

**EVIDENCE, DETERMINANTS, AND CONSEQUENCES OF ASSET PRICE
BUBBLES: THE CASE OF MALAYSIA AND SINGAPORE**

GARY JOHN RANGEL

UNIVERSITI SAINS MALAYSIA

2010

**EVIDENCE, DETERMINANTS, AND CONSEQUENCES OF ASSET PRICE
BUBBLES: THE CASE OF MALAYSIA AND SINGAPORE**

by

GARY JOHN RANGEL

**Thesis submitted in fulfilment of the
requirements for the degree
of Doctor of Philosophy**

JUNE 2010

ACKNOWLEDGEMENTS

When I first embarked on the journey to obtain a PhD degree, I never envisaged that it would be such a long, drawn out process requiring sacrifices of my time away from my family and friends. As such, I am greatly indebted to my wife, Ooi Gaik Lean who has stood by me during all these years of marriage. She took on a major role of nurturing our young children through their early formation years while I was working on this project.

In developing this work, I was helped and encouraged by many people. First and foremost, I would like to thank Assoc. Prof. Dr. Subramaniam Pillay, who was the original supervisor and currently the field supervisor of this work. His tireless efforts to meticulously reading the material I wrote as well as the intellectual discourse we shared has enlightened my understanding in the world of finance and given me an experience in looking at the world as a whole rather than the sum of its parts. I have come to view my relationship with him from a parental-child perspective rather than a supervisor-student perspective.

I am indebted to my current supervisor, Prof. Dr. Fauziah Md. Taib who has been an inspiration and provided me with the necessary confidence to see this work through. Her thoughts and commentary of this work has greatly improved its quality and delivery of the main message. Special thanks also goes to Assoc. Prof. Dr. Lai Yew Wah for kindly providing me with generalised E-Views programs to complete the analysis on the

consequences of asset price bubbles. I have immensely benefited from comments provided by Prof. Richard Heaney of RMIT, Prof. Kenneth Froot of Harvard University, Prof. Ma Yue of Lingnan University, Prof. Ong Seow Eng of National University of Singapore, Prof. Robert Shiller of Yale University, Santiago Herrera of the World Bank, and Assoc. Prof. Winston Koh of Singapore Management University as well as participants from the 2005 Asian Finance Association conference, 2006 HKU-NUS Symposium on Real Estate Research, 19th Australasian Banking and Finance conference, 2007 Singapore Economic Review conference, and the 2008 Bank of Norway conference on fundamentals and non-fundamental asset price dynamics. I also would like to convey my heartfelt thanks to the Statistics Department staff of both Malaysia and Singapore who have provided some valuable datasets which were crucial in seeing this work through.

I would like to thank my children, Vincent Alexander Rangel and Darren Alexius Rangel for their patience with me and their understanding of my time away from them. I dedicate this work to them in the hope it will spur them towards greater heights academically as well as socially. Finally, I dedicate this work to my late father, Anthony Rangel who passed away this year. He provided me with the inspiration to succeed in life and I am also grateful to him for nurturing me through my formative years.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iv
LIST OF TABLES	x
LIST OF FIGURES	xviii
ABSTRAK	xxi
ABSTRACT	xxiii
CHAPTER 1 INTRODUCTION	1
1.0 Background of the Study	1
1.1 Problem Statements	8
1.2 Research Objectives	10
1.3 Research Questions	10
1.4 Significance of the Study	10
1.5 Organization of the Thesis	12
CHAPTER 2 OVERVIEW OF ASSET PRICE BUBBLES	14
2.0 Introduction	14
2.1 Definition of Asset Bubbles	14
2.2 Asset Price Bubbles from a Historical Perspective: Some Classic Examples	17
2.3 Recent Cases of Asset Price Bubbles	22

CHAPTER 3	THEORETICAL ASSET PRICING CONCEPTS	27
3.0	Introduction	27
3.1	Asset Returns: Basic Theoretical Concepts	27
3.2	The Present-Value Relation When the Assumption of Constant Returns is Relaxed	32
3.3	The Rational Bubble Theory	34
3.4	Tests for Evidence of Asset Price Bubbles	36
3.4.1	<i>Variance bounds test</i>	37
3.4.2	<i>West's specification test</i>	41
3.4.3	<i>The intrinsic bubble model</i>	45
3.4.4	<i>Non-stationary and cointegration tests</i>	48
3.4.5	<i>Regime switching tests</i>	51
3.4.6	<i>Duration dependence tests</i>	54
3.4.7	<i>Other tests</i>	58
3.4.8	<i>Experimental methodology</i>	59
3.5	Controversies Surrounding Asset Price Bubbles	60
3.5.1	<i>Mis-specified fundamentals</i>	60
3.5.2	<i>The arbitrage argument</i>	63
3.5.3	<i>Impossibility of negative price bubbles</i>	65
3.5.4	<i>Rational investors</i>	66
3.6	Determinants of Asset Price Bubbles	68
3.6.1	<i>Credit growth and capital inflows</i>	68
3.6.2	<i>Gross domestic product (GDP)</i>	72
3.6.3	<i>Unemployment</i>	74
3.6.4	<i>Volatility of asset returns</i>	75

3.6.5	<i>Convenience yield</i>	76
3.6.6	<i>Interest rates</i>	77
3.7	Consequences of Asset Price Bubbles	78
3.7.1	<i>Financial instability</i>	78
3.7.2	<i>Misallocation of resources and effects on investment</i>	80
3.7.3	<i>Effects on consumption</i>	83
3.8	Remedies against Asset Price Bubbles	86
3.9	Summary of the Chapter	89
CHAPTER 4	RESEARCH METHODOLOGY AND DATA	91
4.0	Research Hypotheses	91
4.1	Evidence of stock price bubbles in the Malaysian and Singaporean stock markets	91
4.2	Hypothesis development of the determinants of stock price bubbles in Malaysia and Singapore	93
4.3	Evidence of real estate bubbles in the Malaysian and Singaporean real estate markets	102
4.4	Determinants of real estate bubbles in the Malaysian and Singaporean real estate markets	104
4.5	Consequences of stock market bubbles and real estate bubbles on the Malaysian and Singaporean consumption and investment	108
4.6	Data	113
4.7	Summary of the chapter	121

