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CHAPTER 9

Singapore's Financial Market: Challenges and Future Prospects

David LEE Kuo Chuen and Kok Fai Phoon¹

Abstract

Singapore has successfully developed into one of the leading international financial centers in a short span of less than half a century. The factors of success can be attributed to time, space and people. Given the complexity and connectivity of today's markets, there are many challenges in a fast changing environment marked by huge global capital flows and punctuated by crisis after crisis. This chapter will explain the success of Singapore's financial market and provide the author's outlook for the island state's future prospects in the aftermath of the U.S. debt crisis, the Euro crisis and likely slowdown in emerging markets. In particular, potential problems due to the voluminous capital flow in a time compressed manner in the small open economy are highlighted.

Key words: financial markets, development, prospects, capital flows, central banking, prudential policies, complexity

9.1 Introduction

This Chapter explains the history and discusses the future prospects and challenges facing Singapore's financial markets. Singapore's financial sector is unique in that government played a major role in creating an eco-system that nurtured quality growth. The Monetary Authority of Singapore (MAS), the de facto central bank of Singapore, was instrumental in developing Singapore as a financial center. Since Singapore's independence in 1965, the economy in general and the financial sector in particular have experienced high and sustained growth. Recent statistics provided in the next paragraph and in the next section, are impressive given the unstable global environment. It is therefore not surprising that the MAS have received well-deserved accolades for its prudential macroeconomic management and for creating and sustaining a vibrant eco-system to support growth.

Singapore has become the largest foreign exchange trading center in Asia and ranks second in interest rate derivatives trading. In April 2013, reported daily trading volume in foreign exchange grew 44% to USD282 billion from three years ago. In fund management, there are more than 500 asset managers managing USD1.1 trillion of assets. Singapore has also

done well in other areas such as wealth management, real estate investment via private equity and publicly listed REITs, investment banking, insurance, treasury management and risk management.

Issues that we will discuss in this chapter will be the impact of capital flows on Singapore's financial sector. Specifically, the discussion centers on the impact of large capital inflows in a time compressed manner and how possible negative impacts can be mitigated through the use of prudential policies by the MAS. In an open economy like Singapore, global flows can have negative longer term impact with symptoms of such potential malaise that include growth mainly driven by the real estate sector and the accumulation of liquid foreign capital resulting in increasingly higher debt to GDP ratios.

9.2 Growth of the Financial Sector

Singapore has developed to be a leading global financial center. Since 1965, Singapore's GDP has grown 32 times, whilst the financial (Finance and Insurance) sector has grown 280 times with a share of the GDP of 12.2% in 2011 (Figure 9.1). The growth of this sector averaged 13.6% p.a. as compared to the 8.1% p.a. overall GDP growth. The financial sector also outperformed the overall GDP growth for 30 years out of the 47 years since Singapore's independence.

On examining the plot of valued-add of the financial sector as a proportion of GDP in Figure 9.1, the share of GDP over time and the gradient of the share ratio, we can observe three distinct periods for the evolution of the financial sector in Singapore. These three sub-periods can be categorized and described as the Development, Regulatory and Supervisory phases: the

Development phase from 1965 to 1980; the Regulatory phase from 1981 to 1998 and the Supervisory phase from 1999 to the present.

Insert Figure 9.1

The table in Figure 9.1 shows that the average financial sector growth has been declining over the three sub-periods from 20.8% to 12.6% and then down to 6.10%. This is not surprising as we can see from the fourth row that the sector has grown 16.5 times, 4.7 times, and 1.3 times in the respective sub-periods.

The average sector growth has been declining due to the larger base effect. Moreover, between the years 1998 and 2004, the sector suffered a reduction in share of GDP due to the Asian financial crisis and the SARs episodes. But the financial sector has since bounced back strongly from the 10% share of overall GDP in 1998 to 12% in 2007.

9.2.1 Singapore's financial sector success factors

What are the success factors of Singapore's financial sector? Kuah (2008) has attributed the financial sector's success to "clustering." On the other hand, the MAS (2012) provided an interesting account of 40 years of history outlining the sector's competitive strength. General consensus is that the success of the Singapore's financial sector is built on prudence with a wide array of competitive advantages.

The current global financial environment is characterized by the interactions between complex, fast changing, and closely connected financial markets. These financial markets are volatile with free capital flow, whilst technological improvement has given rise to

specialization. Given that the financial markets are complex, closely connected, open to rapid flow of capital and highly specialized, few central banks have a clear understanding of the workings of these markets. Even fewer countries have the necessary policy instruments to anticipate, mitigate and deal with possible malfunctions. It is therefore not surprising that there were so many crises in the last 40 years. Interestingly, Singapore has weathered these crises well that would lead us to believe that the regulators have a good understanding of its financial market and were able to leverage on its competitive strengths. The next section will clarify Singapore financial sector's competitive strengths that have fueled its growth.

9.2.2 The development, regulatory and supervisory phases

The Development Phase

The Development phase for Singapore's financial sector was the years from 1965 to 1980. In the 1960's and 1970's, Singapore took the opportunity to provide foreign exchange services to its neighbors. It leveraged on its position as a trading hub in resource-rich Southeast Asia to support the increasing need for foreign currency transactions. Singapore established the Asian Dollar Market during that period. While the economy grew rapidly, the financial sector, with strong demand for domestic and offshore banking activities grew even faster.

The strong growth was made possible by Singapore's geographically strategic position that made Singapore a burgeoning entre-port within a time zone that overlapped the opening trading hours of Europe and the after trading hours of the U.S. markets.

The Regulatory Phase

The Regulatory Phase was from the years 1981 to 1998. In April 1977 and in November 1984, the Insurance Act and Security Industrial Act respectively were brought within the

regulatory purview of the MAS. In the 1980's and 1990's, Singapore was able to leverage on the increasing importance of free capital flow and took advantage of technological advancement to shorten settlement duration. More importantly, ease of capital flows was set within a clear regulatory environment that local and foreign institutions were not only comfortable to operate in, but also to expand their financial activities.

Within this supportive environment, capital flows increased in speed and volume, resulting in exponential growth in the financial sector. The country continued its efforts to embrace an impartial judiciary to ensure certainty of property rights and the enforceability of contract. The clearer rules of law and the regulatory environment increased investors' confidence and trust. The increase in the number of legal and finance professionals along with the promulgation of Section 47 of the Banking Act on client confidentiality played important supportive roles as well.

The Supervisory Phase

The next phase from the years 1999 until now focused on liberalization and on the supervisory role of the regulator with a key objective to promote increasing foreign participation. The banking and other sectors were liberalized, allowing for new banking licenses, greater access to the domestic market and greater percentage of foreign ownership. For example, tax and other incentives, together with the abolition of estate duties promoted the rapid growth in Real Estate Investment Trusts (REITs), and assets in wealth and fund management. These activities were complemented by an increased pool of professionals with different financial market and technical skills.

9.3 The Prospects

Singapore possesses a clear set of positive factors underpinning its future development. It is located advantageously along with a broad base of financial professionals and entrepreneurs who are supported by the right physical and regulatory infrastructure. Ravi (2013) has postulated that smart regulation, diverse ecosystem, pan-Asia focus and deep talent pool as value propositions for future growth. Indeed, the prospects have never been better after 2008 given that there has been huge capital inflow. Singapore has taken advantage of technological change in the financial sector that allows for free capital flow. The development policies have encouraged very specialized concentrations that include REITs (Koh, Lee, Phoon and Seah 2013), wealth (Koh 2013) and fund management to grow. Beside banks and fund management companies, more than 190 insurance institutions are located in Singapore to provide services in the area of marine, energy, aviation, credit and political insurance, beyond the protection needs of the economy (Ravi 2013). Many of the development strategies had been initiated in proposals by the Financial Services Working Group in 2002 (Economic Review Committee 2002). Policy makers were successful in taking full advantage of Singapore's competitive advantages by creating an eco-system for the financial industry to growth.

