

INTER-RELATIONSHIPS BETWEEN STOCK INDEX WITH RESIDENTIAL  
PROPERTIES AND INDIRECT PROPERTY INVESTMENT IN MALAYSIA

LEE YOUNG YEE

A project report submitted in partial fulfillment of the requirements  
for the award of the degree of Master of Science (Real Estate)

Faculty of Geoinformation and Real Estate  
Universiti Teknologi Malaysia

AUGUST 2014

*"To my beloved family, thank you for your support, lastly and most importantly for my supervisor Dr. Janice Lee Yim Mei who never gave up inspiring and motivating me, through this project. Thank you. "*

## **ACKNOWLEDGEMENT**

I am thankful to my supervisor, Dr. Janice Lee Yim Mei, my panel Dr Rohaya and Dr Najib for their comments, opinions and guidance. Many thanks to all the lecturers in this Master course who taught me with valuable real estate insight and knowledge.

Finally, I would like to thank to my course mates in assisting me to complete this projects with relevant information and exchanged ideas.

## ABSTRACT

The implication of this study is to ascertain the wealth effect and credit price effect from various property investment vehicles to Malaysian stock index, where this can provide a guide for optimum investment portfolio decision making by understanding various characteristics. This study utilizes various econometric tools in VECM by exploring inter-relationship between stock index with residential properties and indirect property in Malaysia. The correlation exists between stock index and property markets by common exogenous factors, such as GDP, T-Bill rate and other contagion factors. By variance decomposition, short-run indicated the significant shock from Malaysian GDP, whereas significant long-run shock from stock index to various house price index and indirect property investment, except own shocks. Contagion effects from Singapore exist, particularly to Kuala Lumpur, Selangor Penang and Johor semi-detached house price index in short-run, possible because of medium class income earning in preference in upgrade their house which benefited by increasing Singapore business activities with Malaysia. By applying Granger causality test, it was found that there was a mixture of wealth effect and credit price effect in various locality and type of properties. As for indirect property investment, interestingly, Bursa Malaysia property index having wealth effect from the Bursa Stock index, whereas, S&P Malaysian REIT index experienced credit-price effect, which adversely performed to Bursa property index. Lastly, in short-run, it proven that inflation do caused the house price index, thus housing investment can be inflation hedged.

## ABSTRAK

Implikasi kajian ini adalah untuk menentukan *wealth effect* dan kesan *credit price effect* daripada pelbagai jenis pelaburan hartanah kepada indeks saham Malaysia, kita akan dapat panduan untuk optimum portfolio pelaburan membuat keputusan dengan memahami ciri-cirinya. Kajian ini menggunakan pelbagai kaedah ekonometrik dalam *VECM* untuk meneroka hubungan antara indeks saham dengan index kediaman dan hartanah tidak langsung di Malaysia. Korelasi wujud di antara indeks saham dan pasaran hartanah oleh faktor-faktor luaran yang sama, seperti kadar KDNK, T-Bill dan faktor penularan lain. Dengan *variance decomposition*, jangka pendek yang ditunjukkan *shock* ketara daripada KDNK Malaysia, manakala *shock* jangka panjang dari indeks saham kepada pelbagai indeks harga rumah dan pelaburan hartanah tidak langsung, kecuali *shock* sendiri. Kesan penularan dari Singapura wujud, terutamanya ke Kuala Lumpur, Pulau Pinang dan Selangor Johor indeks harga rumah berkembar dalam jangka pendek, kerana pendapatan para pendapatan sederhana akan mengutamakan dalam menaik taraf rumah mereka, dengan mendapat faedah dengan bertambahan aktiviti perniagaan antara Singapura dengan Malaysia. Dengan menggunakan *Granger causality test*, didapati bahawa terdapat campuran *wealth effect* dan *credit price effect* dalam pelbagai tempat dan jenis hartanah. Bagi pelaburan hartanah tidak langsung, menarik, indeks harta Bursa Malaysia mempunyai *wealth effect* daripada indeks Bursa Saham, manakala indeks REIT Malaysia S & P mengalami *credit-price effect*. Akhir sekali, dalam jangka pendek, ia membuktikan bahawa inflasi yang disebabkan indeks harga rumah, dan pelaburan perumahan boleh dilindung nilai atas keadaan inflasi.

## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>DECLARATION</b>	ii
	<b>DEDICATION</b>	iii
	<b>ACKNOWLEDGEMENT</b>	iv
	<b>ABSTRACT</b>	v
	<b>ABSTRAK</b>	vi
	<b>TABLE OF CONTENTS</b>	vii
	<b>LIST OF TABLES</b>	xiv
	<b>LIST OF FIGURES</b>	xvii
	<b>LIST OF SYMBOLS</b>	xxi
	<b>LIST OF APPENDICES</b>	xxiv
<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 Introduction	1
	1.2 Background	2
	1.3 Problem Statement	3
	1.3.1 Descriptive Statistics and Correlation Analysis	4
	1.3.2 Wealth Effect and Credit Price Effect	5
	1.3.3 Geographical Differences	6
	1.3.4 Exogenous Factors	6
	1.3.5 Contagion Effects	7
	1.3.6 Malaysia Context	8
	1.4 Research Questions	10
	1.5 Research Objectives	10
	1.6 Scope of Study	11

	1.7	Significant of Study	11
	1.8	Research Methodology	12
	1.9	Chapter Organization	14
	1.10	Expected Result	16
<b>2</b>		<b>THE FACTORS FOR STOCK INDEX AND REAL PROPERTIES</b>	<b>17</b>
	2.1	Introduction	17
	2.2	House Price Index	18
	2.3	Stock index, Bursa Property Index and REIT	20
	2.4	T-bill Rate	22
	2.5	Exogenous factors	23
	2.6	Contagion factors	24
	2.7	Variables Study	27
<b>3</b>		<b>RESEARCH METHODOLOGY</b>	<b>30</b>
+	3.1	Introduction	30
	3.2	Descriptive Statistics	30
	3.3	Correlation	31
	3.4	Ordinary Least Square (OLS)	32
	3.5	CUSUM Squared	32
	3.6	Unit Root Test (ADF)	33
	3.7	Johansen Co-integration Test	34
	3.8	Variance Decomposition	36
	3.9	Granger Causality Test	38
<b>4</b>		<b>RESULT AND DISCUSSION</b>	<b>39</b>
	4.1	Introduction	39
	4.2	Descriptive Statistics	43
	4.3	Correlation	45
	4.4	Ordinary Least Square (OLS)	45
	4.5	CUSUM Squared – Structural Breaks	48
	4.6	Unit Root Test (ADF)	50
	4.7	Lag Selection	51

4.8	Johansen Co-integration Test	51
4.9	Variance Decomposition	53
4.10	Granger Causality Test	55
<b>5</b>	<b>CONCLUSION AND RECOMMENDATIONS</b>	<b>58</b>
5.1	Interpretation of result	58
5.2	Implication of Study	61
5.3	Limitation of Study	61
5.4	Recommendations	62
	<b>REFERENCES</b>	<b>63</b>
	Appendices 4.1 – 4.20	64-90



**LIST OF TABLES**

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
2.1	Category A - Residential properties investment in Malaysia	27
2.2	Category B - Indirect real estate investment instrument in Malaysia	27
2.3	Analysis on independent variable in relationship to Malaysia stock index	28
2.4	Analysis on independent variable in relationship to Malaysia house price index	28
2.5	Summary of Background Factors	29
4.1	Descriptive statistics of selected variables	43
4.2	Descriptive Statistics for House Price Index and Indirect Property Investment	44
4.3	Correlation among selected variables	45
4.4	Ordinary Least Squared for KLCI as Dependent Variable	46
4.5	Ordinary Least Squared for House Price Index as Dependent Variable	47
4.6	CUSUM of squared test for stock market and property market	49
4.7	Augmented Dickey-Fuller test for selected exogenous variables	50

4.8	Lag Selection for different house price index	51
4.9	Co-integration for different property price index	52
4.10	Variance Decomposition for different Property Price Index	53
4.11	Granger cause KLCI stock index from house price index	55
4.12	Factors of Granger cause house price	57
5.1	Credit Price Effect & Wealth Effects	60

**LIST OF FIGURES**

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
1.1	Research Design	15
2.1	Charting for Malaysia House Price Index	19
2.2	Charting for Kuala Lumpur Composite Index	20
2.3	Charting for Bursa Malaysia Property Index	21
2.4	Charting for S&P Malaysia REIT Index	21
2.5	Charting for Treasury Bill Rate	22
2.6	Charting for Consumer Price Index	23
2.7	Charting for Malaysia Gross Domestic Product	24
2.8	Charting for Singapore Gross Domestic Product	25
2.9	Charting for Singapore Straits Times Index	26
4.1	Stock Index and Property Index	42
4.2	Chart for CUSUM of squared test	48