CHAPTER 5	EVIDENCE OF BUBBLES FINDINGS	123
5.0	Introduction	123
5.1	Descriptive statistics of the Malaysian stock market and Singaporean stock market	123
5.2	Descriptive statistics of the Malaysian real estate market and Singaporean real estate market	128
5.3	Tests for price bubbles in the Malaysian and Singaporean stock markets	130
	5.3.1 <i>Results of the variance bounds test</i>	131
	5.3.2 <i>Results of the duration dependence test</i>	151
	5.3.3 <i>Results of the unit root/cointegration test</i>	163
	5.3.4 <i>Results of the intrinsic bubbles model</i>	175
5.4	Tests for price bubbles in the Malaysian and Singaporean real estate markets	182
	5.4.1 <i>Results of the variance bounds test</i>	182
	5.4.2 <i>Results of the duration dependence test</i>	193
	5.4.3 <i>Results of the unit root/cointegration test</i>	199
	5.4.4 <i>Results of the intrinsic bubbles model</i>	208
5.5	Summary of findings on evidence of bubbles	210
CHAPTER 6	DETERMINANTS AND CONSEQUENCES OF BUBBLES FINDINGS	214
6.0	Introduction	214
6.1	Determinants of stock price bubbles in Malaysia and Singapore results	214

6.1.1	<i>Discussion of the determinants of stock price bubbles in Malaysia and Singapore</i>	235
6.2	Determinants of real estate bubbles in Malaysia and Singapore results	246
6.2.1	<i>Discussion of the determinants of real estate bubbles in Malaysia and Singapore</i>	255
6.3	Summary of findings on determinants of bubbles	261
6.4	Consequences of bubbles (Malaysia and Singapore) on consumption and investment	265
6.4.1	<i>Consequences of stock price bubbles on consumption</i>	266
6.4.2	<i>Consequences of stock price bubbles on investment</i>	269
6.4.3	<i>Consequences of real estate bubbles on consumption</i>	273
6.4.4	<i>Consequences of real estate bubbles on investment</i>	276
6.5	Summary of findings on consequences of bubbles	279
6.6	Policy issues and recommendations	290
6.6.1	<i>Stock trading reforms</i>	291
6.6.2	<i>Moral suasion</i>	292
6.6.3	<i>Better information dissemination</i>	294
6.6.4	<i>Improved financial databases</i>	298
6.6.5	<i>Monetary policy tools</i>	299
6.6.6	<i>Use of countercyclical policy measures</i>	305

6.6.7	<i>Revolutionise the market for real estate</i>	312
CHAPTER 7	CONCLUSION & SUMMARY	317
7.0	Introduction	317
7.1	Summary of the Study Findings	318
7.2	Limitations and Future Research	325
7.3	Conclusion	328
BIBLIOGRAPHY		330

LIST OF TABLES

Table 3.1	Bank Credit over GDP (%)	69
Table 5.1	Descriptive statistics (Malaysian stock market)	124
Table 5.2	Descriptive statistics (Singaporean stock market)	127
Table 5.3	Descriptive statistics (Malaysian real estate market)	128
Table 5.4	Descriptive statistics (Singaporean real estate market)	130
Table 5.5	Definition of principal symbols used for the variance bounds test	132
Table 5.6	Variance bound tests results (Malaysian stock market)	134
Table 5.7	Variance bound tests results (Singaporean stock market)	138
Table 5.8	Un-weighted unbiased volatility tests (Malaysian stock market)	141
Table 5.9	Un-weighted unbiased volatility tests (Singaporean stock market)	143
Table 5.10	Weighted unbiased volatility tests (Malaysian stock market)	148
Table 5.11	Weighted unbiased volatility tests (Singaporean stock market)	149
Table 5.12	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian stock market (Full sample period)	152

Table 5.13	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian stock market (Sub-sample period (1))	153
Table 5.14	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian stock market (Sub-sample period (2))	154
Table 5.15	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Singaporean stock market (Full sample period)	155
Table 5.16	Run counts, hazard rates, and tests of duration dependence results for the Malaysian stock market using difference of ex-post price and real de-trended price (Full sample period)	156
Table 5.17	Run counts, hazard rates, and tests of duration dependence results for the Malaysian stock market using difference of ex-post price and real de-trended price (Sub-sample period (1))	157
Table 5.18	Run counts, hazard rates, and tests of duration dependence results for the Malaysian stock market using difference of ex-post price and real de-trended price (Sub-sample period (2))	158

Table 5.19	Run counts, hazard rates, and tests of duration dependence results for the Singaporean stock market using difference of ex-post price and real de-trended price (Full sample period)	160
Table 5.20	Run counts, hazard rates, and tests of duration dependence results for the Singaporean stock market using difference of ex-post price and real de-trended price (Sub-sample period(1))	161
Table 5.21	Run counts, hazard rates, and tests of duration dependence results for the Singaporean stock market using difference of ex-post price and real de-trended price (Sub-sample period(2))	162
Table 5.22	Unit root test results (Malaysian stock market)	165
Table 5.23	Unit root test results (Singaporean stock market)	168
Table 5.24	Results from bounds test on Equation (5.5) (Malaysian stock market)	172
Table 5.25	Results from bounds test on Equation (5.5) (Singaporean stock market)	174
Table 5.26	Estimates of Equation (3.41), $\frac{P_t}{D_t} = \kappa + cD_t^{\lambda-1} + \varepsilon_t$ (Malaysian stock market)	176
Table 5.27	Estimates of Equation (3.41), $\frac{P_t}{D_t} = \kappa + cD_t^{\lambda-1} + \varepsilon_t$ (Singaporean stock market)	180

Table 5.28	Variance bound tests results (Malaysian real estate market)	183
Table 5.29	Un- weighted unbiased volatility tests (Malaysian property market)	187
Table 5.30	Weighted unbiased volatility tests (Malaysian property market)	188
Table 5.31	Variance bound tests results (Singaporean real estate market)	190
Table 5.32	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian property market (Full sample period)	194
Table 5.33	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian property market (Sub-sample period (1))	194
Table 5.34	Run counts, hazard rates, and tests of duration dependence for runs of monthly excess value-weighted portfolio returns of the Malaysian property market (Sub-sample period (2))	196
Table 5.35	Run counts, hazard rates, and tests of duration dependence for runs using different between ex-post price and actual price of the Malaysian property market (Full sample period)	196

Table 5.36	Run counts, hazard rates, and tests of duration dependence for runs using different between ex-post price and actual price of the Malaysian property market (Sub-sample period (1))	197
Table 5.37	Run counts, hazard rates, and tests of duration dependence for runs using different between ex-post price and actual price of the Malaysian property market (Sub-sample period (2))	198
Table 5.38	Unit root test results (Malaysian real estate market)	201
Table 5.39	Unit root test results (Singapore real estate market)	203
Table 5.40	Results from bounds test on Equation (5.5) (Malaysian property market)	205
Table 5.41	Results from bounds test on Equation (5.5) (Singaporean property market)	206
Table 5.42	Estimates of Equation (3.41), $\frac{P_t}{D_t} = \kappa + cD_t^{\lambda-1} + \varepsilon_t$ (Malaysian property market)	208
Table 5.43	Summary of evidence of asset price bubbles	211
Table 6.1	Glossary of primary variables (Malaysian stock market)	215
Table 6.2	Glossary of primary variables (Singaporean stock market)	215
Table 6.3	Cross-correlation: Independent variables for determinants of stock market bubbles (Malaysia)	216

