cognizant of the relevance of the role that SWFs will play in international real estate investments in the time to come. It was insightful to note the areas of misalignment between the SWFs and the investment managers. The rationale stated by real estate leaders of SWFs on critical execution issues such as direct investments, product strategy, risk spectrum and transparency offered an interesting contrast to what was believed by the real estate investment managers and advisors about their behavior.

The financial market downturn in the developed economies and the high growth offered by the emerging economies offer an unprecedented opportunity in the short-term for cash-rich SWFs to invest in real estate. The long-term investment horizon, low importance of liquidity and debt in their decision making are important factors that enhance the value of this opportunity. The near 40% losses\textsuperscript{86} incurred by SWFs at the peak of the financial downturn indicate the importance of holistic decision making that accounts for an optimal portfolio strategy and the hedging characteristic of the asset class with their home source of wealth.

Sub-optimal allocation towards real estate in the global portfolio and also within real estate as an asset class, lack of proper understanding of market inefficiencies, herd behavior towards acquisitions and execution strategy, bureaucracy, and lack of transparency are some critical weaknesses that the SWFs need to tackle and overcome. In addition, SWFs must tackle the

\textsuperscript{84} See Appendix 8-1 for the source list for these data. Most of them are obtained through the Annual Reports published by the SWFs.

\textsuperscript{85} Most SWFs are very secretive about their asset allocations.

\textsuperscript{86} ‘GCC Sovereign Funds Reversal of Fortune’, CFR working paper, Brad Setser and Rachel Zeimba, January 2009, Table 1, p2, show the losses made by oil-based SWFs from December 2007 to December 2008: Abu-Dhabi ADIA (-40%), Qatar QIA(-41%), NBIM Norway(-30%) and Kuwait KIA(-36%).
extraneous threat of the barriers to entry imposed by the foreign countries to achieve a robust portfolio that harnesses the potential offered by real estate as an asset class. The future will offer more opportunities in the emerging field of SWF investments in real estate. The authors will continue to closely monitor the trends highlighted by this analysis!
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Principles, S., SWF Generally accepted Principles and Practices.


Appendix Chapter 2

<table>
<thead>
<tr>
<th>Fund Country</th>
<th>Region***</th>
<th>Fund Name</th>
<th>Value</th>
<th>Inception Year</th>
<th>Type</th>
</tr>
</thead>
<tbody>
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<td>UAE – Abu Dhabi</td>
<td>Middle East</td>
<td>Abu Dhabi Investment Authority</td>
<td>$627</td>
<td>1993</td>
<td>Oil</td>
</tr>
<tr>
<td>Norway</td>
<td>Europe</td>
<td>Government Pension Fund – Global</td>
<td>$443</td>
<td>1966</td>
<td>Oil</td>
</tr>
<tr>
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<td>Middle East</td>
<td>SAMA Foreign Holdings</td>
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<td>State Capital Investment Corporation</td>
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<td>$0.30</td>
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<td>Oil &amp; Gas</td>
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<td>UAE – Federal</td>
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<td>Emirates Investment Authority</td>
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<td>2008</td>
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<td>2009</td>
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<td>Abu Dhabi Investment Council</td>
<td>$X</td>
<td>na</td>
<td>Oil</td>
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</table>

Source: SWF Institute data, June 2010 (http://www.swfinstitute.org/fund-rankings/)

*This includes the oil stabilization fund of Russia.
**This number is a best guess estimation.
*** Region is inserted by the authors.

All figures quoted are from official sources, or, where the institutions concerned do not issue statistics of their assets, Some of these figures are best estimates as market values change day to day from other publicly available sources.
Appendix Chapter 5

Tax: Barrier to Entry for SWF investments

Most countries have punitive barriers to entry for Foreign Direct Investments. This is particularly true for real estate holdings. With the advent of globalization and increased global capital flows some of these barriers remain arcane laws that need reform. A recent study by PwC\(^{87}\) states that very few countries exempt SWF income from domestic taxation. The principal of sovereign immunity and reciprocal income tax treaty agreements are some reasons for this exemption.\(^{85}\) The study lists Australia and Philippines as two countries that exempt SWFs from domestic taxation on certain categories of passive income. Other countries\(^{88}\) included in the study provided no exemption and taxed SWFs in the same way as ordinary non-resident persons. In order to illustrate the magnitude of the barrier imposed to foreign investments by tax-laws, the following is a brief note on FIRPTA and its impact on real estate investments in the US.