Looking forward, Singapore's financial sector is set to benefit from the growth in consumption and trade in Asia and the increase in use of the Renminbi (RMB) in trade and investments. A preview of this development is illustrated in the bi-lateral swap facility with offshore RMB or Chinese Yuan market (with up to CNY 300 billion in Chinese Yuan liquidity made available to eligible financial institutions operating in Singapore as a full-fledged Yuan trading center). We expect that Singapore's reputation as a safe haven for wealth management will ensure it will garner a significant share of such activities compared with other financial

centers. We expect Singapore to maintain or even increase its competitive advantages that had taken years to develop resulting in its continued viability and growth in the years ahead. The financial sector has grown because of its openness, judicious use of advanced technology and systems; and specialization and focus. These same factors that have contributed to growth may have also increased the vulnerability of the financial sector to extreme circumstances that result in a huge outflow of capital. I shall elaborate below with more details on such risks that may arise due to the long term structural problems of the USA, Europe, Singapore, and the short term problems of a slowdown in the emerging markets especially China. There are also associated problems brought about by a change in the composition of the Singapore's investment portfolio due to its aging population and a bias to invest in real estate in Singapore. It is important to analyze the impact and guard against possible capital outflow during extreme events, especially when the financial sector and economy is heavily dependent on real estate along with a growth strategy driven by increased issuance of debt and use of derivatives.

Since the 2000's there have been huge global imbalances in fiscal deficits, foreign reserves, income growth and structural issues that cannot be resolved over a short span of time. Creating jobs remains the main problem with advances in technology giving rise to increasing efficiency. Lower overall economic growth driven mainly by domestic consumption may be the norm for countries with foreign reserves in the near future. The countries that fail in creating enough jobs to offset domestic mandatory consumption will face huge challenges. Fortunately, despite an aging population, Singapore has official reserves in excess of USD300 million to withstand short term fluctuations. However, Singapore is highly vulnerable to the global economic environment given its open economy. Essentially, global developments, especially in

the developed world can have a huge impact not only on Singapore's economy, but also on its financial sector.

Specifically, the fiscal gap in the world's largest economy, the U.S. has widened over the past few years following the 2008 debt crisis. There has been a clear divergence between the US Federal Government current receipts and the Federal Government current expenditures over that period. Furthermore, there seems to be no feasible solution to narrow this fiscal gap even in the long term. The "Fiscal Cliff" created great consternation when the tax holiday expired at the end of 2012, reducing federal spending and the U.S. deficit in FY2013. Fortunately, the U.S. economy demonstrated great resilience and while the GDP growth was projected to shrink by 0.5% previously, the economy grew fairly well at 1.1% and 2.5% for first and second quarter of FY2013 respectively. Unemployment that was projected to increase to 9.1% from 8%, instead, reduced to below 8%. All may seem well and capital began flowing back from emerging markets to the US, reversing the trend since 2008. However, clear impediments remain with no solutions to balance the budget with deficits projected to be as high as 5% of the US GDP for 2013 and beyond. While attempts have been made to focus on micro and macro prudential policies, the long term structural problems of the US will continue to affect the global financial markets, increasing volatility and affecting the stability of the global financial system. While QE III (Quantitative Easing) has stabilizing financial markets in the U.S. and even globally. However, by linking the policy with the official unemployment threshold of 6.5% as the trigger for tapering has again temporarily raised fears of financial markets corrections, leading to increased market volatility.

Over in Europe, the debt crisis was more severe than that of the U.S., as building a consensual solution in a divided Euro zone was much harder to achieve. Micro and macro

prudential policies may have calmed markets, but the long-term structural problems resulting from excessive spending and debts continue to be a drag on the economies. It had been well documented that the debt crisis and budget deficits in Europe will take more than a decade to resolve. While debt and budget deficits issues are being addressed, progress remains very slow. According to Eurostat, the statistical office of the European Union, the 2012 government deficit to GDP ratio of EA17 and EU27 both decreased from 4.2% to 3.7% and 4.4% to 4.0% compared with 2011 respectively. However, over the same period, the government debt to GDP ratios increased from 87.3% to 90.6% of the EA17 and 82.5% to 85.3% for the EU27. The good news is that EU27 external current account has recorded a surplus of 36 billion Euros or 1.1% of GDP as at 2013Q2 as compared with only 0.2% of GDP at end 2012.

But, the inability to create jobs, especially for youths below 25 years of age, coupled with increased social spending for an aging population will be a heavy drag on the economies. High youth unemployment can potentially lead to increasing social unrest. In mid-2013, the unemployment rate remains above 27% (62% for under 25s) and 26% (56% for under 25s) in Greece and Spain respectively. These rates compare with the average of 11% (23% for under 25s) for the EU28. New Euro zone addition Croatia (member on 1 July 2013) has a youth unemployment rate of 55% for under 25s. The stabilizing factor for the European markets had been the announcement of outright monetary transactions (OMTs) by the European Central Bank, promising unlimited support for vulnerable countries in the Euro zone. While Singapore has low exposure to European sovereign debt, banking activities resulting from trading activities can slow considerably if problems in the Euro zone flare up or worsen.

Since the beginning of 2013, Brazil, Russia, India and China (the BRIC countries) are all experiencing economic slow down with shrinking manufacturing activities and lower

commodity prices resulting from the anemic global environment. An aging population and income inequality have emerged as social issues not only in the developed economy, but are expected to become a serious problem in the next 10 to 15 years for many of the emerging economies where the impacts of urbanization will be felt. In the short-term, the fear of the FED tapering its USD85 billion a month buying of bonds has resulted in an exodus of capital from the emerging markets since mid-2013 and the reverse trend of normalization of interest rates with the draining of excess liquidity created by Quantitative Easing I-III may continue for 6-8 quarters. Coupled with the slow-down and self-imposed structural reform, especially in Asia, the Asian growth story may subside for a while. But knowing that the slowdown has resulted from deliberate micro and macro prudential policies by government to mitigate the adverse impact of excess liquidity from easy money policy of the developed world gives comfort that the long term Asian growth story is intact.

Furthermore, with the lessons learnt from the Asian financial crisis, central bank reserves had been built up to reduce the need for USD borrowing as compared to pre-crisis levels in 1997. Nevertheless, the recent funds outflows from emerging markets had impacted Indonesia and India severely with their currencies weakening more than 20% as at September 2013. Despite the current high debt to GDP ratios in many countries, the difference this time is that high levels of borrowing are not purely for infrastructure and manufacturing, but mainly for construction, commercial and residential real estate. Therefore, the type of crisis that Asia experienced in 1997 is unlikely to repeat itself, though the speed of outflow of capital may result in significant damage to the heavily debt laden economies.

Another stabilization factor for Asia has been the ambitious plans of the newly elected Japanese government to try to reflate the economy using fiscal policy and aggressive monetary

easing, thus giving a temporary boost to the Asian markets. The Yen as a consequence, has depreciated substantially against other major currencies along with economic growth accelerating, spurred by consumption spending and higher net exports.