Table 6.4	Cross-correlation: Independent variables for determinants of stock market bubbles (Singapore)	217
Table 6.5	Revised cross-correlation: Independent variables for determinants of stock market bubbles (Malaysia)	218
Table 6.6	Revised cross-correlation: Independent variables for determinants of stock market bubbles (Singapore)	218
Table 6.7	Polynomial distributed lag regression results for the determinants of stock price bubbles (Malaysia), 1979Q4-2004Q2	221
Table 6.8	Polynomial distributed lag regression coefficients for only MI and USB, 1979Q4-2004Q2	223
Table 6.9	Polynomial distributed lag regression results for the determinants of stock price bubbles (Singapore), 1979Q2-2006Q4	227
Table 6.10	Polynomial distributed lag regression coefficients for only SDCRG and SI 1979Q4-2004Q2 (Singapore)	230
Table 6.11	Polynomial distributed lag regression coefficients for only SI and SCF in the absence of USB 1979Q4-2004Q2 (Singapore)	232
Table 6.12	Glossary of primary variables (Malaysian real estate market)	247
Table 6.13	Glossary of primary variables (Singaporean stock market)	247

Table 6.14	Cross-correlation: Independent variables for determinants of real estate bubbles (Malaysia)	248
Table 6.15	Cross-correlation: Independent variables for determinants of real estate bubbles (Singapore)	248
Table 6.16	Polynomial distributed lag regression results for the determinants of real estate bubbles (Malaysia), 1993Q1-2004Q2	249
Table 6.17	Polynomial distributed lag regression results for the determinants of real estate bubbles (Singapore), 1980Q1-2006Q4	254
Table 6.18	Summary on determinants of asset price bubbles	263
Table 6.19	Toda-Yamamoto test results on stock price bubbles and consumption relationship (Malaysia)	266
Table 6.20	Toda-Yamamoto test results on stock price bubbles and consumption relationship (Singapore stock market)	267
Table 6.21	Toda-Yamamoto test results on stock price bubbles and investment relationship (Malaysia)	270
Table 6.22	Toda-Yamamoto test results on stock price bubbles and investment relationship (Singapore)	271
Table 6.23	Toda-Yamamoto test results on real estate bubbles and consumption relationship (Malaysia)	273
Table 6.24	Toda-Yamamoto test results on real estate bubbles and consumption relationship (Singapore)	274

Table 6.25	Toda-Yamamoto test results on real estate bubbles and investment relationship (Malaysia)	276
Table 6.26	Toda-Yamamoto test results on real estate bubbles and investment relationship (Singapore)	277
Table 6.27	Summary of evidence on consequences of bubbles	280
Table 7.1	Summary of hypotheses and findings for evidence of asset price bubbles (Malaysia and Singapore)	319
Table 7.2	Summary of hypotheses and findings for determinants of stock price bubbles (Malaysia and Singapore)	320
Table 7.3	Summary of hypotheses and findings for determinants of real estate bubbles (Malaysia and Singapore)	322
Table 7.4	Summary of hypotheses and findings for consequences of asset price bubbles (Malaysia and Singapore)	323

LIST OF FIGURES

Figure 1.1	Nominal Kuala Lumpur stock exchange composite index (KLCI).	2
Figure 1.2	Nominal Singapore Straits Times Index and nominal implied dividends (Datastream calculated).	4
Figure 2.1	South Sea company stock price (in log scale).	19
Figure 2.2	Dow Jones Industrial Average 1921-1932 (log scale).	21
Figure 2.3	Nikkei Index 1950-2002 (arithmetic scale).	23
Figure 3.1	Selected prices of Gouda Tulip Bulbs (log scale).	61
Figure 4.1	Overall flow of Minsky's Financial Instability Hypothesis and variables outside the model.	100
Figure 4.2	Relationship model between real estate bubble propagation and various explanatory variables.	107
Figure 5.1	Mean Dividend Payouts by Sectors (Malaysia), 1993-2000.	125
Figure 5.2	Actual real KLCI month-end values and constructed fundamental values.	137
Figure 5.3	Actual real STI month-end values and constructed fundamental values.	139
Figure 5.4	Malaysian stock market comparison between real detrended price (P), naïve forecast price (P^0), and the ex-post price (P^*) for the full sample period.	145

Figure 5.5	Singaporean stock market comparison between real de-trended price (P), naïve forecast price (P^0), and the ex-post price (P^*) for the full sample period.	146
Figure 5.6	Actual price-dividend ratio, fitted price-dividend ratio (Equation 3.41), and residuals.	178
Figure 5.7	KLCI Monthly dividend yield (annualised).	179
Figure 5.8	Actual real Bursa Malaysian property index month-end values and constructed fundamental values.	185
Figure 5.9	Malaysian property market comparison between real de-trended price (P), naïve forecast price (P^0), and the ex-post price (P^*) for the full sample period.	188
Figure 5.10	Comparison between actual PPI and present value PPI (Full Sample 978Q1-2008Q1).	191
Figure 5.11	Actual price-dividend ratio, fitted price-dividend ratio (Equation 3.41), and residuals.	209
Figure 6.1	Actual stock price bubbles, fitted stock price bubbles based on polynomial distributed lag regression, and residuals (Malaysia).	225
Figure 6.2	Actual stock price bubbles, fitted stock price bubbles based on polynomial distributed lag regression, and residuals (Singapore).	234
Figure 6.3	Time series of stock price bubbles proxy and stock market return volatility (Malaysia).	243

Figure 6.4	Time series of stock price bubbles proxy and stock market return volatility (Singapore).	244
Figure 6.5	Actual stock price bubbles, fitted real estate bubbles based on polynomial distributed lag regression, and residuals (Malaysia).	251
Figure 6.6	Actual stock price bubbles, fitted real estate bubbles based on polynomial distributed lag regression, and residuals (Singapore).	252
Figure 7.1	Bursa Malaysia Property Index (nominal) and Malaysia House Price Index (MHPI) (1991=100)	326

BUKTI, PENENTU DAN AKIBAT DARI GELEMBUNG HARGA ASET: KES MALAYSIA DAN SINGAPURA

ABSTRAK

Gelembung harga asset adalah suatu fenomena yang telah berlaku berkurun lamanya. Fenomena ini boleh menyebabkan kesan negatif ke atas ekonomi sesebuah negara sewaktu pembentukan dan juga semasa fasa keruntuhannya. Isu mengenai pembentukan gelembung adalah berkenaan salah peruntukan sumber-sumber ekonomi yang sememangnya terhad kepada aktiviti spekulasi yang mengerumuni aktiviti produktif. Apabila gelembung itu runtuh, kesannya lebih terasa kepada masyarakat keseluruhannya. Walau bagaimanapun, para penyelidik masih lagi membahaskan kewujudannya secara sejarah, apakah yang menyebabkan pembentukannya, dan apakah akibatnya terhadap negara dan juga masyarakat setempat.

