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HOUSE PRICE CHANGES, RIPPLE EFFECT AND BANK STABILITY IN MALAYSIA

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By

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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March 2018

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Housing is one of the key sectors in an economy. Changes in the housing market have often led to an economic boom and then a downfall. Malaysia, as a developing economy, has experienced exponential growth in its housing market recently. We have had three objectives in forming our study. The first objective is to examine the ripple effect as it may relate to housing prices. The ripple effect, at least in theory, might be seen when increases in housing prices in some regions, such as the four most developed states in Malaysia, seem to cause housing prices in nearby regions to also increase. We have investigated the possible ripple effect in selected states in the central and northern regions of the country by means of the spatial vector autoregressive model. We have found that prices in Kuala Lumpur influence prices in Selangor and Negeri Sembilan and that prices in Penang influence prices in Perak and Kedah. The second objective is to investigate how the macroeconomic picture is reflected in housing price changes. It is essential to identify the economic factors that have significantly affected housing prices and the housing factors that have affected the economy. Our study argues that the relationship between housing prices, housing sales, and macroeconomic variables is, in fact, nonlinear. We have found that in the long run, the real effective exchange rate asymmetrically affects housing prices, whereas the estimated number of house sales responds more to positive changes in income. Imbalance in the residential market is often the underlying cause of a financial crisis. If the level of mortgage lending is high but the market begins to decline, banks could become unstable. The third objective is to examine the impact of changes in housing prices on bank stability in Malaysia by using the autoregressive distributed lag estimation. We see that an inverted-U–shaped relationship exists between housing prices and the Z-score, so that initially, banks are more stable when housing prices increase; banks become unstable after prices

reach a certain extreme point. The relationship is significant in both the short and long run. Our study presents several findings that could affect economic policy. First, with regard to the ripple effect, we suggest that price movements in the most developed state should be the target for policymakers. Second, evidence in the macroeconomic picture shows that housing prices are sticky downward, and it is therefore essential to consider price stickiness in formulating policy. Third, our findings highlight the fact that banks become unstable after prices have risen above a certain point; once prices have "overheated," policies for stabilizing the market may be needed.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PERUBAHAN HARGA RUMAH, KESAN RIPPLE DAN KESTABILAN BANK DI MALAYSIA

Oleh

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Pengerusi : Profesor Madya Normaz Wana Ismail, PhD
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Sektor perumahan merupakan salah satu sektor utama dalam ekonomi. Pergerakan di pasaran perumahan sering menyebabkan ledakan ekonomi dan ekonomi diikuti dengan kejatuhan. Malaysia sebagai negara yang sedang membangun telah mengalami pertumbuhan yang rancak di pasaran perumahan sejak kebelakangan. Kajian kami terdapat tiga objektif. Objektif pertama adalah untuk mengkaji kesan *ripple* atas harga rumah Malaysia untuk negeri dan daerah yang terpilih. Bedasarkan teori, kesan ripple adalah ketara ketika kenaikan harga perumahan di beberapa wilayah, seperti empat negeri yang termaju di Malaysia, telah menyebabkan harga rumah di negeri yang terletak berdekatan seolah-olah mengikuti momentum ini. Oleh itu, kami mengaplikasikan *Spatial Vector Autoregressive Model (SpVAR*) dalam kajian ini dengan memberi tumpuan kepada zon Tengah dan Utara Semenanjung Malaysia. Hasilnya dalam analisis Negeri dan daerah mengesahkan bahawa harga rumah di Selangor dan Negeri Sembilan dipengaruhi oleh Kuala Lumpur. Begitu juga, perubahan harga rumah di Perak dan Kedah, adalah dipengaruhi oleh Pulau Pinang. Di samping itu, kajian ini menentukan hubungan *assymetric* harga dan jualan perumahan dengan pembolehubah makroekonomi. Kajian ini menunjukkan bukti bukan linear dalam model. Walau bagaimanapun, kajian ini hanya menyimpul bukti hubungan jangka panjang antara harga rumah dan perubahan positif pertumbuhan ekonomi dan negatif, dan susut nilai ringgit Malaysia. Dengan meneliti impak faktor makroekonomi terhadap penjualan rumah di Malaysia, kajian ini mendapati jualan rumah lebih sensitif terhadap perubahan positif pendapatan. Ketidakseimbangan dalam pasaran perumahan merupakan punca krisis kewangan. Ini adalah kerana bank akan megalami ketidakstabilan sekiranya pinjaman kepada sektor perumahan mencapai tahap yang terlalu tinggi sehingga pasaran mula lembap. Objektif ketiga adalah mengkaji kesan