Taxation for Investments in U.S. Real Estate FIRPTA

FIRPTA: Based on fears of policy makers in the mid-west FIRPTA was enacted in 1980 with a primary motive of limiting foreign control over US farmlands. “It authorized the IRS to apply a withholding income tax on non-resident aliens and foreign corporations with sales of US real property interests. When a person or corporation purchases a US real property interest from nonresident aliens or foreign corporation, they are required to withhold 10% of the amount realized. The withholding tax is intended to ensure that the US is able to tax the gains realized on the sale of such interests.”\(^{89}\)

“The gains from real property transactions are taxed at the same rate that applies to domestic tax payers (35%). Profits from foreign investment in domestic real estate are thus subject to Effective Income Tax ( ECI) in the United States as well as taxes in the investors home country, resulting in an effective tax rate that frequently reaches as high as 54.5%. In


\(^{88}\) The study lists the following countries in this category: Malaysia, Taiwan, Sri Lanka, Japan, China, Hong-Kong, New Zealand, Singapore, Thailand, Vietnam, India, Pakistan and Indonesia.

addition, FIRPTA’s complex rules generate additional costs for non US investors by requiring thorough, recurring analysis to determine applicability.”⁹⁰

A recent white paper on FIRPTA reform⁹¹ makes a strong case for a shift in policy. Here are some highlights of the paper:

- An estimated 2.8 trillion of global capital is available for US real estate investments.
- An estimated $1.4 trillion in debt obligations are maturing in the next five years.
- The US economy has lost 8.4 million jobs and $12.6 trillion in household net worth since 2007.
- FIRPTA reform will:
  - Stimulate hiring in industries connected with commercial real estate.
  - Stabilize the commercial real estate markets.
  - Create capital inflows in the US markets from high growth foreign investors such as SWFs.

The paper assumes that large foreign investors typically have a 40% allocation towards real estate for the United States.

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Appendix Chapter 6

Appendix 6-1 Unit Root test (sample result)

### Augmented Dickey-Fuller Unit Root Test on UKRE

<table>
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<th>Null Hypothesis: UKRE has a unit root</th>
<th>t-Statistic</th>
<th>Prob.*</th>
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<tr>
<td>Exogenous: Constant</td>
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<tr>
<td>Lag Length: 1 (Automatic based on SIC, MAXLAG=6)</td>
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<td></td>
</tr>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-5.005671</td>
<td>0.0004</td>
</tr>
<tr>
<td>Test critical values:</td>
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<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.690871</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.676263</td>
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</tr>
<tr>
<td>10% level</td>
<td>-2.627420</td>
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</table>


### Augmented Dickey-Fuller Test Equation

**Dependent Variable:** D(UKRE)

**Method:** Least Squares

**Date:** 06/28/10  **Time:** 23:41

**Sample (adjusted):** 1983 2009

**Included observations:** 27 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
<td>UKRE(-1)</td>
<td>-1.000185</td>
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<td>-5.005671</td>
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<tr>
<td>D(UKRE(-1))</td>
<td>0.717956</td>
<td>0.210801</td>
<td>3.406090</td>
<td>0.0023</td>
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<tr>
<td>C</td>
<td>0.103821</td>
<td>0.026376</td>
<td>3.936137</td>
<td>0.0005</td>
</tr>
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</table>

| R-squared     | 0.511062    | Mean dependent var | -0.001485 |
| Adjusted R-squared | 0.470318 | S.D. dependent var | 0.113227 |
| S.E. of regression | 0.062406 | Akaike info criterion | -2.048885 |
| Sum squared resid | 0.102977 | Schwarz criterion | -1.905903 |
| Log likelihood | 30.57344    | F-statistic     | 12.54301   |
| Durbin-Watson stat | 2.216069 | Prob(F-statistic) | 0.000187 |
Appendix 6-2 Correlation Graphs