Kajian ini ingin memberikan pemahaman yang lebih mendalam ke atas ketiga-tiga persoalan tersebut. Suatu pendekatan berbilang ujian telah digunakan bagi menentukan kewujudan gelembung tersebut. Dengan menggunakan hipotesis ketidak-stabilan kewangan seperti yang dicadangkan oleh Hyman Minsky dan juga kaedah 'polynomial distributed lag', beberapa pembolehubah yang menonjol telah dikenalpasti sebagai mempunyai ciri-ciri penjelasan mengenai penyebaran gelembung harga aset di Malaysia dan Singapura. Dalam kes penyebaran gelembung harga saham, kedua-duanya iaitu pertumbuhan Keluaran Dalam Negara Kasar (KDNK) dan aliran modal adalah pembolehubah penjelas yang konsisten dan signifikan.

Bagi gelembung hartanah, kadar faedah sebenar, pertumbuhan KKDN sebenar dan proksi gelembung harga saham adalah indikator utama. Dengan kesemua indikator utama di dalam tangan, para pelabur dan pihak berkuasa /kerajaan boleh melaksanakan pengukur yang bersesuaian bagi memantau pembolehubah menonjol untuk membaiki kesan pembentukan dan keruntuhan gelembung tersebut.

Akhir sekali, dengan menggunakan pendekatan 'Granger causality', gelembung harga aset secara keseluruhannya didapati mempunyai kesan 'uni-variate' ke atas aktiviti ekonomi sebenar apabila diukur dengan penggunaan dan pelaburan. Ini menunjukkan bahawa kerajaan dan bank negara mungkin telah menggunakan polisi seperti polisi kewangan yang bergantung kepada keadaan, pujukan moral, penyebaran maklumat penilaian yang lebih baik, penyediaan pangkalan data kewangan, polisi kitaran bertentangan dan revolusi pasaran kewangan dengan peralatan pengurusan risiko yang lebih baik. Walaupun sesetengah dari tindakan ini adalah kontroversi namun adalah penting bagi pendemokrasian kewangan ini dijalankan oleh kedua-dua negara untuk mempromosikan pelakuan pelaburan yang bersesuaian tanpa bahaya risiko.

EVIDENCE, DETERMINANTS, AND CONSEQUENCES OF ASSET PRICE BUBBLES: THE CASE OF MALAYSIA AND SINGAPORE

ABSTRACT

Asset price bubbles have been a phenomenon that has occurred for centuries. This phenomenon can result in a negative impact on a country's economy during the build-up and collapse phase. The issue with a bubble build-up is the misallocation of scarce economic resources in speculative activities which crowd out investment in productive activities. When the bubble collapses, its effect is even greater on society as a whole. Researchers nevertheless are still debating its existence even historically, what its causes are, and whether it will have any consequential effects on countries generally and society at large.

This study seeks to provide further insight on these three questions. A multi-test approach was employed to determine the existence of bubbles. Using the financial instability hypothesis proposed by Hyman Minsky and a polynomial distributed lag approach; several salient variables were identified to have explanatory properties on the propagation of asset price bubbles in Malaysia and Singapore. In the case of stock price bubbles propagation, both real GDP growth and capital flows are consistently significant explanatory variables. As for real estate bubbles, real interest rates, real GDP growth, and the stock market bubble proxy are leading indicators. With these leading indicators in hand, both investors and government authorities can implement appropriate monitoring measures on these salient variables to ameliorate the effects of bubble build-up and its collapse.

Lastly, using the *Granger causality* approach, asset price bubbles in general have uni-variate effects on real economic activity measured by consumption and investment. This indicates that government and central bank may undertake policies such as monetary policy dependent on the situation, moral suasion, better dissemination of valuation information, creating individual financial databases, countercyclical policies, and revolutionising financial markets with improved risk management tools. Although some of these measures albeit are controversial, it is imperative that democratisation of finance is undertaken by both countries in order to promote appropriate investment behaviour but without the downside risk.

CHAPTER 1

INTRODUCTION

1.0 Background of the Study

The stock market is pivotal to the health of a country's economy. This is more so in Malaysia as it is a small and open economy and Singapore, which is a trading nation with limited natural resources. Speculation and extreme volatility are therefore dangers, which may not necessarily lead to economic downturns. The Malaysian and Singaporean stock markets and real estate markets have suffered their fair share of booms and busts.

The Malaysian stock market has experienced seven boom-bust cycles since its inception. The first was the crash of 1973 that lasted for nearly two years. Neoh (1989) attributed the stock market rise to speculation by first-time investors as the main cause of the boom and the subsequent crash. Most investors were mainly civil servants who were investing in the stock market for the first time. The lack of alternative investments (the three months fixed deposit rate at that time was five per cent) caused the money in circulation to be channelled into the local bourse and the bull-run took off in January 1971 and reached its peak on 13 February 1973 (Neoh, 1989).

At that time the Singaporean and Malaysian stock markets were interlinked. The Straits Times Industrial Index peaked at 611 points recording a cumulative increase of over 472 per cent over the two year period. Share prices had reached dizzying heights. For example, one thousand shares of Overseas Chinese Banking Corporation (OCBC) was priced at RM50,000 at its height. This sum was equivalent to the selling price of two terrace houses at that point in time (Neoh, 1989). Prices subsequently collapsed and

OCBC's stock price crashed to RM3.58 from a high of RM50.00 per share which is a decrease of almost over 93 per cent.



Figure 1.1 Nominal Kuala Lumpur stock exchange composite index (KLCI).

As can be seen from Figure 1.1, the second was the crash of 1981, which ended after 16 months. A less severe downturn occurred in the beginning of 1984 and reached its trough only in May 1986. The next crash in 1987 coincided with the U.S. stock market financial meltdown of that year lasting for a period of almost nine months (Neoh, 1989). After the extraordinary boom of 1993, the market again headed south in 1994 and moved upwards for the next three years leading to a sharp fall during the 1997 Asian financial crisis whereby between July 1997 and mid-January 1998, the all ordinaries index of the KLSE fell by over 65 per cent, wiping off almost US\$225 billion of market capitalization which was the biggest stock market plunge among the five “crisis” countries (Athukorala, 1998). The

market recovered from the 1997 Asian financial crisis with price appreciations from a historical low of 302.91 points at end of August 1998 whereby the KLCI almost reached the 1000 points mark in February 2000 only to suffer a setback after that year.

Neoh (1989) has noted that the Malaysian stock market has progressively been more speculative in nature with each passing boom and bust. In the first half of 2005, the stock market was jolted by the limit-down phenomena which led to a collapse in prices of several second-liners and third-liners. This had even prompted the Malaysian Securities Commission (SC) to launch a probe to investigate these disruptive movements in share prices ("Limit-down trades on Bursa persist," 2005).