Singapore has so far avoided the high debt, high mandatory spending, and high unemployment crises faced by many developed countries. However, like the many countries that have experienced rapid economic growth and urbanization in the past 50 years, its population is aging. The 2011 fertility rate of 1.2 births per woman is one of the lowest in the world. This development will have major consequences for economic growth and dependency providence, especially for participation rates due to the availability of financial professionals in segments of the financial markets and the need for retirement investment capital in Singapore. To discuss the demographic impacts on Singapore's financial markets, we will first look at the experiences of the U.S. This will allow us to draw inferences on the likely scenario for the Singapore, where symptoms of likely impacts are already showing in the trading volume in its exchanges.

Life cycle investment patterns have shown that as one grows older, the willingness to take risk declines. Equity markets are expected to be under pressure worldwide because of the aging demographics. Exposure to equities has also declined among most 401(k) participants (Investment Company (2011, 2012)). Consequently, on a global basis, we expect to see lower flow into equity funds and perhaps reduced trading volume of equities on exchanges. Furthermore, traditional exchanges will be affected by competition from alternate platforms.

Since 2007, net new cash flow into equity funds has been on the decline and the rebound in the market after 2008 was not accompanied by continuous and large cash inflows, according to the Investment Company Institute (Investment Company (2011, 2012)). This

finding is troubling. Net withdrawals from equity funds amounted to USD 153 billion in 2012, USD 28 billion more than 2011. While there is a positive correlation between funds inflow and market performance, the relation has weakened over the years suggestive of a long-term down trend. While there is an increase of inflow into mutual fund companies in the region of between USD 40-50 billion in recent years, the flows away from equity have been increasing. Considering that mutual funds account for 57% of household defined contribution retirement accounts and in aggregation that funds hold around 28% of US corporate equity, the down trend signals lower trading volume ahead. As for direct holdings of equities, the net outflow totaled USD 225 billion from 2009-2012, after a period of substantial inflow of USD 1,271 billion from 2004-2008. The turnover rate - the percentage of a fund's holdings that have changed over a year - is a measure of a fund's trading activities and the rate has been declining from an average of 62% for 1980-2012 to around 48% (Investment Company (2012)).

In the U.S., factors such as lower investor risk tolerance, product development and greater investment diversification, have been found to play an important role in the investors' reduced demand for domestic equity mutual funds. However, investor demographic is likely to be the major factor as a decline in investors' willingness to take above-average or substantial investment risk as investors grow old is a key finding for the U.S. More importantly, there seems to be less of an appetite to take risk even for the same cohort that was found when comparing the 50-64 age-group over time. The percentage of those willing has declined from 23% to 19% from 2001 to 2012. Similarly, for those above 65, the percentage willing to take higher risk decreased from 9% to 7%.

On a separate note, shrinking trading volume in traditional and domestic exchanges is a concern. Mergers and acquisitions of exchanges have also proven difficult to improve economy

of scales. After all, most of the mergers were driven by the competition from alternative trading platforms such as dark pools. Indeed, in the U.S., the rise of high frequency trading has fragmented trading volumes rather than increased trading volume in traditional exchanges. Moreover, the growth in cash flow to bond funds has been mostly positive since year 2000 with the exceptions of years 1999, 2003 and 2009. The same secular and demographic factors that reduce funds flow to equity may have served to boost flows into bond funds. With the baby boomers retiring coupled with a reduced appetite for risk, more investment allocations have been in fixed income funds.

Based on the previous observations, the prospects for equities are not likely to be rosy and the growth in transactions is expected to slow. However, as long as economies continue to grow, we may see continual growth in the foreign exchange, derivatives markets, debt markets and other non-equity sectors. Given Singapore's aging population and the corresponding reduced appetite for equities, it is not surprising that we will observe similar patterns as the U.S. going forward. There, however, remain bright spots where the fixed income market and derivatives market in Singapore have flourished.

While the FX market is growing in single digits to above USD261 billion in Oct 2012, the derivatives market has grown at double digit pace. The SGX (Singapore Exchange) has more than 770 listed companies of which 40% are foreign and is the largest securities market in Southeast Asia with approximately SGD 1 trillion in total market capitalization. The SGX is known as the derivative supermarket as it has become the offshore venue for Japan, China, Taiwan, India and ASEAN futures. More than 90% of derivative volume is of index derivative of key markets mentioned above. Furthermore, the SGX provides clearing not only for exchange traded securities and derivatives, it also provides clearing for over-the-counter

derivatives given that it is among the first in the world to comply with CPSS-IOSCO (the Committee on Payment and Settlement System and the International Organization of Securities Commission) principle and certified under Basel III as qualifying counterparty. In this environment with regulators pushing for OTC products to be cleared through the exchanges, Singapore is well equipped to take advantage of the redirection of offshore business. For example, SGX AsiaClear experienced healthy growth in transactions of 77% for 2012 in energy, freight and dry bulk-related derivatives. Singapore leads in Iron ore derivatives with 109.7 million metric tonnes of iron ore swaps and options cleared. SGX also cleared SGD 340 billion in notional values of SGD and USD interest rate swaps and Asian FX forwards in 2012.

Given the experience of the U.S., we examine the securities and the derivatives business on the Singapore Exchange. While the SGX generated comparatively low revenue of SGD 715million and net profit of SGD 336 million in FY2013, its contribution to the financial sector is still significant. A breakdown of SGX's revenue shows that the securities business is the largest revenue generator with SGD 279 million accounting for 38% share, with derivatives at SGD 201 million and a share of 28%. The average daily trading volume of futures contracts after the crisis of 2008 in Singapore increased from 238,000 contracts in 2009 to 308,000 contracts in 2012. The increase in the volume can be mainly attributed to the introduction of China A50 futures and Nikkei options. Algorithmic trading has increased from an average daily market share of 15% to 35% per day in 2012, more than two fold. At this rate of growth, it is not unreasonable to conjecture that algorithmic trading will double to 70% in fewer than three years with the introduction of fastest trading platform REACH at the SGX. The proportion forecasted is also in line with trading patterns in the US. While derivatives accounted for 26% of SGX's revenue, its growth was 23% over previous year compared with 9% growth in

equities revenue. We expect that demand for derivatives as risk management tools along with the potential of further product development will continue to support Singapore's leading position as a derivative market.

Singapore's corporate debt market has seen an upward trend in the amount of outstanding long-term SGD and Non SGD corporate debt. At the end of 2012, the outstanding amount of Singapore corporate debt reached SGD 231 billion with an annual growth rate of 14% (MAS Annual Report 2013). In 2012 alone, the issuance was SGD 134 billion with SGD 30.5 billion in SGD Bonds. The weighted average maturity of these newly issued SGD bonds increased to 12.9 years from 7.5 years compared with one year ago with 22% from foreign issuers. The corporate debt sector is another high growth area with 90% of bond listings from overseas. The major development in the bond market has been the introduction of the 30-year government bond (30Y SGS – 30 year Singapore Government Securities) to extend the yield curve as a benchmark for pricing of corporate bond. A SGD corporate bond index was launched in June 2013. To widen and deepen the market, bond borrowing facilities will eventually be introduced and the MAS is already providing swap liquidity to primary dealer banks handling SGD debt.