**LIST OF SYMBOLS**

ADF	-	Augmented Dickey-Fuller Test
CUSUM	-	Cumulative Sum Control Chart
CPI	-	Consumer Price Index
GDP	-	Gross Domestic Products
JHA	-	Johor Overall House Price Index
JHD	-	Johor Detached House Price Index
JHH	-	Johor High-rise House Price Index
JHS	-	Johor Semi-Detached House Price Index
JHT	-	Johor Terrace House Price Index
KLA	-	Kuala Lumpur Overall House Price Index
KLCI	-	Kuala Lumpur Composite Index
KLD	-	Kuala Lumpur Detached House Price Index
KLH	-	Kuala Lumpur High-rise House Price Index
KLS	-	Kuala Lumpur Semi-Detached House Price Index
KLT	-	Kuala Lumpur Terrace House Price Index
MYA	-	Malaysia Overall House Price Index
MYD	-	Malaysia Detached House Price Index
MYGDP	-	Malaysia Gross Domestic Product
MYH	-	Malaysia High-rise House Price Index
MYS	-	Malaysia Semi-Detached House Price Index
MYT	-	Malaysia Terrace House Price Index
OLS	-	Ordinary Least Squared
PI	-	Bursa Malaysia Property Index
PGA	-	Penang Overall House Price Index

PGD	- Penang Detached House Price Index
PGH	- Penang High-rise House Price Index
PGS	- Penang Semi-Detached House Price Index
PGT	- Penang Terrace House Price Index
REIT	- Real Estate Investment Trust
S&P	- Standard & Poor
SGA	- Selangor Overall House Price Index
SGD	- Selangor Detached House Price Index
SGGDP	- Singapore Gross Domestic Product
SGH	- Selangor High-rise House Price Index
SGS	- Selangor Semi-Detached House Price Index
SGT	- Selangor Terrace House Price Index
STI	- Singapore Strait Time Index
TBILL	- Treasury Bill rate
VECM	- Vector Error Correction Modal

**LIST OF APPENDICES**

<b>APPENDIX.</b>	<b>TITLE</b>	<b>PAGE</b>
A	Augmented Dickey-Fuller test for House Price Index	65
B	Lag selection	66
C	Johanson Co-integration Test	72
D	Variance Decomposition.	77

## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

Both real estate market and stock markets are important investment vehicles to the general public, who will put substantial amount into their investment portfolio. Thus, the observations on the fluctuation of the market price are an ideal action in understanding of the market mechanism avoiding the blind spot and significant depreciation of capital, and make a prudent investment and portfolio strategy. Housing considered as a long-term investment which accounts for a large proportion of household wealth (FTI, 2012). Moreover, residential property is represents a large portion of household investment portfolio and ex-post efficient portfolio in increasing with risk aversion of the investor (Ting 2003, Case et al, 2001), which proved that investment in real property is significantly important role as a vehicle.

There are a great deals of considerations in selecting real estate instruments or stock market or even a combination of both in investor portfolio in gain short term or long term profitability in terms of rental, dividend yield and capital appreciations. However, the business environment is constantly changes in nature, direction or even the fundamental, this lead to a very uncertain and vague in future market movements. Moreover, there are different market characteristics for each

investment instrument in relation to the market as a whole, some may react sensitively and some may be lagged behind the market.

There are direct and indirect real estate investments in Malaysia, which in this study will be include direct investment in residential real properties, whereas indirect investment will be included with Real Estate Investment trust (REIT) and property index comprise of listed property company in Malaysia. These are important investment vehicle available in Malaysia real property market, as most of the individual investor holding their most and significant asset holding in these sectors. Thus, a better and in-depth study in understanding the market behavior characteristics is extremely important for future investment strategy deployment and portfolio management, in acquisition, disposal or hedging against the market.

Interrelationship and spillover effects from various economic indicators are also influence the property market and stock market as a whole; it would be worthwhile in investigating the interrelationship among them as well.