It is therefore important to investors to ascertain as to where does fundamental value end and speculation begin. Investors cannot simply rely solely on research reports by research houses and the stock picks which are heavily covered by the media. It was this sense of confidence which led to overconfidence in the durability of the uptrend in stock market (Neoh, 1989). Prior to the Malaysian stock market crash of 1981, most stock recommendations from brokers and stock market forecasts depicted by the media were bullish in nature. There were few if any dissenting voices (Neoh, 1989). In fact, due to the recent trend in extreme volatility in prices and trading volume, Bursa Malaysia has since 18 July, 2005 made available to the public its queries to companies whose share prices depict unusual activity and whose trading depict unusual volume. From 18 July, 2005 to 19 October, 2005, a total of 21 notices have been disseminated through the Bursa Malaysia website http://www.bursamalaysia.com/website/bm/media_centre/media_releases.html.

This is an average of seven notices a month. The goes to show how important it is for investors to be knowledgeable about speculation in specific firms as well as speculation in the overall market.

Singapore too has not escaped from the tell-tale signs of asset price appreciation and its subsequent bursting. There has been nine cycles of boom to bust from 1973 to 2006 with the Straits Times Index (this is a Datastream calculated index) rising from a collapse in the mid-1970s to reach a peak of 128.14 points in early July 1981 which was not far off the value in early 1973 (See Figure 1.2).

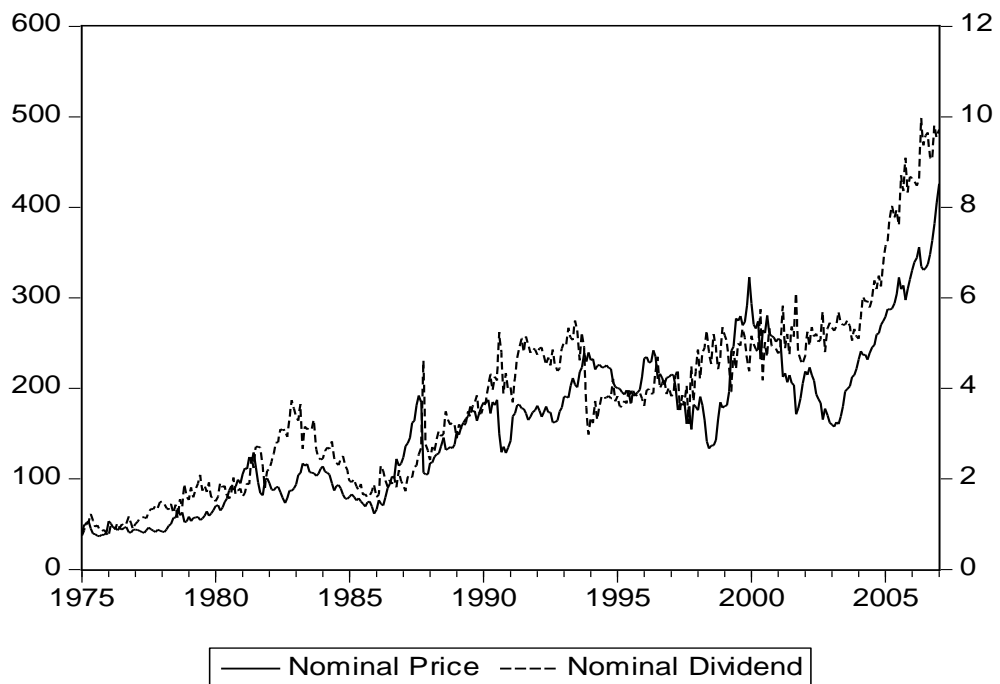


Figure 1.2 Nominal Singapore Straits Times Index and nominal implied dividends (Datastream calculated).

The index subsequently collapsed to a low 76.23 points in the month of September 1982. This was a dramatic 40.51 per cent reduction in market capitalisation. As documented on the KLCI, the Straits Times Index (STI) mirrored the rise and fall of the Dow Jones Industrial Average (DJIA) by

hitting a peak of 185.40 points in early October 1987 and thereafter collapsing 102.33 points in a mere four months. The STI recovered to reach a peak of 188.54 in August 1990.

Although there were several peaks and troughs after that, the STI nevertheless climbed steadily to reach a record value of 247.04 points in mid-1996. The onset of the 1997 Asian financial crisis led to a collapse of the STI to 158.09 points. This was a collapse of 36 per cent in value. This is much less than the collapse suffered by the KLCI. The STI recovered dramatically after the crisis and hit a record of that time of 335.37 points in January 2000. This was 112.13 per cent increase since the collapse during the financial crisis. This could be attributed to the fact the Singaporean economy depends much on the manufacturing sector especially semiconductors. This rise was related to the dot com boom which was also known as NASDAQ bubble. The post-millennium collapse of the STI also mirrored the collapse of the NASDAQ as well. The STI dropped to 173.37 in October 2001 which amounts to a 48.3 per cent decline within a period of almost two years. This incidentally is the largest drop ever recorded. The STI has since recovered and has gone on to record its highest ever value of 356.07 points in May, 2006. One wonders whether the STI is currently in a bubble.

Boom-bust cycles have also occurred in other asset markets. There were two documented instances of property price appreciations from 1971 to 1973 and 1979 to 1982. After both these appreciations, the property market collapsed (Ratnam, 1983). Palma (2000) observes a significant run up in real estate prices from 1988 to 1995. Starting for a base of 100 in quarter one of 1988, the Malaysian real estate index increased to almost 600 points at end

of third quarter of 1994. There was a slight adjustment subsequently as the index eased to below 400 points in the fourth quarter of 1995. The liberalization of capital in-flows, low mortgage rates, and little movement in the stock market as compared to the boom of 1993 set in motion another run-up in real estate prices. The index increased from below 400 points at the end of the last quarter of 1995 to touch a peak of slightly above 900 points in the third quarter of 1998. The index eased on the onset of the 1997 Asian financial crisis.

Several stylized facts can be seen from a view of Singapore's property price index (PPI). The PPI had increased significantly from the period of 1978 and peaked in 1996, quarter two. This was probably due to the liberalisation policies carried out by the Singaporean government during the 1990s and coupled with excess demand for housing which boosted the market (Bardhan, Datta, Edelstein, & Lum, 2003). There was also an increase in the supply of land parcels as the Singaporean government sold 99 year leases in view of the ever increasing economic affluence of its citizens that caused many to fall out of the eligibility bracket of public housing (Chua, 2000). Prices started to fall well before the 1997 Asian financial crises which may denote that house price is a possible leading indicator of financial crises. Prices hit bottom at the end of 1998 and recovered somewhat up to the year 2000, only to gradually taper off to the present.