For the equities market, of the thirty new offerings in the first three quarters of 2013 that raised USD 8.1 billion, 6 were REITs and business trusts. There are 38 REITs and business trusts listed on the exchange with a market value of SGD 67 billion, making Singapore the largest cluster in the Asia Pacific region excluding Japan. The recent trend is interesting given the challenging market conditions worldwide. For 2013Q3, Singapore was ranked number 2 in the world behind the US for IPO fund raising (Ernst and Young 2013). USD1.7 billion was raised representing an increase of 39% from the previous quarter. The SGX Catalist Board,

targeted at less established companies, also saw an increase in new offerings from USD4 million to USD 137.9 million from 7 deals in previous quarter. Out of the USD 1.7 billion, USD 1.27 billion was from 3 REITs. For the first 9 months in 2013, equity deals from the real estate sector were dominant with 86% of the USD 2.9 billion new listings, and 39% or USD 5.8 billion of in total.

In addition, Phang et al. (2013) have proposed to introduce listed REITs with public residential housing assets which accounts for more than 80% of Singapore's housing units. If such an idea eventuates, public housing REITs and hedging instruments based on daily traded Housing REITs can be another growth area. There is no doubt that real estate is expected to outpace others including sectors like the financial and oil and gas.

With the start of the RMB clearing operations by Industrial and Commercial Bank of China of Singapore, SGX has started offering depository services for RMB Bonds. REITs, wealth and fund management will also continue to grow amidst margin squeeze. The assets under management (AUM) grew 21.5% to above SGD 1.6 trillion in 2012 with more than 80% from outside Singapore and 70% invested in the Asia-Pacific region. Together with derivatives, these sectors offset the single digit 4.8% growth to SGD 9.3 billion in the non-life insurance sector. The real estate and related sectors will continue to be a growth area given the short supply of freehold land above ground, and the potential increase in population to over 6 million or more. Construction and property loans will continue to increase in tandem given that construction underground will typically be more costly. Such property and construction loans have already increased substantially at double digit growth rates as reported in the MAS annual report (2013). The Asian Dollar Market, while growing at a much slower pace of 7.4% has the potential to see growth boosted once lending in RMB increases.

The biggest impetus will likely be business and finance activities associated with the RMB bilateral swap arrangement with China. The RMB is seen to be undervalued and will continue to appreciate in the long-term. Foreign businesses have increased their willingness to pay their suppliers in RMB with Chinese companies accepting RMB to avoid currency volatility. In less than two years, trade using the RMB has risen from almost zero to RMB 600 billion accounting for 12% of China's total trade. Capital control has provided stability to China's financial system. In addition, China's urbanization has still a long way to go compared with the U.S. Urban consumption in China is estimated at three times rural consumption. Trade and burgeoning consumption growth highlight the potential for RMB transactions. China's per capita GDP was USD 9,233 (GDP of USD 8.22 trillion) compared with USD 49,965 (GDP of USD 15.68 trillion) in the U.S. in 2012. China's per capita GDP is projected to reach 20% of the U.S.'s USD 50,000 in 2020. With 1.4 billion people compared with 315 million in the US in 2012; assuming that China's economy continues to grow at a pace faster than 6% p.a., then its GDP will surpass the USA by 2020.

9.4 The Challenges

The focus for MAS has been to strengthen the framework for robust protection of depositors, insurance policy holders, consumers of financial services and of course, financial stability. The MAS constantly reviews and refines rules governing the insurance industry, financial advisory firms, fund managers and banks promulgating various MAS (Amendment) Bills and other legislations. Similar to most regulators, MAS has initiated actions to increase statutory reserves, to enhance risk management process and internal controls, to combat money laundering. The most interesting and significant development was the launch in May 2013 of

RMB clearing services in Singapore by the Singapore Branch of Industrial and Commercial Bank of China. As of July 2013, Singapore has SGD 28.5 billion RMB deposits, a growth of 40% since Dec, 2012. Singapore can continue to serve the international trading companies based in the country and as an intermediary for RMB flows between China and its trading partners. The Bank of China signed a memorandum of understanding with the SGX in Sep 2013 to develop Yuan products and services. Given that the SGX has already supported 141 companies from China in their fund raising efforts, this will only grow over time.

We expect such initiatives to provide more opportunities for RMB trades, finance and especially bi-lateral swaps. These are areas that are definitely worth exploring given the resilience and competencies inherent in Singapore financial sector. Historically, given the constraints of a small economy and its many short comings, Singapore has demonstrated its ability to take a new financial infrastructure and architecture and move it ahead of the curve among its competitors not only in the region, but on a global basis as well. One excellent and recent example is the emergence of other exchanges that rode on the China listing and left Singapore behind with smaller Chinese companies for listings on the SGX. However, regulations to boost fund management via a common market using the Asia Region Funds Passport (ARFP) are to be introduced in 2016. This creates a common platform making it easier for fund managers to launch the same product across four countries, namely, Australia, New Zealand, South Korea and Singapore. Other new innovations via derivatives and REITs, together with the ability to take advantage of new trading platforms and RMB internationalization in the fixed income market, have moved the financial sector a notch higher.

The greatest challenge confronting Singapore's financial sector is not from within. Ironically, it is what it has enjoyed the most, i.e., the external environment in an open economy,

and the free flow of capital in large volume. The danger arises from the technological improvements resulting in specialization in a time compressed world. With quantitative easing, easy credit, low interest environment, asset price inflation, changing pattern of reduced long term investment of an aging population, more reliance on derivatives and foreign debts a growth strategy, the Singapore financial sector is vulnerable to a rapid withdrawal of huge foreign capital, as in the case during the Asia Financial Crisis (Forbes and Warnock (2011) and Rozhkov (2009)). This is especially crucial as the housing market is a major component of individual debt and has been increasing rapidly over time. The consolation is that many property cooling measures (Lee et al. 2013) and consumer loan measures (especially for car and credit card) have been introduced. With the revised MAS Notice 637 to implement the Basel III capital framework, Singapore-incorporated banks are required to maintain a ratio of no less than 9% (inclusive of a capital conservation buffer requirement of 2.5%) for Common Equity Tier 1 capital with effect on 1 January 2013. This is higher than the requirement set by the Basel Committee on Banking Supervision of 7%. Given that the debt to GDP ratio has crossed 100%, this buffer will provide some comfort.

The rapid GDP growth in Singapore over the past several years has been attributed to an increasing foreign and immigrant workforce, a more flexible regime for lending to real estate investment, pro market regulations to develop the debt market for SGD and foreign currencies for non-Singapore incorporated entities, an open door policy for professionals and high net worth and their liquid assets, as well as investment in infrastructure and facilities to attract tourism dollars. This is not to underplay the contribution of investment in manufacturing, especially in pharmaceutical, oil and gas, shipping, education, logistic, commerce and other economic sectors. The focus of this chapter is to discuss the challenge and potential issues of

having an open economy that may be vulnerable to rapid capital flow, fast information flow, large volume transaction, and speedy technological change.

Being a very open economy, Singapore's fate is closely linked to its Asian neighbors and trading partners. According to Rozhkov (2009) and IMF estimates (IMF (2009)), when Asian economies were under financial stress during the Asian crisis, the recession lasted a median of 4 quarters with cumulative output loss of more than 27% for Asia as a whole. It is also noted that 30% of credit to the private sector evaporated 8 quarters after the peak of the recession.

The Pan-Electric crisis (MAS (2004)), the Baring crisis, the Asian Crisis and the recent debt crisis did not result in systemic banking crisis. Regulations had already been in place for foreign institutions to increase their capital base in their branches in Singapore. However, over time, greater economic and financial integration have resulted in higher correlation among the Asian economies and financial markets. Coupled with a lower likelihood for strong export led recovery due to the malaise in the developed economies, capital outflow will have a negative impact for Singapore's private sector as demonstrated in 2008.