perubahan harga rumah terhadap kestabilan bank di Malaysia. Hasilnya menunjukkan hubungan berbentuk U songsang antara harga rumah dan Z-skor. Hubungan ini penting dalam jangka masa pendek dan jangka masa panjang. Dalam erti kata lain, kenaikan harga menstabilkan bank pada mulanya, dan mengancam kestabilan bank apabila harga rumah mencapai titik klimaks tertentu. Secara ringkasnya, keputusan kajian ini memberi beberapa implikasi terhadap perkembangan ilmu dan pembuat dasar. Pertama, sehubungan dengan adanya kesan *ripple* dari bandar utama ke seluruh bandar, kajian ini mencadangkan supaya pergerakan harga di negara yang paling maju sebagai sasaran bagi para pembuat dasar. Kedua, dengan bukti yang menunjukkan penyelarasan harga rumah adalah kurang fleksibel , ini menandakan bahawa faktor ketegaran harga perlulah dipertimbangkan oleh pembuat dasar. Selain itu, kajian ini the menunjukkan bahawa bank menjadi tidak stabil apabila peningkatan harga rumah melepasi sesuatu titik. Oleh itu, dasar untuk menstabilkan pasaran adalah diperlukan sekiranya pasaran adalah “overheated”.

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Firstly, I would like to express my deepest gratitude to my supervisor, Associate Professor Dr. Normaz Wana Ismail for the immense support, guidance and patient throughout my research journey. Throughout my dissertation writing period, Dr. Normaz, provided me meticulous suggestions, ideas and encouragement. Her enthusiasm in research has motivated me in my studies. This thesis would not have been possible without her extraordinary support.

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I certify that a Thesis Examination Committee has met on 1 March 2018 to conduct the final examination of Kok Shiau Hui on her thesis entitled "House Price Changes, Ripple Effect and Bank Stability in Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) were adhered to.

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Signature: _____
Name of Member of Supervisory Committee: Associate Professor Dr. Lee Chin

Signature: _____
Name of Member of Supervisory Committee: Associate Professor Dr. Zaleha Mohd Noor

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GOM	Gombak
HL	Hulu Langat
KL	Kuala Lumpur
KLG	Klang
K.LGT	Kuala Langat
KRN	Kerian
KUL	Kulim
LRT.M	Larut Matang
PEN.I	Penang Island
PET	Petaling
SBN	Seremban
SEL	Selangor
SEP	Sepang
S.P	Seberang Perai
S.INN	Selangor Inner
S.MID	Selangor Mid
S.O-SW	Selangor Outer-Soutwest
S.O-S	Selangor Outer-South

CHAPTER 1

INTRODUCTION

1.1 Introduction

The development of housing markets plays an important role on the housing sector, financial sector and the economy. For instance, the housing market affects the household consumption and when the housing market booms, this will boost the economy (Girouard & Blöndal, 2001; Campbell & Cocco, 2007). Moreover, as compared to other asset markets, real estate is also found to have a bigger impact on the economic growth (Helbling & Terrones, 2003; Case et al. 2005).