## **1.2 Background**

This study is about interrelationship between various real estate investment instruments and stock index. House price index is defined as periodic board measure of movement of house price in the region from serving as an indicator of house price trends; it provides an analytical tool for estimating the changes in the rates of housing affordability basically. In Malaysian context, house price index computation is based on sampling of transactions on house type stratification. As a result, fixed basket of house characteristics of “average” house is revalued for each period by Laspyeres index (JPPH, 2013)



Whereas, stock index is a measurement for stock market in arriving value determination, typically by weighted average. It is a tool used by the investors to describe the market and to make comparison on specific investment. In Malaysia, we are using FTSE Bursa Malaysia Kuala Lumpur Composite, also known as KLCI as our stock performance yardstick, which the index computation is based on weighted capitalization of 30 listed companies (Bursa 2014).

Additionally, we also investigate the interrelationship between the stock index and REIT, where REIT is an entity that own various type of real properties for generating income which basically from rental and capital appreciation from the property acquisition. Returns from REIT and S&P 500 proved that stock market contains important and timely information on real estate fundamental (Gyourko and Keim, 1992) Causality relationship between stock market and property market may given different result by adopting different causality test (Okunev et al. , 2000). Notwithstanding REIT is an indirect property investment, it would be worthwhile to investigate in Malaysia context for its market characteristics in relation o stock index and property markets. In comparison to unit trust, REIT which traded at the stock exchanges and actively from an avenue for exploring the connection between stock and real estate investment (Subrahmanyam, 2007).

### **1.3 Problem statement**

There are many investment instruments available in Malaysian market. Apart from stock market, real estate market is served as an important investment instrument, especially for the direct real property, where it may involve substantial of cash flow. Thus, prudently investment deployment is essential. In this study, we need to ascertain the appropriate real estate instrument, for both direct and indirect, which is closely related to the stock index in Malaysia. Relatively, we can be sure of the property price is either overvalue or undervalue and the occurrence which cause the changes in market condition and its amplitude.

In this study, by comparing different direct and indirect real estate investment instruments, we can easily compare among them closeness for the relationship to the economic yardstick of stock index. The direct real estate investment terrace houses, semi-detached houses, bungalow, high-rise houses and commercial properties in various geographical location in Malaysia. Whereas, the indirect real estate investment may be including stock price for REIT Company as well as Malaysian property index, who mainly are the major real estate players.

Thus, the important of this study is to undergo a comprehensive study on stock index and house price index which taking consideration of exogenous factors to ascertain not only the relationship, the shocks from variable and lead-lag causality relationship. This is extremely important for an investor to have better knowledge of individual economic or related factors that influence the market in order to have better deployment of the portfolio.

### **1.3.1 Descriptive statistics and Correlation Analysis**

Descriptive statistic is merely explaining the relationship between stock market and real estate market; however this is not enough in explaining the factors for the relationship. Thus, providing more empirical studies with manipulating relevant the facts and data is essential to find out the interrelationship among all the factors and variables. In this we can ascertain this particular Malaysian market on the existence of wealth effects or credit effect or both in relationship to the cause and effect approach, which may give a direction to the investors for both property and stock markets. Otherwise, the investors may not really understand what their financial resources investment deployment, which in some extent will turn to disastrous in just mainly based on surface data.

There are quite a number of research in correlation analysis in ascertain the relationship between stock and real estate's market. However, based on different

countries and time periods, the result can be negative correlated (Ibbotson & Siegal, 1984, Eichholtz & Hartzell, 1996, Hartzell, 1986) or positive correlated (Worzala & Vandell, 1993).

Simple correlation is not enough to address the co-movement, or defined as the tendency of two or more variables to move in parallel. Many studies attempted to explore the relationship between stock market and real property market. Low positive correlation exists between stock market and real estate market, especially for commercial sector (Newell and Chau, 1996). Bivariate analysis is unsatisfactory because the relationship between variables might be already reflected from common factor for stock market and property market (Quan & Titman, 1999; Ibrahim, 2010). Thus, this study will not limited to a simple relationship study, but applying other econometrics tools for better understanding of the market behavioral characteristics, timing and the cause and effects relationship, for instance the CUSUM structural breaks and Granger causality test would be recommended.