The market value of Singapore reserves is not known precisely although it is reported officially by MAS that the foreign reserves are valued at USD262 billion as at Aug 2013. The uncertainty created by market perception of the total reserve size is ironically an important stabilizing force. If the market is unsure of the how large the reserve is in the armory to defend the Singapore dollar (SGD), then the probability of a collapse of the SGD is reduced., Along with the central bank's reputation of providing confidence with liquidity to investors and the private sector, the SGD has traditionally been viewed as a safe haven currency during crises. This perception was slightly dented during the Asian Crisis, and furthermore, the new global

financial architecture has made the central banks' mission of maintaining stability of their currencies more complicated than before. This is not in any way a problem faced by MAS alone but the consequence of time compression risk caused by a combination of advanced technology, rapid information flow, as well as huge and free flow of capital.

In this new era, the rapid free flow of capital (both capital inflows and outflows) is more difficult to manage. The magnitude of such flows can be in the ten or hundred billions USD over a short time span, creating instability in the financial system, with massive asset inflation and deflation. Historical evidence has shown that the extent of the surge and stop episodes on capital inflows prior to 1997 and 2008 along with the sharp withdrawals during the two crises can be very damaging to the economy.

The potential danger of global contagion brought about by the complexity inherent in the leveraged financial system flushed with liquidity is a real and constant danger. Leverage, illiquidity and concentration are the most toxic cocktails one can have. There are many examples of institutions self-organizing themselves into a critical situation when we are heavily leveraged, holding on to illiquid assets with great concentration. Real estate, bank lending and individual ability to service debts are a real issue for the financial sector in Singapore. Let me give a few specific isolated examples of how this can happen in order to using the challenges we are facing, but not only in Singapore.

9.4.1 The flood, the reservoir and finance

In this section, we explain a concept related to complexity in financial markets and development. In finance, we are always looking for a law of nature, and to recognize patterns in other sciences as a way to understand problems. Consider the reservoir in the diagram with inflow and outflow of water. Persistent rainfall will fill our drains and eventually our reservoir.

An intense rainfall within a short period of time when the water level is high will lead to flooding.

Insert Figure 9.2

The letter R is the range and the lines indicate the minimum and maximum of the water level. In order to prevent flooding and that we have enough water during a drought, we must have an idea of the potential maximum and minimum level of the reservoir. We need to know the range R and its volatility. Hurst (1951) developed the relation of the form:

$$R = C \sigma T^H$$

where R is the range, C is a constant, σ is the standard deviation of R and T is the period ahead. What this means is that we will know what R is T periods ahead if we know the Hurst coefficient H , which is between 0 and 1. We also know that the larger the H , the larger the R and the more persistent is the rainfall.

We can relate the massive printing of money that can be moved around freely with the impact of heavy rainfall. Unlike the weather change that happens over a longer period, the printing of money is close to instantaneous. What is even more disturbing is the speed of capital flow via wired transfer or via the Internet. This has the same impact of smoothing the flow of the drain and increasing the speed of flow to fill up the reservoir thereby increasing the volatility. It is quite obvious from the diagram that if you fill the reservoir quicker than you can drain, the water will overflow and cause severe damage to surrounding areas. In that case, you will have an H higher than 0.5 and around possibly 0.8 or higher. This has the same effect of a bubble forming. Eventually, the bursting of the bubble will have very damaging consequences

not only on our own Wall Street in Raffles Place (Singapore), but also the Main Street like the shopping centers and housing estates in Orchard Road, Boon Lay and Bukit Timah.

It is interesting to note that the quarterly Property Price Indices for Singapore in various functional forms is anti-persistent with H between 0.3 and 0.5. If you look at the plots of the Urban Redevelopment Authority (URA) Residential Property Price Index (RPPI) in Figure 9.3, the series is smoother than a random walk suggesting that it reverts to its mean more often. In Figure 9.4, we have plotted the log returns of URA RPPI year on year (Series 1) and quarter on quarter (Series 2) series.

Insert Figure 9.3

Insert Figure 9.4

A possible explanation is that the visible hand is doing a good job in countering the rapid outflow and inflow of capital out of and into the property market whenever extreme events occur. Contrary to current belief that the property market is out of control and that there is a bubble, the results suggest that despite the peaks and troughs, the policy instruments have worked fairly well to reduce instability. If the housing prices do not exhibit mean reversion and continues to exhibit a persistent uptrend, then there is a likelihood that a bubble has formed. This is clearly not the case for Singapore as the time series exhibit more mean reversion than a

persistent uptrend. It is also interesting to note that it is not the price increase or level that will directly induce instability; it is the amount of potential bad debts that is the key trigger. Therefore, if households and mortgage debts continue to increase to a level that poses danger when there is a rapid withdrawal of capital, then macro prudential measures have to be introduced. It is important to note that if a bubble is allowed to form in the housing market, any intervention will be very damaging. It is the ability to use macro prudential policies to avert a bubble and therefore to reduce the probability of a potential voluminous capital outflow that is more important.

Bubble detection techniques are self-defeating. If a bubble is allowed to build up, a soft landing is extremely difficult as any proactive policy actions will result in perceived negatively resulting in dire consequences. At the wrong time, introducing prudential policies will only invite unwanted attention that can result in a mass exodus of capital from the sector or country to preserve portfolio performance. This self-interest behavior of participants will almost result in self organized destructive behavior collectively. The job of a policy maker is to prevent a bubble from forming so as to avert likely rapid withdrawal of voluminous funds by investors, triggered by a fear of illiquidity in a highly leveraged financial sector. The co-operation of multi government agencies in Singapore has successfully averted a bubble from forming using macro prudential policies.

Both the MAS and URA have been successful in preventing a serious problem from forming especially in the area of mortgage finance. However, if the debt ratio linked to real estate continues to increase over time, if affordability is not correspondingly increased and if the economy is perceived to be heavily reliant on real estate, then such a “real estate” driven

economy becomes vulnerable to risks of capital outflow. More specific discussions of liquidity flow using the concept of flooding and self-organized activities follows.

9.4.2 High frequency trading and H

High power computers have brought about a new form of trading: the emergence of High Frequency Trading (HFT), a special case of algorithmic trading with lightning speed of execution. HFT is supposedly a supplier of liquidity lowers transaction costs and lowers the bid-ask of financial assets. HFT is using technology to increase the flow of capital in the shortest possible time such as a micro-second. The round-trip latent time, or the time taken to give an order, to execute, and to inform the executor has decreased from 20 seconds from a few years ago to 250 micro seconds in NASDAQ OMX INET. Things are occurring faster than the time we have to think, to strategize and to react. Technology has brought about efficiency beyond the optimal point and this is starting to trouble us, as we have seen in many mini crashes of stock market and bond market around the world. HFT did not cause crashes but it exaggerated volatility.

During the Flash Crash in 2010, the machines sold US stocks to 1 cent and bid up a few others to USD99999.99, because those are the two limit prices that can be executed. While transaction cost of trading has decreased in recent years with high frequency trading as provider of liquidity, it has also become a competing consumer of liquidity during extreme periods of volatility. Financial markets expect these traders to provide trading volume during both normal times and extreme events. But the fact is that in extreme events, such traders would on the same sell side as everyone else. There will be no liquidity provided by these traders as there would be no buyers of decent size. On the contrary, these traders would be the ones with the speed and size to sell when markets expect them to be on the buy side with decent bid size. There is simply no

free lunch, and lower transaction costs brought about by HFT traders would be repaid with higher volatility during a crisis.