Despite that, over the past decade, the rise of the housing price in many countries has subsequently been followed by the collapse of the housing market. This has raised concerns for many policymakers and investors. The slump in the housing markets is often related to financial crises. This is because the housing markets are strongly related to the banking sectors as the purchase of houses is mainly financed by mortgage loans. The Nordic banking crisis, Japan's asset bubble in the 1990s, US Subprime Mortgage Crisis in the year 2007 are some typical examples of financial crises. A common feature for these crises is these countries began with an extensive growth in asset prices, imprudent lending practices, rapid credit extensions and over-investments in the housing market. After the housing market bust, a huge amounts of non-performing loans ensues which then triggers bank failures.

Malaysia, like many other developed economies, has experienced rapid growths in the housing market. The housing market gradually became one of the key investments for many households. However, the upswing of house prices recently, has drawn attention towards the issue of affordability, which has certainly affected the middle to lower income group. According to the study conducted by IMF in 2013, a substantial increase in the housing prices since the year 2010, and a relatively high household debt in Malaysia indicate that the housing market has a potential to bubble. In light of the past evidence of housing booms ending badly, a proper assessment of the overall house market analysis is necessary, and hence the present study is carried out for this purpose.

1.2 Overview of the Malaysian Housing Market

Since its Independence Day in the year 1957, the Malaysian housing market is mainly managed by the public sector. Prior to the 1970s, the property prices in Malaysia are rather stable and are associated with low inflation rates. For instance, the terrace houses were first launched at a lower price.

The introduction of the government housing loan in 1971 has also nourished the property industry in Malaysia. The first housing boom in Malaysia took place during the period of 1973 to 1975. The property prices continued to rise in 1978 as the Malaysian economy performed well during that period. While the high-rise properties in the areas of Kuala Lumpur, have begun since the late 1980s. However, the Central Bank of Malaysia imposed high interest rates and tightened the bank credits for the construction industry in the year 1982. These were enforced to reduce excessive demands and speculative activities. Therefore, the property prices began to stabilise with dropping values since then. Then the worldwide crisis hit globally in the years 1981-1982, and Malaysia's property market crisis reached its peak in the years 1984-1987. As a result, the demand for properties weakened and there was an oversupply of properties in the market. This resulted in the government taking up several initiatives to improve the market which included: the National Land Code (NLC) made an amendment which allowed foreign ownerships of properties in Malaysia; the Employees Provident Fund (EPF) also allowed partial cash withdrawal for housing loans; the Central Bank of Malaysia also injected liquidity into the local financial system.

Hence the property market showed an improvement in 1988 after the government initiated a corrective measure, whereby the state of Johor experienced a sluggish growth. While the private sector, had launched many construction projects. Consequently, the value of properties and volume of transactions kept rising. At the same time, foreign investments poured into Malaysia due to cheap labor costs, incentives offered by the government and weak Malaysian Ringgit. In 1989, the foreign ownership of properties focused in the areas of Johor, Kuala Lumpur and Penang Island. The strength of the property market continued until the first half of 1997.

The Asian financial crisis in 1997 drastically affected the Malaysian economy and the property market. This is because many banks faced non-performing loans which shot up double in value which meant that the ratio of non-performing loans to total loans rose from 4.1% in 1997 to 7.5% in 1998. Moreover, the broad property sectors itself contributed 35.5% of this non-performing loan. As such, many banks encountered losses. In addition, the construction sector slumped as many mega projects were postponed. The property sector was then categorised as non-productive by the Central Bank of Malaysia, and credit flow to this sector was strictly regulated. This phenomenon carried on until the fiscal and monetary policies took place. Eventually, the property market resumed to the pre-recession level in the year 2000.

In the year 2001, the Malaysian housing market encountered a mild shrinkage and incorporated the property overhang due to the global economic recession. The non-performing loans even reached its peak which was approximately 8.4%. In line with the Ninth Malaysia Plan and the 2001 budget, the housing market continued to outperform during the years 2002 to 2005. A total of 84 thousand housing units was completed. From this total, 77.6% was contributed by the private sector, and the remaining was by the public sector. However, only 72.1% of the construction was expected from the private sector, and 27.9% of the construction was expected from the government. At this time, there were four types of housing constructed by both the private and public sector which included low cost, low medium cost, medium cost and high cost housing in urban and rural areas.