6-2-1: Oil

![Correlation Graphs for Oil and Various Indices]

- Oil vs. USNCREIF
- Oil vs. UKRE
- Oil vs. JAPANRE
- Oil vs. S_P500
- Oil vs. FTSE100
- Oil vs. NIKKE250
6-2-2: China

![Graph showing economic indicators for China and other countries.](image-url)
6-2-3: Singapore

![Graphs showing economic data comparisons over time for various countries and indices, including GDP-SING, USCREIF, UKRE, JAPANRE, S&P500, FTSE100, and NIKKEI250.](image)
6-2-4: Korea

- GDP_KOR
- USNCREIF
- UKRE
- GDP_JAPAN

- S&P500
- FTSE100
- NIKKEI225

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110
### Vector Autoregression Estimates

**Date:** 06/28/10  **Time:** 23:43  
**Sample (adjusted):** 1982-2009  
**Included observations:** 28 after adjustments  
**Standard errors in ( ) & t-statistics in [ ]**

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<tr>
<td><strong>UKRE(-1)</strong></td>
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<td>0.713909</td>
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<tr>
<td></td>
<td>(0.18003)</td>
<td>(0.48422)</td>
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<td></td>
<td>[2.36251]</td>
<td>[1.47436]</td>
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<tr>
<td><strong>OIL(-1)</strong></td>
<td>-0.046172</td>
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<td></td>
<td>(0.07626)</td>
<td>(0.20510)</td>
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<tr>
<td></td>
<td>[-0.60550]</td>
<td>[0.16366]</td>
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<tr>
<td><strong>C</strong></td>
<td>0.054706</td>
<td>-0.023198</td>
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<tr>
<td></td>
<td>(0.02352)</td>
<td>(0.07076)</td>
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<tr>
<td></td>
<td>[2.07878]</td>
<td>[-0.32772]</td>
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**Statistics:**
- R-squared: 0.203660
- Adj. R-squared: 0.139952
- Sum sq. resid: 0.240145
- S.E. equation: 0.096009
- t-statistic: 3.196804
- Log likelihood: 26.89178
- Akaike AIC: -1.706556
- Schwarz SC: -1.563020
- Mean dependent: 0.033273
- S.D. dependent: 0.105683
- Determinant resid covariance (dof adj.): 0.000635
- Determinant resid covariance: 0.006506
- Log likelihood: 26.78789
- Akaike information criterion: -1.486849
- Schwarz criterion: -1.196377
## Vector Auto Regression Tests

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<th>JAPAN_CBRE(-1)</th>
<th>UK_IPD(-1)</th>
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### Appendix 6-4 Auto Vector Regression Results

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<td>-0.18678 **</td>
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** Notes:**
- * coefficient
- Standard errors
- *** t-statistics

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112
Contd...

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<td><strong>R-squared</strong></td>
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<td>0.119544</td>
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<tr>
<td><strong>S&amp;P500(-1)</strong></td>
<td>0.063481</td>
<td>-0.014812</td>
<td>0.06668</td>
<td>-0.041643</td>
<td>0.068047</td>
<td>0.172579</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.042305</td>
<td>0.105027</td>
<td>0.048077</td>
<td>0.068995</td>
<td>0.05204</td>
<td>0.124785</td>
</tr>
</tbody>
</table>

* coefficient  * Standard errors  *** t-statistics
Appendix 6-5 VAR-Impulse Response Tests

6-5-1-1. Oil Return vs. US NCREIF

6-5-1-2. Oil Return vs. UK IPD

6-5-1-3. Oil Return vs. Japan CBRE

6-5-1-4. Oil Return vs. US S&P500

Response to Cholesky One S.D. Innovations ± 2 S.E.
6-5-1-5. Oil Return vs. UK FTSE 100