9.4.3 Asian Crisis: Lesson Learnt

We have learnt from the last few crises that rapid inflow and outflow of capital occur when the profit and loss or balance sheets of banks are badly affected. At other times, when credit is tightened, trades will fall dramatically resulting in a wave of withdrawals from the debt and equity markets.

After the Asian Crisis, Asian bank's reserves were increased substantially along with improved regulation of banks and lowered toxic assets on their balance sheets. China took this a step further to control the speed of flow of information and capital by shutting down the Internet at times. Despite its efforts, in the twelve months through September 2012, an estimated USD225.7 billion fled the country. The outflow would have been much greater if there were no capital controls in China given this race to zero (trading) time. Fortunately, capital control in China prevented a much larger volume of funds flowing out during the current downturn.

It is well-known that domestic owned banks in Singapore play a crucial role in providing liquidity during crises as foreign institutions would likely have many problems to deal with and focus outside Singapore, especially if they were taken over by other institutions or by their own central bank. As a small red dot (that is what Singapore is known as to its neighbors), Singapore can only impose higher capital requirements and other liquidity requirements so that during a crisis, lending to businesses in Singapore would not be affected. Alternatively, more liquidity can be injected by the central bank. Another risk during a crisis situation is posed by lending to foreign institutions. If such lending is not carefully monitored

and if the ability to repay by foreign entities is suspect, a loss in confidence in the financial sector can be triggered.

This is one of the two empirical examples that tail risk has increased in Singapore. The Hurst exponent H is getting larger for shorter holding periods with the volatility becoming larger resulting in a thinner tail distribution. The volume is displaying a higher H and when you cannot clear the market with a huge amount of outstanding buy or sell orders, toxic volume shows up. Persistence in returns and volume of asset prices lead to thicker tail distribution with Power Law characteristics. Complexity and behavioral factors are affecting the market in a more prominent way than ever before. What is worrying is that the initial advantage from lower cost and increased liquidity may overtime self-organize into a concentrated group of players and impose greater risk to the world financial markets across all asset classes, especially to those markets that have no barriers to capital flow. During the crisis, portfolios are highly correlated and become concentrated, and these cause great instability in the market turbo charged with leverage.

9.4.4 Spain's banking crisis

Another example is the recent banking crisis in Spain. As the European Central Bank printed money with the objective of strengthening the capital base and liquidity of Spanish banks, the banks in performing their task efficiently purchased more Spanish sovereign debt, thinking it would be the most liquid and the safest asset. When the market realized that there were further austerity measures to come and that banks were not providing loans to SMEs to grow the economy, a sovereign debt crisis was triggered by fears of stagnant growth and rising non-performing loans. The Spanish banking sector suddenly found that it became a

concentrated reserve portfolio of Spanish sovereign debt that had to be marked-to-market under Basel III and became a crisis sector.

The correlation with sovereign debt on the balance sheets of banks had increased even though the exposure was only 6%; way below the historical high of 12%. This is another example of doing a job too well, but unwittingly being put into a critical situation. What we now see is related to the power law and complexity phenomena and that a self-organized behavior becomes a real issue. The major problem in applying the law of nature to finance is behavioral. Take the case of prediction, if we were to ask where the earth would be next year, we would know roughly where we are relative to the sun. However, if I were to ask: “Where the market index will be next year at this time?” We will not have a clue as perhaps a wide range of outcomes is probable. In addition, if we knew the outcome, our action may render our original forecast to be inaccurate. We simply cannot forecast the absolute magnitude but we can have a good idea about of the range or volatility of outcomes. We are surely in a chaos that is not deterministic. Likewise, we will never know how correlated or concentrated a bank’s portfolio is until the crisis erupts (or maybe not even then). In addition, we will never know how illiquid our portfolio will be until the crisis hits. We may have self- organized ourselves into more correlated and concentrated portfolios as a whole and once we are in a crisis, it is hard to get out of that situation. These are the main challenges of an open economy that Singapore’s financial sector serves given the chaotic state and complexity of the world today.

As mentioned previously, the mixture of leverage, illiquidity and concentration is deadly. Financial innovation may seem to have reduced or redistributed risk at the micro level, but systemic risk may not be reduced at the macro level. There are already great efforts in increasing the capital base, reserve requirements and margins to tackle leverage. The markets,

unlike the orbit of the earth, are gravely affected by human behavior. Bubbles can be formed easily given an open economy, but by monitoring debt and reducing leverage, hopefully we can avoid greater instability. While excess liquidity is a major issue, the reverse is as dangerous and illiquidity during crisis can instill greater instability. It would be important to prevent the supplier of liquidity from turning into a consumer of liquidity thereby causing great damage.

When it comes to the concentration of assets and participants, it is prudent to ensure that markets are not dominated by a small group of participants with the same set of instruments or strategies. The strong linkages among participants and their portfolios can propagate weaknesses in a single or small number of entities into a systemic failure. In a small economy such as Singapore where the domestic market is limited in size with the economy wide open to many international investors, along with a group of SMEs without any economies of scale, the concentration of strategies and market structure will make Singapore a great deal more vulnerable than if the country is larger in size and less open.

9.5 The Instability Paradox

Her Majesty the Queen Elizabeth visited the London School of Economics in November 2008 and demanded an answer to the question from top economists: “Why had nobody noticed that the credit crunch was on its way?” The collective answer from 33 top academics in the UK was summarized by the following sentence: “principally a failure of the collective imagination of many bright people.” In other words, everyone was taking care of their own interest and executed their own mandate so well that they failed to realize they had put the whole economy and system at great risk.

Clearly, communication and the exchange of information are sometimes detrimental to self-interest or profit maximization because narrow interests are competing. With advanced technology, we have even more specialized, as each task is difficult on its own. In addition, we are now given a short time to think, to strategize and to react. Machines are faster than human beings in a time compressed world. The profit based financial institutions will always move faster and ahead of the regulators who are cost based.

There is already a call to limit the speed of everything to the speed of human understanding or a speed that we can handle so as to minimize the damage. This can also be done by constant balancing of competition and cooperation, whether it is among policy makers, government, corporations and people. Constant communication, making different parties aware of the constraints of others as well as the impact of collective actions is important. Given the low cost of funds and the flexibility to extend the loan tenure to 30-35 years will likely cause many borrowers to be over extended. The banking system may be sound and prudential policies are in place to maintain stability, but the combination of surging property prices, increased lending to private local and foreign corporations, low interest rates, growing leverage of consumers and corporations, pose significant risks to financial stability.

Insert Figure 9.5

Mortgages account for 46% of Singapore's GDP and is an increase of 35% from 2010 (see Figure 9.5). The total loan amount has been increasing at 18% for the past three years. If

interest payments are to increase by 3%, MAS estimates that 10-15% of the borrowers may be at risk as repayment accounts for more than 60% of their salary. While the 3% increase in interest payment for the vulnerable group of borrowers is not likely in the near future, it does signal a potential risk given that 2011 and 2012 saw the highest property transaction values and total debt servicing ratios. Tighter loan to value as a prudential policy tool has limited the build-up of an even higher leverage ratio. On the other hand, Singapore government debt to GDP was reduced from 103.4% of GDP to 97.9% in 2013 and most government debt is internal borrowing and used for investments by the government. Development strategies are well thought through to leverage on Asian and global growth, albeit they are not without risk.