From the period of Q1 2010 to Q3 2016, the price of housing recorded a remarkable high growth which exceeded 9% annually, instead of 3.2% in the past decade. In Figure 1.0, the housing price index showed an upward trend, and it hit the peak in 2016Q3 by reaching 241.6 index point. Similarly, the sales value for residential properties was rather stable before year 2010. In fact, the sales value achieved the highest number in the year 2014. One of the reasons attributed to the strong growth in housing price and sales after the year 2010, was the increase in speculative purchases in 2010. According to the BNM report, there was a 15.8% growth in the number of borrowers with at least three outstanding housing loans in the year 2010. Since housing was treated as both an investment and a neccessity good, the homebuyer might not be too responsive to the changes in house prices. This may explain the continunuous upward trend of the Malaysian housing price.

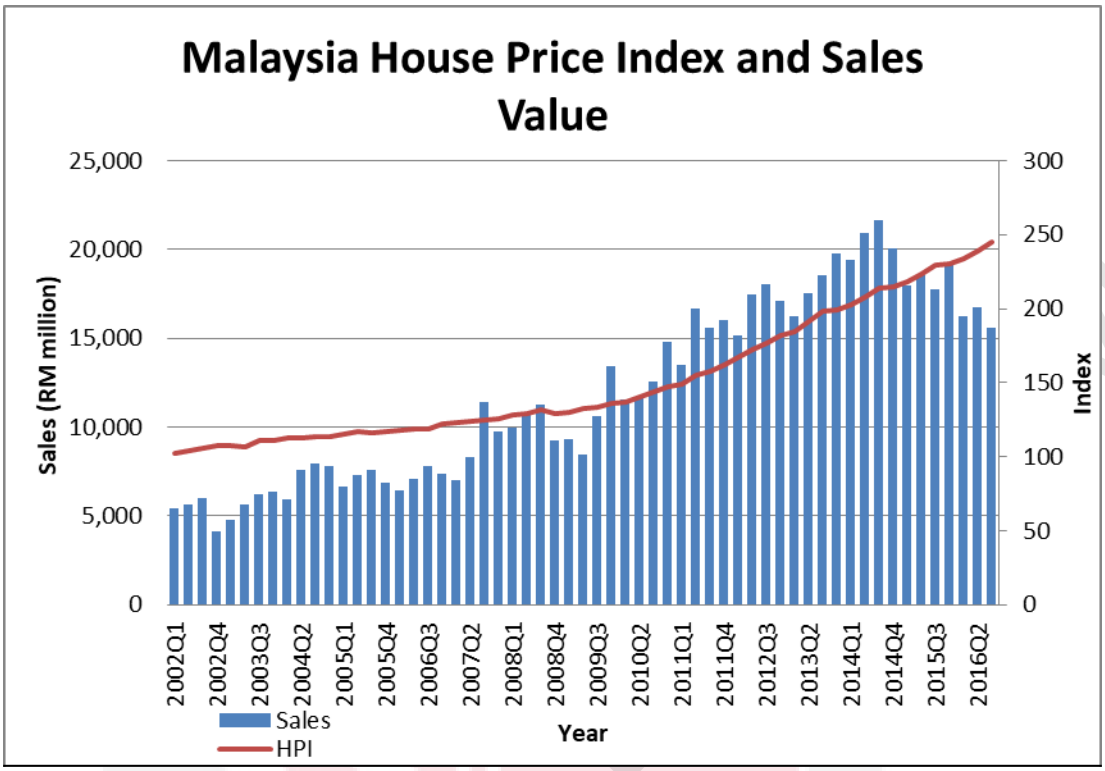


Figure 1.1 : Malaysian House Price Index and Sales Value from the period of Q1 2002 to Q3 2016
(Sources **:** Datastream International. October, 2016. Available: Datastream International/Economics)

1.3 The Movement of Housing Price According to State and District

The regional housing price provides a better understanding of the housing market particularly the issues of wealth distribution, labor mobility and the impacts of the fluctuating regional housing price on regional economic activity. (Alexander & Barrow, 1994).