Response of OIL to OIL

Response of OIL to FTSE100

Response of FTSE100 to OIL

Response of FTSE100 to FTSE100

6-5-1-6. Oil Return vs. Japan NIKKEI 250

Response of OIL to OIL

Response of OIL to NIKKEI250

Response of NIKKEI250 to OIL

Response of NIKKEI250 to NIKKEI250

6-5-2-1. GDP Growth China vs. US NCREIF

Response of GDP_CHINA to GDP_CHINA

Response of GDP_CHINA to USNCREIF

Response of USNCREIF to GDP_CHINA

Response of USNCREIF to USNCREIF

6-5-2-2. GDP Growth China vs. UK IPD

Response of GDP_CHINA to GDP_CHINA

Response of GDP_CHINA to UKRE

Response of UKRE to GDP_CHINA

Response of UKRE to UKRE

115
6-5-2-3. GDP Growth China vs. Japan CBRE

Response to Cholesky One S.D. Innovations ± 2 S.E.

6-5-2-4. GDP Growth China vs. US S&P 500

Response to Cholesky One S.D. Innovations ± 2 S.E.

6-5-2-5. GDP Growth China vs. UK FTSE 100

Response to Cholesky One S.D. Innovations ± 2 S.E.

6-5-2-6. GDP Growth China vs. Japan NIKKEI 250

Response to Cholesky One S.D. Innovations ± 2 S.E.
6-5-3-1. GDP Growth Singapore vs. US NCREIF

6-5-3-2. GDP Growth Singapore vs. UK IPD

6-5-3-3. GDP Growth Singapore vs. Japan CBRE

6-5-3-4. GDP Growth Singapore vs. US S&P 500

117
6-5-3-5. GDP Growth Singapore vs. UK FTSE 100  
6-5-3-6. GDP Growth Singapore vs. Japan NIKKEI 250

6-5-4-1. GDP Growth Korea vs. US NCREIF  
6-5-4-2. GDP Growth Korea vs. UK IPD
Appendix Chapter 7

7-1 Oil-Based SWF- US (NCREIF)

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>US TBI</th>
<th>USCREIF</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.57%</td>
<td>13.64%</td>
<td>0.13</td>
<td>28%</td>
<td>22%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.28</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2 Oil-Based SWF- US (TBI)

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>US TBI</th>
<th>USCREIF</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.61%</td>
<td>13.90%</td>
<td>0.13</td>
<td>25%</td>
<td>17%</td>
<td>7%</td>
<td>50%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.25</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Mean-Variance Space Diagram](image1.png)

![Asset Composition of the Ex Post Efficient Frontier](image2.png)

![Mean-Variance Space Diagram](image3.png)
7.3 Oil-Based SWF-UK

<table>
<thead>
<tr>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>FTSE100 UK Tbond LT</th>
<th>UK IPD</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.08%</td>
<td>12.37%</td>
<td>0.10</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.07 0.37 0.24 0.01

7.4 Oil-Based SWF-Japan

<table>
<thead>
<tr>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>Nikkei250 JPN Bnd LT JAPAN CBRE</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.04%</td>
<td>13.55%</td>
<td>0.46</td>
<td>0%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.16 0.47 0.17 0.30
7.5 GDP China- US (NCREIF)

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDPCHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.51%</td>
<td>3.36%</td>
<td>0.82</td>
<td>5%</td>
<td>16%</td>
<td>29%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.16 0.21 0.28 1.15

7.6 GDP China- US (TBI)

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US TBI</th>
<th>GDPCHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.65%</td>
<td>3.79%</td>
<td>0.76</td>
<td>6%</td>
<td>23%</td>
<td>20%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.16 0.21 0.25 1.15
7.7 GDP China- UK

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>FTSE100</th>
<th>UK TBnd LT</th>
<th>UK IPD</th>
<th>GDPCHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.63%</td>
<td>2.90%</td>
<td>0.95</td>
<td>0%</td>
<td>37%</td>
<td>13%</td>
<td>50%</td>
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</table>

Sharpe Ratio 0.07 0.37 0.24 1.19

MEAN-VARIANCE SPACE

7.8 GDP China- Japan

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>Nikkei250</th>
<th>JPN Bnd LT</th>
<th>JAPAN CBRE</th>
<th>GDPCHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.54%</td>
<td>3.68%</td>
<td>1.30</td>
<td>0%</td>
<td>36%</td>
<td>14%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.18 0.47 0.17 1.83