Given the concerns over the increase in mortgage loans and property price inflation, the Singapore government has introduced macro prudential policies, usually making minor changes each time to gauge the policy response of and impact on participants with diverse interests. No fewer than 17 property measures have been introduced since 1981 in Singapore. The “more often, less drastic” approach to sense the reaction of the market, before introducing a more drastic approach where necessary, has been successful in Singapore. This inching approach has given the policy maker a “good feel” of the market and time to study the reactions of vested parties. Obviously, such a strategy can only be employed way before any potential bubble is formed as once it is formed, a time compressed policy reaction may well exacerbate the damage.

9.6 Micro and Macro Prudential Policies

History has shown the keys to Singapore’s success and resilience include being at the right place at the right time, being well supported by human resource and infrastructure. We also learnt that these factors can be sustained, leading us to conclude that prospects for Singapore

remain positive when compared with other financial centers despite a tight labor market. Professional, postgraduate and leadership training programs will continue to play an important role to develop the perquisite talents to support Singapore's financial sector.

We have learnt that the most of the challenges faced by Singapore may not be within its control given the open economy that relies on free mobility of capital and advanced technology with ever increasing specialization. Uncertainty is aggravated by the rapid and voluminous flow of capital in an environment of multiple interests.

Given that the episodes of quantitative easing by the FED have widened the income distribution gap through asset price inflation, the competing interests of the entire spectrum of income groups are now even more diverse. Balancing the interests of many groups in a time compressed world requires more than monetary and fiscal policy response. Imposing capital control is not necessarily an optimal option for Singapore. Better options would be the use of micro and macro prudential policies that include strengthening the capital base, lowering leverage and increasing transaction tax to slow flows, transactions and asset price appreciation. In a time compressed world with multiple interests, we expect that these modern policy instruments may dampen and possibly reduce the damage, but are unlikely to prevent future bubbles and crashes. It is insufficient to monitor exchange rate/consumer price inflation, it is more important to both target asset inflation and maintain financial stability to ensure not only economic growth, but to ensure a right balance of social equity.

Gradual change to deal with uncertainty is the right policy for now. Singapore is faced with the need to deal with uncertainty in a state of indeterministic chaos. It has become harder to quantify what risk is and therefore it is difficult and even impossible to manage what is not known. The implications are that one should only make small gradual changes to policy to

prevent the butterfly effect. In times of great uncertainty, slowing the policy response may be the best approach and a small step is better than subscribing to the ideal of creative destruction. MAS has been working within this framework especially with regards to asset price inflation and many rounds of cooling measures have been introduced. This has the advantage of gauging the behavior of the adaptive agents and gathering feedback to further refine the measures step by step. The measures have so far been successful in molding the “desired” behavior of market participants.

Ironically, we have to put up obstacles during a normal period to induce inefficiency in order to avoid concentration and high correlation. Intense competition will lead to a tug-of-war among regulated firms. It is important to ensure intense competition does not lead to survival of the fittest or result only in the survival of organizations that employ the same strategy, thus leading to concentration. To avoid too big to fail is to avoid concentration of organizations that account for substantial employment and value added in a small economy, perhaps leading to sub-optimal economy of scale for organizations to compete internationally. This balance between concentration and economy of scale is a major challenge for a financial city that is also a city state. This balance have further implications for policy options that include the employment of local versus foreign talents, to allocate resources on MNCs versus SMEs, domestic versus regional businesses, and private versus public enterprises.

The mindset of efficiency and profit maximization may have to take a backseat in periods of instability and social inequity caused by leverage, illiquidity and concentration. In response, some regulators in other parts of the world are already calling for reform with urgent execution of even more micro and macro prudential policies such as lowering the leverage of financial institutions, banning short selling during crises and making OTC derivatives trading

transparent. Others in Europe have called for circuit breakers to slow down trading speed during crises to ease the consumption of liquidity and correlation across all asset classes and markets. Yet more have called for prudential policies to slow down asset inflation, to lower debt ratios and to prevent huge capital outflows during crises. However, not many countries can execute the “right” prudential policies as easily as Singapore. Prudential policies are not new, but Singapore has been known to take the lead in implementing many of these prudential policies ((MAS (2010), Oh (2013), BBA (2010), Kawai and Morgan (2012)). The effectiveness and implementation issues of such policies in other Asian countries can be found in HKMA (2012).

This ease of introduction of prudential policies is an advantage. But Singapore does face other social issues. There are social equity issues of employing locals versus engaging foreign talents, taxing rich versus subsidizing the lower and middle classes, and many other non-financial considerations. Singapore has addressed many of these financial and social issues and notably has done well in managing the development of the financial sector for 40 years. The challenges remain to balance the need to regulate or to allow market forces to work in achieving growth within a set of social objectives. More importantly, the Singapore government needs to demonstrate that it understands how the markets work so that the implemented policy achieves the right results. Only by maintaining the trust and social capital, can the government continue to earn the right to implement new policies with ease, which is a major competitive advantage for Singapore.

9.7 Conclusion

The future of Singapore's financial markets lies in its stability in a time compressed world of complexity and so far, it has been very successful! Singapore is already in the right place and in the right time by being in an advantageous location in Asia. It possesses the relevant human capital of very competent professionals with strong political leadership that promote an embracing culture for global talents. To maintain growth with financial and social stability, the key political and economic focus will be to provide a satisfactory balance between the ever increasing interests with possibly divergent objectives. Given a strong track record where policy makers have demonstrated good understanding of how the markets function and the ability to create and maintain an eco-system for growth, future prospects of Singapore's financial sector and its markets remain positive. The key risk to such a future is clearly Singapore's vulnerability given its openness to global economic developments and funds flows. Macro and micro prudential policies needs to be considered and implemented carefully, to prevent the development of bubbles and imbalances in its various financial markets. Excessive credit in domestic loan and loans to foreign entities need to be carefully managed. Capital flows and especially significant reversals over a short time span do not only increase market volatility; but under more extreme scenarios exacerbate real imbalances that can result in systemic failures of both the financial and real sectors.

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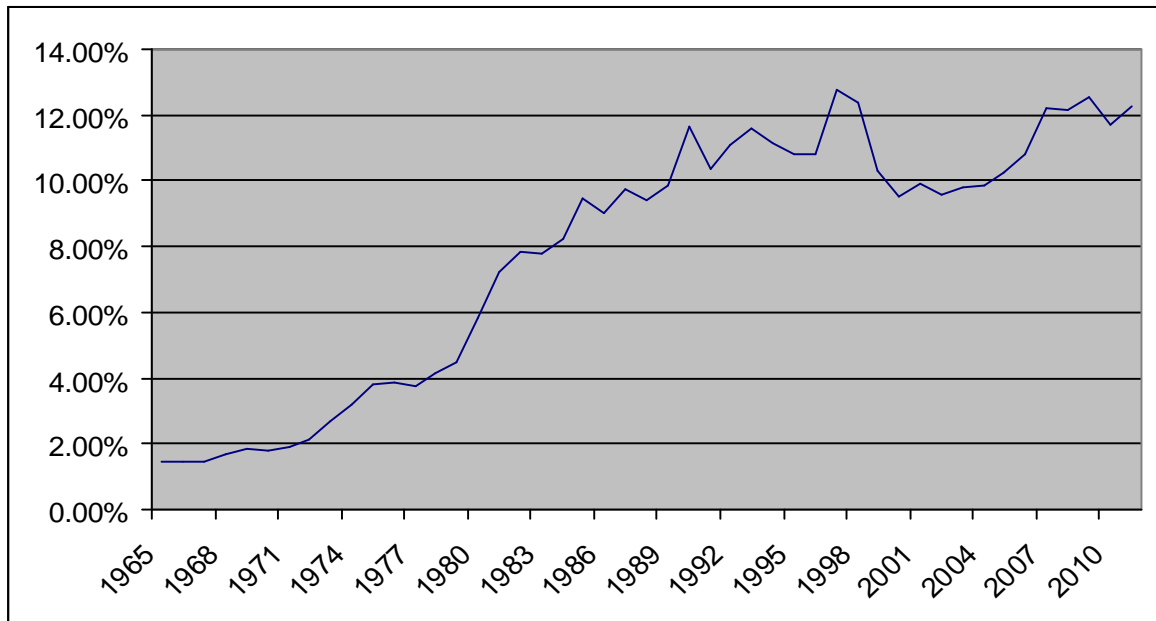
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Figure 9.1 The Financial (Finance and Insurance) Sector's Share of GDP