### **1.3.2 Wealth Effect and Credit Price Effect**

There are two significant theoretical views in explaining the relationship between stock and real estate price. Firstly, the well-know wealth effect, where stresses a transmission channel from stock to real estate (Markowitz, 1952). Most studies discovered that wealth effect on aggregate consumption and prices is relatively weak (Fama, 1951; Fischer and Merton, 1984; Poterba and Samwick, 1995). Hence, it indicated the stock market lead the property market. Secondly, it is the credit-price effects, which caused by the property holding in balance sheet in a listed company increase its value, which possessed of large unrealized capital gain that increase the company wealth, and hence the property market will lead the stock market. Therefore, the interaction between these two assets markets will lead to a complementation in price influences for each other's (Chen, 2001). More studied in

examining the applied co-integration and Granger causality to time series data between two assets market to ascertain the existence of wealth effect (Sutton, 2002; Green, 2002) and credit-price effects (Sim and Chang, 2006; Ansari, 2006). It would be reasonable that higher stock prices raised the share of household's portfolios in stock market and caused a readjusting their portfolio by stock disposal and acquisition of real estate (Kapopoulos & Siokis, 2005). Therefore, in Malaysian context, it would be an indication for investment strategy deployment.

### **1.3.3 Geographical differences**

After finding out the relationship between stock market and real estate market, there would be different relationship between geographical region with different price level, as Green (2002) noted, a more expensive market could be a prime candidate for wealth effect, thus with various reasons, which including quantity supply, changes in demands will constitute different outcome. Thus, it will worthwhile to investigate different real estate market in the country, because different geographical location, do have different market characteristics (Panayotis Kapopoulos & Sioks, 2005). This is important for this study include various market from different location in Malaysia

### **1.3.4 Exogenous factors**

There are spill-over effects in economic and financial stability in the real estate investment with a cleared define of fundamental (Hibers et al., 2008). Using equilibrium price equation which including residential property price index and exogenous variables, such as GDP, interest rate, inflation, household consumption and stock index, can be a test for the existence of property bubbles in its correlations

in Korea and Japan (Kim and Suh, 1993). Pricing modal with empirical study in its equation that consists of income and price conducted for Tokyo office market from 1977 to 1999; the variable included net operating income, office occupation rate, price index and general economic indicator, for instance, GDP, inflation rate and interest rate (Peng and Hudson-Wilson). Interest rate is the investor ability in borrowing to finance investment in property and stock market (Chen, 2001). There is a strong evident of hedging effectiveness in relation to real property and inflation (C.L. Lee, 2014). Economic growth is a common factor for real estate market, government intervention in economic means affect the house price (Chen et al, 2014). This concludes that, in this study, those exogenous variable have to be included in order to ascertain the interrelationship, especially GDP, interest rate, inflation rate and etc.

As for property stock listed in Malaysia Bursa stock exchange, it also affected by the economic climate and political condition, it showed year 2004, the listed Malaysia property stock performance is at its worst level by OLS in studying various financial ratios (Chan et al., 2012). This is an important real estate investment instrument in relation to its performance with stock index which backed by real estate industry spearhead.

### **1.3.5 Contagion effects**

According to World Bank (2011), there are ideas of contagion where it defined either, the cross country shocks transmission or across the countries spillover effects, or the shocks transmission to other countries which may beyond any fundamental link among the countries and beyond the common shock or contagion occurs when cross-country correlations increase during “crisis” or unexpected incidents relative to correlations during “tranquil”, where the market or business environment considered stable in a sense.

According to Calvo and Reinhart (1966) there were two types of contagion. Fundamental-based contagion is the first type, which arisen from connection involved among the “infected” countries and others by form of trading for goods and services or finance activities. Secondly, as a “true” contagion, this is a herding behavior among the investors by following the trend (Calvo and Mendoza, 1988; Kaminsky and Reinhard, 2000). There are evident that interdependence between Hong Kong stock market and Mainland economy, which in the same time affect the Hong Kong real estate market as contagion effect (Hui and Ng, 2011; Ni J.S. & Liu J.C. , 2011).

Thus, in this study, as Malaysia and Singapore economic is closely connected, GDP as an economic factors may be included in the study for both Malaysia and Singapore in studying the relationship between Malaysian stock index and real estate market and other indirect property investment instruments.

### **1.3.6 Malaysian Context**

In Malaysia context, a wealth effect and credit price effect studied was done for various markets in the country. Generally, found that there were mixture of credit price effect and wealth effect throughout the country (Lean, 2012).