MEAN-VARIANCE SPACE
7.9 GDP Singapore- US (NCREIF)

<table>
<thead>
<tr>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDP SIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00%</td>
<td>3.74%</td>
<td>0.33 6%</td>
<td>21%</td>
<td>23%</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.16 0.21 0.28 0.02

7.10 GDP Singapore- US (TBI)

<table>
<thead>
<tr>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US TBI</th>
<th>GDP SIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.12%</td>
<td>4.00%</td>
<td>0.34 6%</td>
<td>25%</td>
<td>18%</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

Sharpe Ratio 0.16 0.21 0.25 0.02
### 7.11 GDP Singapore- UK

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>FTSE100</th>
<th>UK Tbond LT</th>
<th>UK IPD</th>
<th>GDPSIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.76%</td>
<td>3.35%</td>
<td>0.27</td>
<td>0%</td>
<td>39%</td>
<td>11%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Sharpe Ratio* 0.07 0.37 0.24 -0.10

### 7.12 GDP Singapore- Japan

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>Nikkei250</th>
<th>JPN Tbond LT</th>
<th>JAPAN CBRE</th>
<th>GDPSIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.68%</td>
<td>3.90%</td>
<td>1.01</td>
<td>0%</td>
<td>39%</td>
<td>11%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Sharpe Ratio* 0.18 0.47 0.17 1.16
7.13 GDP Korea- US (NCREIF)

<table>
<thead>
<tr>
<th></th>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US NCREIF</th>
<th>GDPKOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.27</td>
<td>7%</td>
<td>15%</td>
<td>28%</td>
<td>50%</td>
</tr>
</tbody>
</table>

7.14 GDP Korea- US (TBI)

<table>
<thead>
<tr>
<th></th>
<th>Rm</th>
<th>StD</th>
<th>SHARPE</th>
<th>SP500Stk</th>
<th>USTBnd LT</th>
<th>US TBI</th>
<th>GDPKOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
<td>0.21</td>
<td>0.29</td>
<td>7%</td>
<td>20%</td>
<td>24%</td>
<td>50%</td>
</tr>
</tbody>
</table>
### 7.15 GDP Korea- UK

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>FTSE100</th>
<th>UK TBnd LT</th>
<th>UK IPD</th>
<th>GDPKOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.68%</td>
<td>3.10%</td>
<td>0.26</td>
<td>0%</td>
<td>36%</td>
<td>14%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio

- GDPKOR: 0.07
- UKIPD: 0.37
- UKTBnd LT: 0.24
- FTSE100: -0.16

#### MEAN-VARIANCE SPACE

### 7.16 GDP Korea- Japan

<table>
<thead>
<tr>
<th>Rm</th>
<th>Std</th>
<th>SHARPE</th>
<th>Nikkei250</th>
<th>JPN Bnd LT</th>
<th>JAPAN CBRE</th>
<th>GDPKOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.42%</td>
<td>4.29%</td>
<td>0.86</td>
<td>0%</td>
<td>40%</td>
<td>10%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Sharpe Ratio

- GDPKOR: 0.18
- JPNCBRE: 0.47
- JPNBnd LT: 0.17
- Nikkei250: 1.07

#### MEAN-VARIANCE SPACE
### Appendix Chapter 8

<table>
<thead>
<tr>
<th>SWF</th>
<th>Real Estate Allocation Percent</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADIA</td>
<td>5 to 10%</td>
<td>ADIA Annual Report 2009 page 11</td>
</tr>
<tr>
<td>GIC Singapore</td>
<td>12%</td>
<td>GIC Annual Report 2009 page 11</td>
</tr>
<tr>
<td>Korea Investment Corporation</td>
<td>2%</td>
<td>KIC Annual Report 2009 page 2</td>
</tr>
<tr>
<td>Mubadala</td>
<td>13%</td>
<td>Graeme Newell (2010) page 23</td>
</tr>
<tr>
<td>Norway: NBIM</td>
<td>5%</td>
<td>NBIM Website 2010</td>
</tr>
<tr>
<td>Temasek</td>
<td>7%</td>
<td>Graeme Newell (2010) page 23</td>
</tr>
</tbody>
</table>

---

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