Period	Development	Regulatory	Supervisory
Years	1965-1980	1981-1998	1999-2011
No of Years	16	18	13
Growth (times)	16.5x	4.7x	1.3x
Average	20.80%	12.60%	6.10%

Figure 9.2 The Flood and The Hurst Coefficient

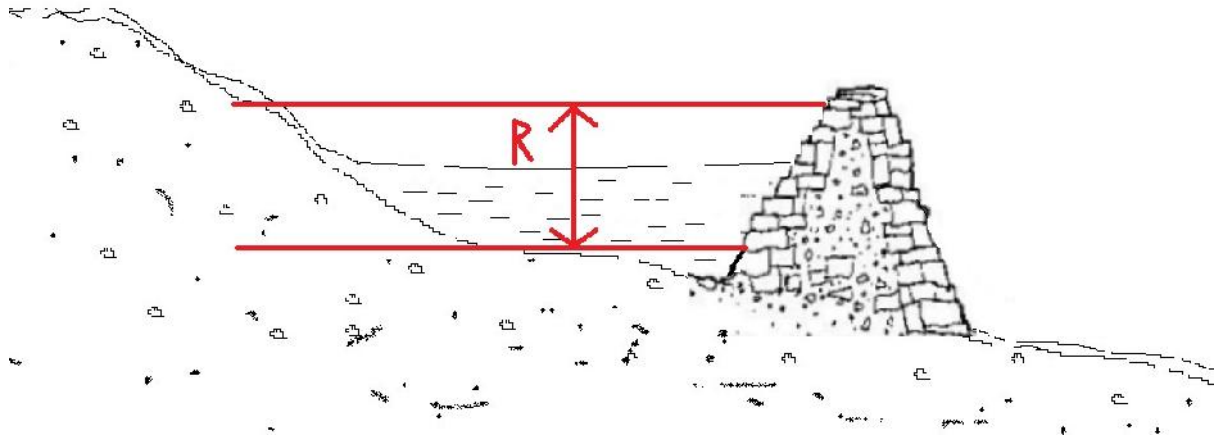


Figure 9.3 URA Residential Property Price Index

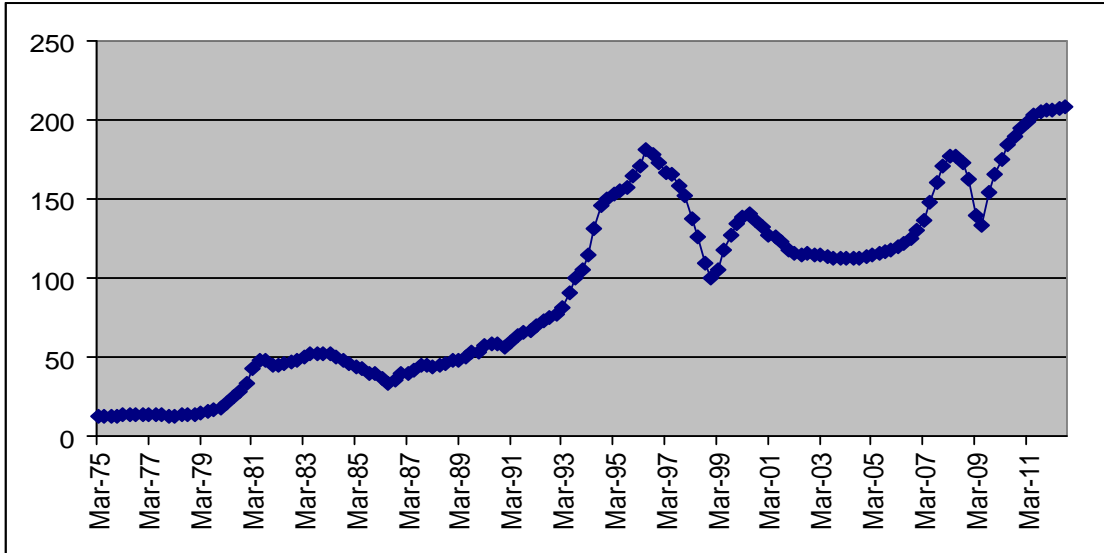


Figure 9.4 URA Returns of Residential Property Price Index

(Series 1: Year on Year Log Return, Series 2: Quarter on Quarter Log Return)

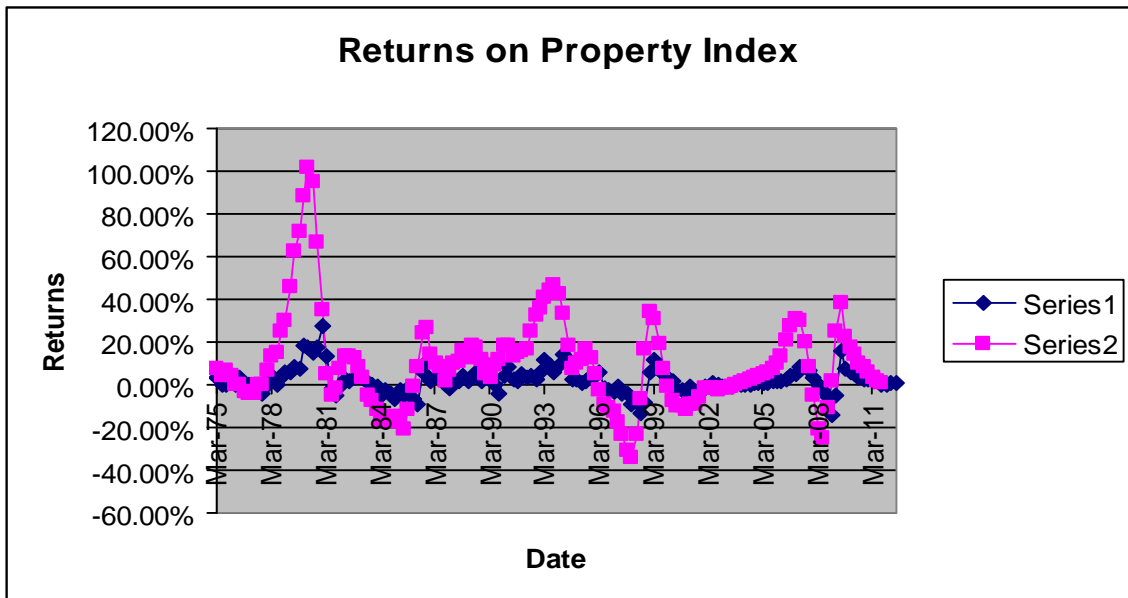


Figure 9.5 Percentage of Real Estate Loan to GDP