However there are few differences between Lean’s study and this study. Lean’s studied is based on year 2000~2010, however in this study, the examination from 2000Q1-2013Q4 will be observed for lasted update in arriving variance decomposition and Granger causality test. Lean’s studied only based on BLR as exogenous factors, however, in this studies exogenous factor in considering the influences from the market, GDP, inflation and contagion effect from Singapore will be taken into consideration. This is to have better finding of the impact of shock to

the housing price index as well as stock index. In additionally, the time for the critical point for the transformation of the market behavior which related to the lead-lag relationship for the mentioned indexes?

We opted for T bill yield rate instead of BLR taken as exogenous factor, because of the tendency to intrinsic rate and behavioral movement for market reaction on fluctuation to the reality. Lean's study is only covered for whole market, Selangor, Penang and Kuala Lumpur. However, in this study, we will have comprehensive study for more geographical region, which including Johor state and various major city. Econometrics tools is difference in structural break studies as well as this study will have additional application of variance decomposition for ascertain the medium-term and short-term shock from various exogenous factors. This is to further ascertain the extent of impact for various exogenous factors.

Contagion effects is a one of the vital part in this study, which we consider Singapore economic effect do have some influence to Malaysia property market, particularly Johor state. A further study in Johor state housing market will be conducted in relation to Singapore stock index as dependent variable.

Thus, we have to ascertain the relationship between the Malaysian stock market and property market in different periods. Because there do have different reasons for different price movement. Thus the structural break does provide us the direction for the study. Variance decomposition explaining the shocks from exogenous factors and Granger causality provide the cause and effects. This will be a comprehensive study for Malaysia property market, which is very important for any investor in investment decision making for certain geographical area or indirect investment vehicle.

## **1.4 Research Questions**

1. What is the correlation between stock market and real estate market as a whole or different property types and property markets, as well as influences from other control variable, such as interest rate, GDP and contagion effect from Singapore market? What is the relationship among stock index with REIT and Bursa Malaysian property index?
2. What are the reasons and the time for structural breaks in relationship between stock index and housing price index?
3. Any wealth effects and credit price effect in Malaysia? What is impact for that?

## **1.5 Research Objectives**

1. To identify the relationship between stock market and real estate market, for different property type, property market and property investment instruments, which includes the impact from exogenous factors.
2. To identify the causes and critical point for the transformation of the lead-lag relationship between stock index and housing price index.
3. To identify wealth effect and credit price effect in Malaysian stock market and real estate investment by causality test. To have details on the action and reaction for residential properties, property index and REIT to the stock index for ascertain the reason for the relationship.



## **1.6 Scope of Study**

The data obtained for the study including the stock market index as well as residential property index from the year 2000Q1 to 2013Q4. REIT index will be collected from 2006Q4 to 2013Q4. Besides this, other exogenous factors also included, for instance Malaysia GDP, T-bill yield from government, Consumer price index (CPI) and Singapore GDP and Singapore stock index for the same period.

## **1.7 Significant of study**

### **1 Individual investor**

The findings of this study allow the individual investor to make wise decision making in real estate investment instrument selection with their limited financial resources.

### **2 Institutional investor**

The findings of this study allow the institutional investor to have better knowledge of characteristics the mentioned real estate investment in managing the portfolio, especially in a balanced investment deployment.

## 1.8 Research Methodology

Broadly, this study undergoes different stages in investigating the interrelationship among the stock index, property index and exogenous factors.

i. Stage 1 – Preliminary study

Descriptive statistics to identify the central tendency throughout study period. Additionally, the correlation to ascertain the causal relationship, and OLS to identify the significant relationship

ii. Stage 2 – Structural breaks

CUSUM- square applied to identify the period of structural breaks between stock index and real property investment vehicles.

iii. Stage 3 – Data processing

Natural logs for all data, except CPI and T-bill rate, which is to avoid any possible any heteroscedasticity. Further on this, unit root test for identifying the stationarity of the data, if needed first differential the data from non-stationary to stationary data, which is required for Vector error correction model (VECM). This study will adopt Augmented Dickey-Fuller (ADF) test.

iv. Stage 4 – Lag selection and co-integration

Before using VECM model, we have to identify the lag selection and co-integration. As for lag selection, we can adopt from sequential modified LR test (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) at 5% level. Using the selected lag, we perform the Johansen co-integration test to identify number of co-integration variables. It because only variables with at least one co-integrated can be use in VECM.

v. Stage 5 – Identify the shock

Variance decomposition is to identify the own shock or variables shock for short term and medium term which observe from the past historical data.

vi. Stage 6 – causality test

Granger causality test is to identify the lead-led relationship, which in hence to conclude the wealth effect or credit price effect and other independent granger causes impacts,

## **1.9 Chapter Organization**

### Chapter 1

It is about introduction of the real estate investment market in Malaysia and outline of the structure of this study, which including the problem statement, objective of the study, scope of study, significant of study, research methodology and data collection and organization of study.