The dramatic collapse of the stock market in 1997 and the physical glut in office space and abandoned residential projects are fresh on the minds of investors. However, there is a need to look at the behaviour of asset prices over the long-term and identify periods of *irrational exuberance*

because after all, most investors have short memories and may repeat the same mistakes in future.

The need to understand the behaviour of asset prices is all the more important with shorter business cycles emerging in recent times. An analysis of the asset price bubble phenomenon should be a comprehensive one. There is no point in only examining one aspect of asset price bubbles. A comprehensive analysis would therefore give investors an overall view as summed up by Shiller (2003).

Although, some central bankers have advocated that the primary role of the central bank is to ensure price stability, others have argued that central bankers need to ensure financial stability as well (Posen, 2006; Roubini, 2006). This ongoing debate has not abated and the importance of a satisfactory analysis of whether this phenomenon occurs in Malaysia and Singapore is therefore all the more imperative. It is not enough to spot the phenomenon but also important to understand in what conditions does it propagate, and what are its effects on the economy. This allows investors regardless of whether they are individual investors or institutional investors to make better investment decisions by incorporating some of the techniques that will be discussed in this thesis.

The situation in the global finance arena lately had been one of great uncertainty. All this has been triggered by advent of new financial products like sub-prime mortgages and credit default swaps (CDS). The unravelling of the real estate bubble in the US has reverberated in financial markets around the world. The extent of collapse in real estate prices in the US which initially was seen as a country-specific problem and its effect on global financial

markets have surprised many financial analysts and economists alike. This may however reflect the reality of the new global financial order where far flung countries' financial markets have become increasingly integrated.

The analysis will be based on a two-country comparison. The countries chosen are Malaysia and Singapore. The choice of these two countries is based on the fact that a priori, both countries are linked economically as well as historical. So, the analysis of both countries should hypothetically yield similar results. Conducting a two-country analysis would also strengthen the robustness of the results with regards to the variables used.

1.1 Problem Statements

Asset price bubbles are suspected to have far reaching effects on a country's economy. How an asset is valued at the present moment or in the future influences major economic and social policy decisions that affect not only investors but also society at large, and even the world. If asset prices at present or in the future are exaggerated, then as a society, we may invest too much in business start-ups (as for example during the Internet boom in the U.S.) and expansions, and too little in infrastructure, education, and other forms of human capital which improves the productivity and GDP of a country's economy. This misallocation of resources is even worse during a real estate market boom such as the one recently experienced by the U.S. economy. A property boom does nothing to boost long-term growth unlike the Internet boom which left a modern capital stock which still continues to yield productivity gains ("The great thrift shift," 2005).

If we think an asset is worth much more than its intrinsic value, we may make economic decisions that may be detrimental. We may become complacent in maintaining our savings rate, funding our pension plans, and instituting proper social security insurance. Shiller (2005) points out that most investors seem to view the asset market as a force of nature by itself. They do not fully realize that they themselves, as a group, determine the level of the market and its volatility. Institutional investors like the Employees Provident Fund of Malaysia, the Armed Forces Provident Fund, and the Central Provident Fund which are huge investors in capital markets need to safeguard the interests of its contributors by implementing appropriate investment policies based on in-depth analysis of asset prices.

We need to ascertain that the price level of the stock market and the property market today, tomorrow or for that matter any other day reflects sensible economic reality, just as we need to know what is held in our bank accounts. The proper valuation of these asset classes will determine the current and future wealth of us as individuals and a country's economy as a whole.

Research of asset price bubbles especially on real estate bubbles is especially sparse in the context of Malaysia and Singapore. Fewer studies have been conducted on the determinants of asset price bubble let alone on the consequences towards a country's economy. This study seeks to fulfil that gap and analyse asset price bubbles in its entirety, from its formation to its consequences towards the decision making framework of the individual and also the firm.

1.2 Research Objectives

The purposes of this research are as listed below.

- To investigate empirically the existence of asset price bubbles within various asset classes in the Malaysian and Singaporean economies which will be the basis for other research objectives.
- To identify the determinants of asset price bubbles.
- To examine the effects of stock price bubbles and real estate bubbles on the economy.

1.3 Research Questions

There are three research questions this study seeks to answer. First, is there any evidence of asset price bubbles within different asset classes in the Malaysian and Singaporean context? Second, what are the determinants of asset price bubbles within the Malaysian and Singaporean context? Third, what are the possible consequences of a stock price bubble and a real estate bubble on Malaysia and Singapore with specific emphasis on consumption and investment?

1.4 Significance of the Study

Asset price bubbles are known to have some effects on the economy. However, there have been times when there has been no effect at all. For example, Mishkin and White (2003) found little stress on the financial system due to stock market crashes in the U.S. in 1903, 1940, 1946, 1962, and 2000. On the other hand, episodes where crashes put stress on the financial system include 1929 and 1987. There were also sharp increases in interest

rates spreads associated with the crashes of 1907, 1930-33, 1937, and 1973-74. By unravelling the factors that lead to and amplify asset price bubbles, policymakers will be better equipped to deal with any destabilizing effects of asset price bubbles on an economy. This study attempts to synthesize the various strands of analysis to offer policymakers a more complete picture of what asset bubbles are, how we might identify them – and more importantly – whether it has any destructive effects on the financial system and a country's economy.

Trichet (2003) offers two reasons why asset prices and wealth effects may have grown over the last decade. First, changes in asset valuations, which were mainly driven by the new economy stock prices from the mid 1990s and their subsequent collapse in 2000, have been dramatic. Second, these changes have significantly influenced private spending more than past asset price movements did because there has been an increasing percentage of share ownership observed in a number of industrialized countries.

It should be noted that the strength of economies such as Malaysia and Singapore depend on the smooth functioning of the financial system. The difficulty and the inconclusiveness of economists on how to identify an asset price bubble and its consequences will be noted in the literature review following. Therefore, this study seeks to add new insights in the workings of the financial system of a small open economy like Malaysia and a trading economy like Singapore, whereby both are highly dependent on foreign capital inflow and investment. The goal of the Malaysian government is to promote the country as a premier financial centre. As for the Singaporean

government, the goal is maintain their country's position as a premier financial centre. This makes this study all the more imperative to understanding a phenomenon that has plagued most developed countries.

1.5 Organization of the Thesis

The remaining chapters of this thesis are organized as follows. In the second chapter, the focus is on an overview of the asset pricing theory and how it relates in particular to the stock market and real estate. The next chapter looks at the empirical evidence of asset price bubbles with focus on both developed countries and developing countries. A notable difference would be the nature of the tests used to determine asset price bubbles which results in contradictory and conflicting outcomes on the same set of data in some cases.

Previous studies on the determinants of asset price bubbles are discussed next. The discussion then focuses on the consequences of these bubbles. Finally, the chapter closes with a brief overview on the policy measures that have been described by previous published works. Controversy is abundant in this section.