Generally, the economic theory suggests that the housing prices are determined by the housing demand and supply. Therefore, the regional housing prices should differ across the region due to the differences in demographic patterns and economic environments. Nevertheless, empirical studies have shown evidence that the shock of regional housing price does transmit into the housing market through four approaches, which include migration, equity transfer, spatial arbitrage and spatial patterns. Thus the regional housing prices are interrelated. This phenomenon is referred as the ripple effects. The theoretical explanations on ripple effects will be further discussed in chapter two.

To analyse the changes of regional house prices in Malaysia, Figure 1.2 displays the housing price index by state, and the average growth of housing prices after the year 2010. On average, house prices in most states had more than 10% of annual growth after the year 2010. While states such as Sabah, Terengganu and Kuala Lumpur, had recorded the highest index point. On the contrary, Table 1.1 shows the current house prices for various types and states and their respective price changes.

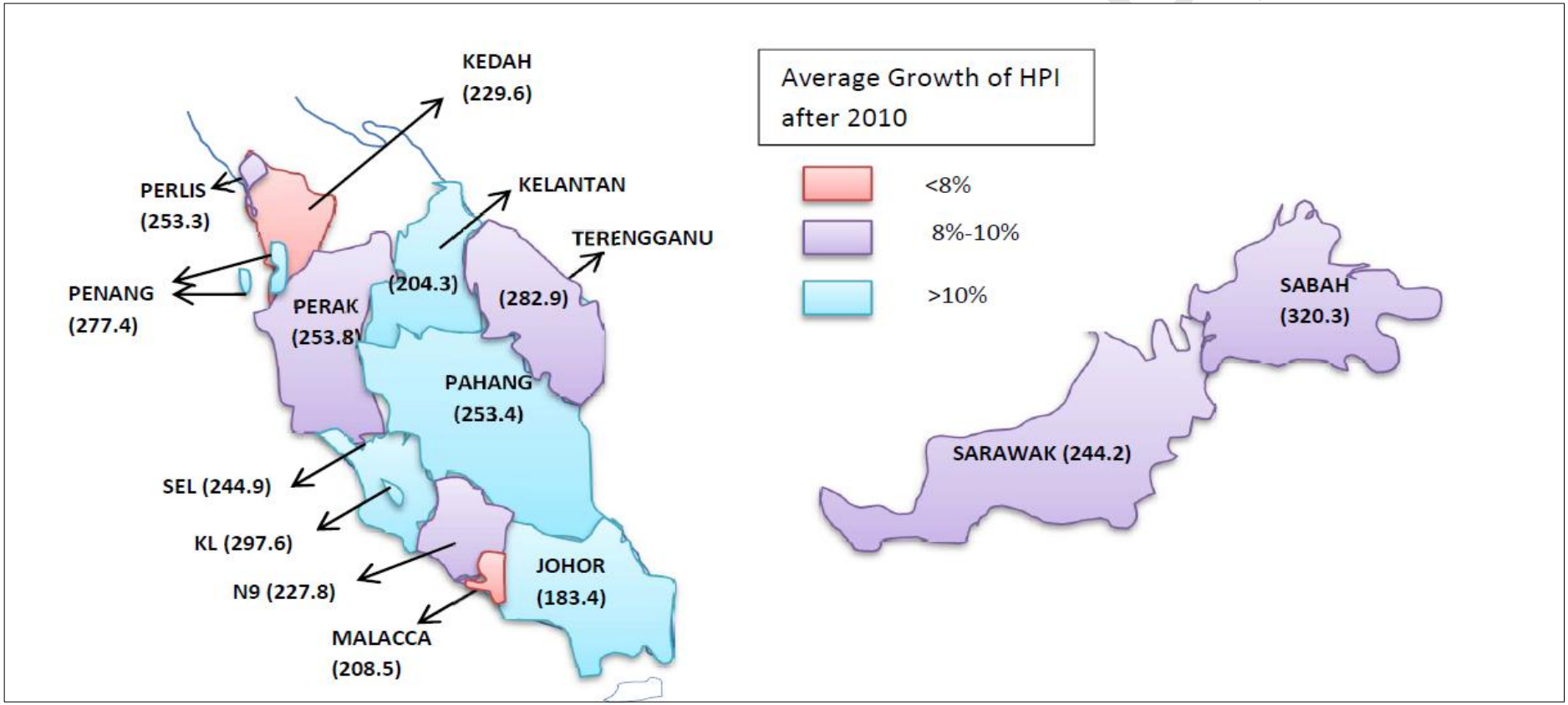


Figure 1.2 : Malaysia Housing Price Index by state in 2016Q3 and the average growth of housing price index after the year 2010

(Sources : National Property Information Centre)

Notes : Author's own calculation; Index base year= 2000.

Table 1.1 : Comparison of average housing price by type and state in 2002 & 2016 (values are in RM)

State	2002(Q4)			2016(Q3)		
	Condo/ Apartment	Terrace	Semi-Detached	Condo/ Apartment	Terrace	Semi-Detached
Kuala Lumpur	242,172	332,847	929,000	697,450	952,789	2,439,396
Selangor	140,360	223,450	443,785	353,589	578,985	1,207,953
Johor	261,834	199,999	361,089	301,772	421,816	641,364
Penang	196,403	214,106	382,710	626,431	510,717	967,326
Perak	-	109,859	207,868	184,437	274,140	524,982
N.Sembilan	-	126,510	206,714	116,809	402,939	612,128