### Chapter 2

There are definition of the direct property investment for related property type and market, which also including the indirect investment instrument like REIT and Bursa Malaysia property index. Moreover, the further definition and explanation on Malaysian stock index and other exogenous economics control exogenous variables which might affect the real estate market.

### Chapter 3

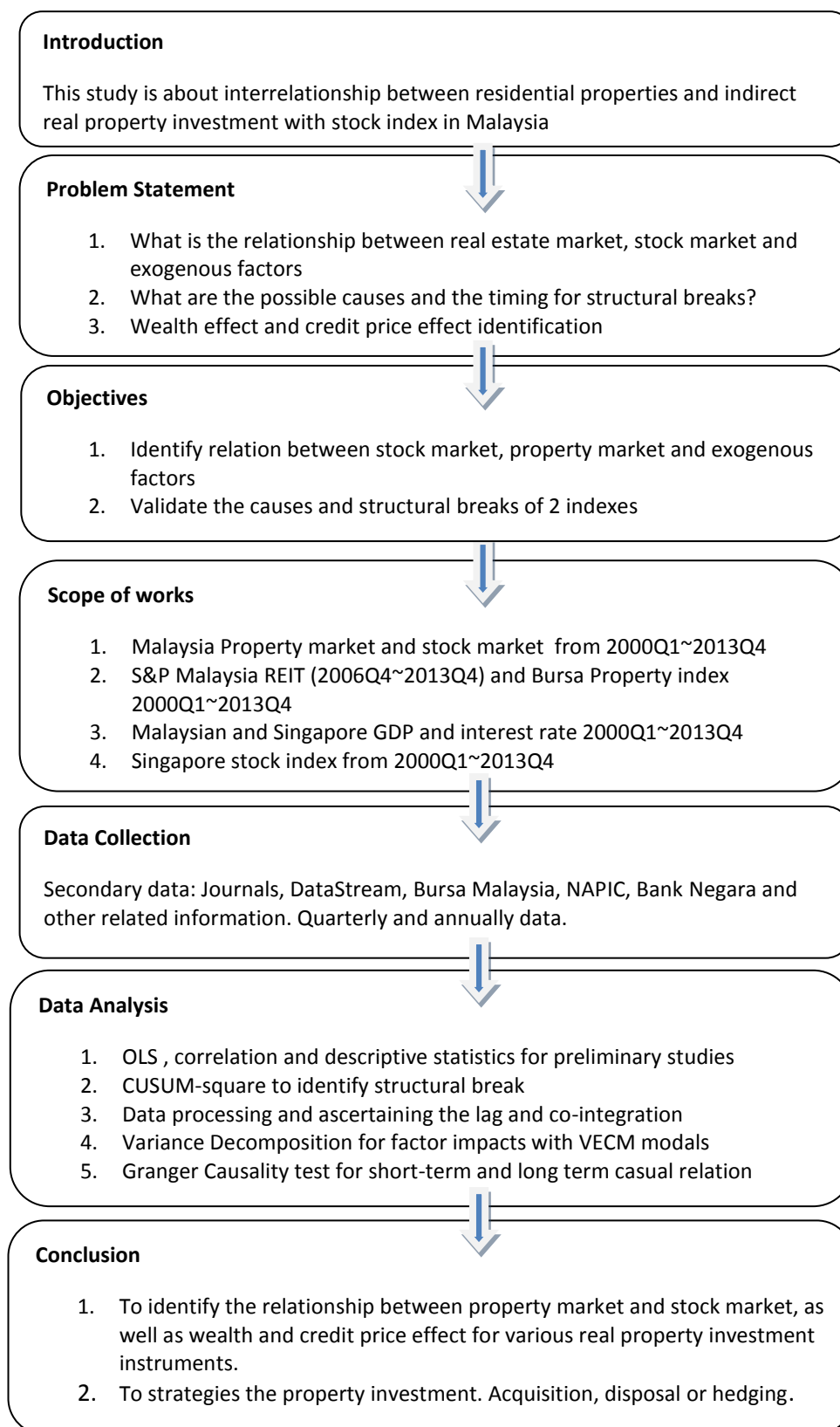
This chapter is focuses in implementation of research methodology and data analysis from data collected from 1988 to 2013.