The next chapter discusses the research methodology to be used to answer all the research questions posed and to provide the proper empirical tests for testing the various hypotheses put forth. A detailed description of the data collected as well as its sources is explained as clearly as possible.

Chapter 5 and penultimate chapter presents the findings on the second and third research questions posed which are what are the determinants of asset price bubbles and what are the consequences of asset

price bubbles. Chapter 6 closes out with a discussion on the policy implications and measure government authorities or central banks could undertake in light of formation of an asset price bubble or the aftermath of its collapse.

Finally, the last chapter presents the summary and conclusion focusing on the salient points of the findings, limitations of the present research, possible ideas for future research, and ends with an overall conclusion of the thesis.

CHAPTER 2

OVERVIEW OF ASSET PRICE BUBBLES

2.0 Introduction

In this chapter, we first explore the various definitions of asset bubbles which are all centred on a common theme. The next section looks at asset price bubbles in the historical sense and highlights the gullibility of investors over the centuries. The modern episodes of asset price bubbles are discussed next. This reinforces the point that investors have short memories of pain of a price collapse.

2.1 Definition of Asset Bubbles

The word *bubble* is essentially something that grows bigger and bigger due to an injection of air and water for example. Its bursting could be due to the inability of the object to sustain further intake of water or air. The analogy of a common bubble can be translated into asset prices as well.

The late Charles P. Kindleberger (2000), author of the famous *Mania, Panics, and Crashes: A History of Financial Crises* defines a bubble as “an upward movement over an extended range that then implodes.” Kindleberger elaborated further on the definition of bubbles in the *New Palgrave Dictionary of Money and Finance*:

A bubble may be loosely defined as a sharp rise in price of an asset or a range of assets in a continuous process, with the initial rise generating expectations of further rises and attracting new buyers – generally speculators interested in profits from

trading in the asset rather than its use or earning capacity
(p.243).

This definition relates to a cycle of positive reinforcement. As long as there is positive reinforcement that asset prices will be on the rise, more players will enter the market in the hope of getting out in time by selling the assets that have risen to the next person. This is also known as the *greater fool theory*, which is usually very popular during the immature phase of a stock market's development (Neoh, 1989) although a recent study has shown this behaviour to be also prevalent in the U.S. which was a developed market during the 1999-2000 Internet bubble (Dhar & Goetzmann, 2006).

Garber (2000) has added more substance to the definition of a bubble by linking asset price movements to *fundamentals*. Fundamentals refer to those economic factors such as cash flows and discount rates that in tandem determine the price of any asset. He stated, "The definition of bubble more often used in economic research is that part of asset price movements that is unexplainable based on what we call fundamentals" (p. 4).

Rosser (1991) gives more depth with regards to the discussion on fundamentals when defining a bubble. A speculative bubble "exists when the price of something does not equal its market fundamentals for some period of time for reasons other than random shocks. [Fundamentals] is usually argued to be the long-run equilibrium consistent with a general equilibrium" (p. 107).

Shiller (2005) approaches the bubble definition from an investor behavioural viewpoint whereby a speculative bubble is "an unsustainable increase in prices brought on by investors' buying behaviour rather than by genuine fundamental information about value" (p. 5).

Siegel (2003) proposed a somewhat operational definition of an asset market bubble focusing on the deviation between expected returns and actual returns over a certain time period. He defines a bubble (or a negative bubble) as a period of rising (or falling) prices in an asset market at time t if it can be shown that the *realized* return of the asset over a given future time period (which is defined by the *duration* of the asset) can be shown to be inconsistent, i.e., more than two standard deviations from the expected return, given the historical risk and return characteristics of that asset at time t .

In this study, a careful distinction must be made on the exact concept of asset bubbles, which will be used to govern the analysis of the results. The focus is on asset bubbles, which propagate in the presence of rational investors. This means that asset bubbles can coexist within a rational expectations environment. Another name that is frequently used is a rational growing bubble. Therefore, this somewhat arbitrarily distinguishes the rational bubble from *fads*, *sunspots*, and *information bubbles*. Camerer (1989) defines these other phenomenon succinctly.

In summary, although there are various definitions espoused by different economists, one ubiquitous theme is recognizable which is, growth of a bubble requires positive feedback from initial investments. A bubble cannot grow unless there are some initial gains received by the primary investors. Speculative investing with no regards whatsoever for fundamentals occur when secondary investors enter the fray or when primary investors re-invest their earnings. The definition of speculative bubbles adopted in this study is based on Kindleberger's bubble definition as listed in the *New*

Palgrave Dictionary of Money and Finance. In this study, rational speculative bubbles are examined.

2.2 Asset Price Bubbles from a Historical Perspective: Some Classic Examples

Asset price bubbles are not something of a new phenomenon. In fact, there have been well-documented cases from as early as the 17th century. The earliest was known as the *tulipmania*. The Netherlands became a centre of cultivation and development of new tulip varieties after the tulip's entry into Europe from Turkey in the mid-1500s. The wealthy and professional growers created a market for rare varieties in which bulbs sold at very high prices. For example, the Semper Augustus bulb sold for 2000 guilders in 1625, which is equivalent to an amount of gold worth US\$16,000 at US\$400 an ounce. Garber (1990) describes the *tulipmania* frenzy in detail:

By 1636, the rapid price rises attracted speculators and prices of many varieties surged upward from November 1636 through January 1637. In February 1637, prices suddenly collapsed, and bulbs could not be sold at 10 per cent of their peak values. By 1739, the prices of most prized bulbs of the mania had fallen to no more than 0.1 guilder. This was 1/200 of 1 per cent of Semper Augustus's peak price. (pp. 37-38)

This speculative mania involved practically the whole country so much so that productive activities were neglected as the grip of *tulipmania* took over and governed even the common peoples' lives. The collapse of the tulip

market in the Netherlands led to economic distress and the beginning of the declining imperial power of the Dutch across the world.

Britain became the major economic superpower after the decline of the Dutch towards the middle of the 18th century. Nevertheless, asset price bubbles did not escape Britain. The infamous London-based South Sea Company came up with an ingenious plan to take over Britain's national debt in return for interest and sole trading rights to the South Seas (South America) and hence, in theory, to the treasures of the gold and silver mines in Peru and Mexico.

In actuality, the control of the trading rights was in the possession of Spain, which made it difficult for the company to generate a profit. Moreover, Spain allowed the South Sea Company to send only one ship a year to trade with South America (Neoh, 1989). Nevertheless, speculators frantically bid up the share price. It rocketed from £130 to £1,000 within seven months, and then collapsed abruptly, leaving many investors ruined and landing the Chancellor of the Exchequer of the day in prison. Figure 2.1 chronicles the fortunes of the South Sea Company.