### Chapter 4

This chapter is regarding the data analysis with different econometrics tools such as descriptive statistics, correlation, OLS, CUSUM, differentials for stationary data, ADF test, Johnson co-integration test, variance decomposition and Granger causality test.

### Chapter 5

This chapter comprises of conclusion of the study, as well as implication and limitation of the study. Furthermore, there are some recommendations for further investigation beyond this study.



**Figure 1.1** Research Design

### **1.10 Expected outcome**

There should be one of the real estate investment type or market that appear with high correlated to the stock market index as well as identify the time for structural breaks. Whenever it can be ascertain, we can conclude the determinants of real estate market to the stock index by variance decomposition analysis. It may also prove that, if wealth effect is exaggerated, the real estate may lead to the hinge of property bubbles. As a metaphor, when we conclude the relationship between stock index and real estate vehicle, we can make slightly adjustment for hedging effectiveness by using stock futures index. Hedging purpose is an important issue in investment to avoidance from the risks with minimum transaction charges to protect the investor's capital.

## REFERENCES

- Alessio Ciarlone (2011). Housing wealth effect in emerging economies. *Emerging Market Review*. 12, 399-417
- Belayet H & Ehsan L. (2009). Determinants of housing price volatility in Canada: a dynamic analysis. *Applied Economics*. 41, 3521-3531
- Chan K.T, Yap V.C (2010). Stock Performance of the property sector in Malaysia . *Journal of Modern Accounting and Auditing*. 18(2), 241-246
- Chen M.C , Kawaguchi Y. and Patel K. (2004). An analysis of the trends and cyclical behaviors of house price in the Asian markets. *Journal of Property Investment & Finance*. 22(1), 55-75.-
- Lee C.L. (2008). The inflation-hedging characteristics of Malaysian residential property. *Journal of Housing Markets and Analysis*.7(1), 61-75
- Green, R (2002). Stock prices and house prices in California: New evidence of wealth effect? *Regional Science and Urban Economics*. .32, 775-783
- Hui C.M. & Ng M.H (2011)., Wealth effect, credit price effect, and inter-relationships between Hong Kong's property market and stock market. *Property Management*. 30(3), 255-273
- Hassan G.T (2014). Dynamic Relationship between House Prices in Malaysia's Major Economic Regions and Singapore House Price. *Regional Studies 2014*
- Hi J.S. & Liu J.C. (2011). The study in house market and stock market in China-Hong Kong-US. *International Conference on Business and Economics Research*. 1(2011)

- Lean H.H., Russell Smyth.(2014) “Dynamic Interaction between House Price and Stock Prices in Malaysia” *International Journal of Strategic Property Management*. 18(2), 163-177
- Lean H.H. & Russell Smyth (2012). REITs, Interest Rates and Stock Prices in Malaysia, *International Journal of Business and Society*. 13(1), 2012, 49-62
- Lean H.H. & Russell Smyth (2014). Dynamic interaction between house prices and stock prices in Malaysia, *International Journal of Strategic Property Management*.18(2), 163-177
- Lean H.H. (2012), Wealth Effect or Credit-Price Effect? Evidence from Malaysia. *Procedia Economics and Finance*. 1 , 259-268
- Liao W.C. , Zhao Daxuan & Sing T.F. (2014) , Risk Attitude and Housing Wealth Effect, *Journal of Real Estate Finance Economic* ). 48,467-491
- Kapopoulos P. and Siokis F. (2005). Stock and real estate prices in Greece: wealth versus credit-price effect. *Applied Economics Letter*. 12, 125-128
- Sim S.H. & Chang B.K. (2006), Stock and Real Estate Markets in Korea: Wealth or Credit-Price Effect, *Journal of Economic Research* 11, 99-122
- Ting Y.K. (2006), The role of residential property in personal investment portfolio: The case of Malaysia, *Pacific Rim Property Research*. 10(4) 466-485