Another bubble that was closely related to the South Sea bubble was the Mississippi bubble, which occurred in France. The scheme emerged in the context of the monetary theory and system derived by John Law. It involved monetary expansion using paper currency, which he argued would expand real commerce on a permanent basis, which in return would increase the demand for the new currency sufficiently to preclude a rise in prices.

Garber (1990) chronicles specifically the details of the Mississippi bubble:

... he quickly convinced the Regent to permit him to open a conventional, note-issuing bank in June 1716, the Banque Generale. In August 1717, Law organized the Compagnie d'Occident to take over the monopoly on trade with Louisiana and on trade in Canadian beaver skins. To finance the company, Law took subscriptions on shares to be paid partly in cash but mostly in government debt. He then converted the government's debt into *rentes*, offering the government an interest rate reduction. (p. 42)



Figure 2.1 South Sea company stock price (in log scale).

The value of shares in Law's company rose dramatically as Law's empire expanded. Shares in the company started at around 150 livres tournois (the French unit of account at that time) per share in January 1719. At the end of that year, share prices reached 10,000 livres. The market

became so seductive that people from the working class started to delve in its shares.

The weak spot in Law's scheme was his willingness to issue more bank notes to fund the purchase of shares in the company. Stock price began falling in January 1720 as some investors sold shares to turn capital gains into gold. In order to stop the sell-off, Law restricted any payment in gold that was more than 100 livres. Law devalued shares in the company in several stages during 1720 and this allowed Law's enemies to take control of the company by confiscating the shares of investors who could not prove they had actually paid for their shares with real assets rather than credit. By September 1721, share prices dropped to 150 livres, which was the original price at which the shares were sold for (Knight, 2002).

Moving closer to the 20th century, business optimism in the United States picked up after World War I. This was due to new inventions like the car and the radio, which were changing peoples' lives as well as the shape of the country's economy. There was hope and confidence in the stock market and in people's ability to get rich with little or no effort leading to much speculation. Elaborate financial instruments that had no real value other than the inflated paper profit fuelled intense speculation. The bubble built up until in October 1929 when the frenzy on Wall Street ended culminating in a 19.6 per cent fall of the Dow Jones index for that month. In the following month, the index fell a further 22 per cent. As the consequence of the 1929 Great Crash, the U.S. economy went into a depression, which spread across the globe, and lasted for several years.

Galbraith's (1971) authoritative account of this episode in the *Great Crash, 1929* succinctly points out that the experience of 1929 burned so deeply into national consciousness. Numerous legislative laws were passed after 1929 to make securities speculation more honest and, it was hoped, more readily restrained. However, in the recent times, it can be seen that none of these laws were a perfect safeguard. Figure 2.2 shows the movement of the Dow Jones Industrial Index before and after the crash of 1929.



Figure 2.2 Dow Jones Industrial Average 1921-1932 (log scale).

The recurrences of speculative excesses in widely differing environments suggest that it is, at best, a product of human nature (Simon, 2003). Based on the descriptions of the bubbles above, the nature of the speculative manias usually began with sound economic activities. Nevertheless, the herd instinct forged ahead as irrationality took over from rationality. In other words, an individual could be acting rationally, but the

market as a whole could be at the same time, irrational. The next section will focus on recent asset price bubbles and the controversies surrounding the existence of asset price bubbles.

2.3 Recent Cases of Asset Price Bubbles

Mishkin and White (2003), document significant aggregate price increases just before the collapse of the U.S. stock market in what is now known as the crash of October 1987. On October 19, the Dow Jones suffered a 22.6 per cent decline, and for the month, the index was down 23.2 per cent. When measured on the S & P 500, the market fell 12.1 per cent in October and 12.5 per cent in November. Remarkably, the pattern of the rise and fall mimicked the rise and fall of the market for 1926-1929.

Japan's bubble economy of the late 1980s was also an example of the excesses of asset price bubbles. Among asset prices, what exhibited the most rapid rise initially were stock prices. The Nikkei 225 began accelerating in 1986 and the index hit a peak of Yen 38,915 at the end of 1989, 3.1 times higher than the level at the time of the Plaza Agreement in September 1986 (Yen 12,598). Then stock prices fell sharply to Yen 14,309 in August 1992, more than 60 per cent below the peak (Okina, Shirakawa, & Shiratsuka, 2001). French and Poterba (1991) tried to rationalize the possibility that the high actual price earnings ratio (P/E) observed on Japanese stocks during this period could be due to differing accounting practices between U.S. firms and Japanese firms. Although it was found that the P/E ratios for Japanese firms would have been lower had they been using U.S. accounting practices, this difference could explain neither the doubling of this ratio in 1986 nor its

decline in 1990. Figure 2.3 shows the movement of the Nikkei index before and after the crash.



Figure 2.3 Nikkei Index 1950-2002 (arithmetic scale).

In the real estate market, prices have also followed the behaviour of the stock market. Land prices in Japan rose continuously from the 1950s to 1990. In 1991, the total land value in Japan was estimated at nearly US\$20 trillion (Stone & Ziemba, 1993). This was more than 20 per cent of the world's wealth. A prime location condominium in Tokyo peaked at over US\$3,500 per square feet and was 70 per cent more expensive than the new Trump tower in mid-town New York (Saito, 2003).

By 1996, prices of land of all types nationwide had sunk back to levels consistent with the long-term trend of the overall economy. However, the speculation, which culminated in frenzied buying and selling of land, left a hangover of enormous proportions that has affected Japan's economy to this day. Bank lending soared to record levels when prices increased but lending was still growing although prices subsequently fell. This debt overhang is the

source of the Japanese banking system's financial difficulties today (Alexander, 1997).

If developed countries have experienced asset price bubbles, what about developing countries? Herrera and Perry (2003) document the existence of asset price bubbles in Latin American countries in their sample period from 1980-2001 using the rational bubble and the intrinsic bubble theories discussed below. Collyns and Senhadji (2003) found that asset price bubbles were present during the 1990s especially in the real estate markets of most Asian countries but their subsequent bust during the 1997 Asian financial crisis affected each country quite differently.

Thailand was heavily affected because the property price bubble was large and the financial system was weak. Malaysia also experienced a sharp decline in real estate prices and a heavy build-up in non-performing loans. Indonesia and South Korea both underwent severe foreign exchange and banking crisis, but the property sector played a smaller role, reflecting less obvious property price bubbles and smaller bank exposure to the property sector.

Using Australia as a benchmark, Sarno and Taylor (1999) confirmed the existence of asset price bubbles in East Asian economies before the 1997 Asian financial crisis. The technique used was the residuals augmented least squares (RALS) method to circumvent the methodological problems as pointed out by Evans (1991) which will be discussed in Chapter 3. Real stock price series appeared to diverge rapidly away from the real dividend series, and often collapsing after a period of rapid price advancement and then proceeding again. They concluded that since Australia was not affected by