Malacca	99,117	145,217	242,500	175,080	308,402	491,988
Kedah	-	128,376	224,304	107,250	307,189	436,724
Pahang	172,878	154,534	237,660	264,504	345,888	665,496
Terengganu	-	143,168	107,619	273,167	260,091	333,481
Kelantan	-	113,825	132,458	-	339,966	311,381
Perlis	-	69,556	131,649	-	336,288	360,921
Sabah	168,748	161,603	233,807	281,033	329,462	508,484
Sarawak	-	-	-	340,189	255,686	338,194

(Source : National Property Information Centre)

Refer to table 1.1, as of Q3 2016, the rise in average current house price is approximately triple if compared to the year 2002. Among the fourteen states, the average current housing price in Kuala Lumpur, Selangor, Penang, Johor and Sabah are the highest, and this is a contradiction to the house price index analysis. Interestingly, the house price index in Johor is recorded as the lowest, but it ranks the fifth most expensive current house price in Malaysia. This could be relevant to the calculation of price index which is defined as the changes of price with a base year. Hence comparisons between states using price index are not appropriate as they only indicate the growth of house prices but do not reflect the actual values in the market.

In fact, Kuala Lumpur has the highest population density and is renowned as the centre of economics and business in the country; Selangor, a state that enjoys a robust growth in the manufacturing sector, transportation and communication since the year 2000, and has led GDP contributions to the national economy; Penang, a highly industrialised state, earning the name of 'Silicon Island' and with a high total capital investment, is equally important to the Malaysian economy (Yusof & Bhattasali, 2008). In fact, there are few factors that explain the high growth of housing prices in the aforementioned states, and these include rapid growth of population, urbanisation, infrastructure and manufacturing sectors. In 1957, the population of Malaysia was only 7.4 million. In contrast, the population of Malaysia increased to 30

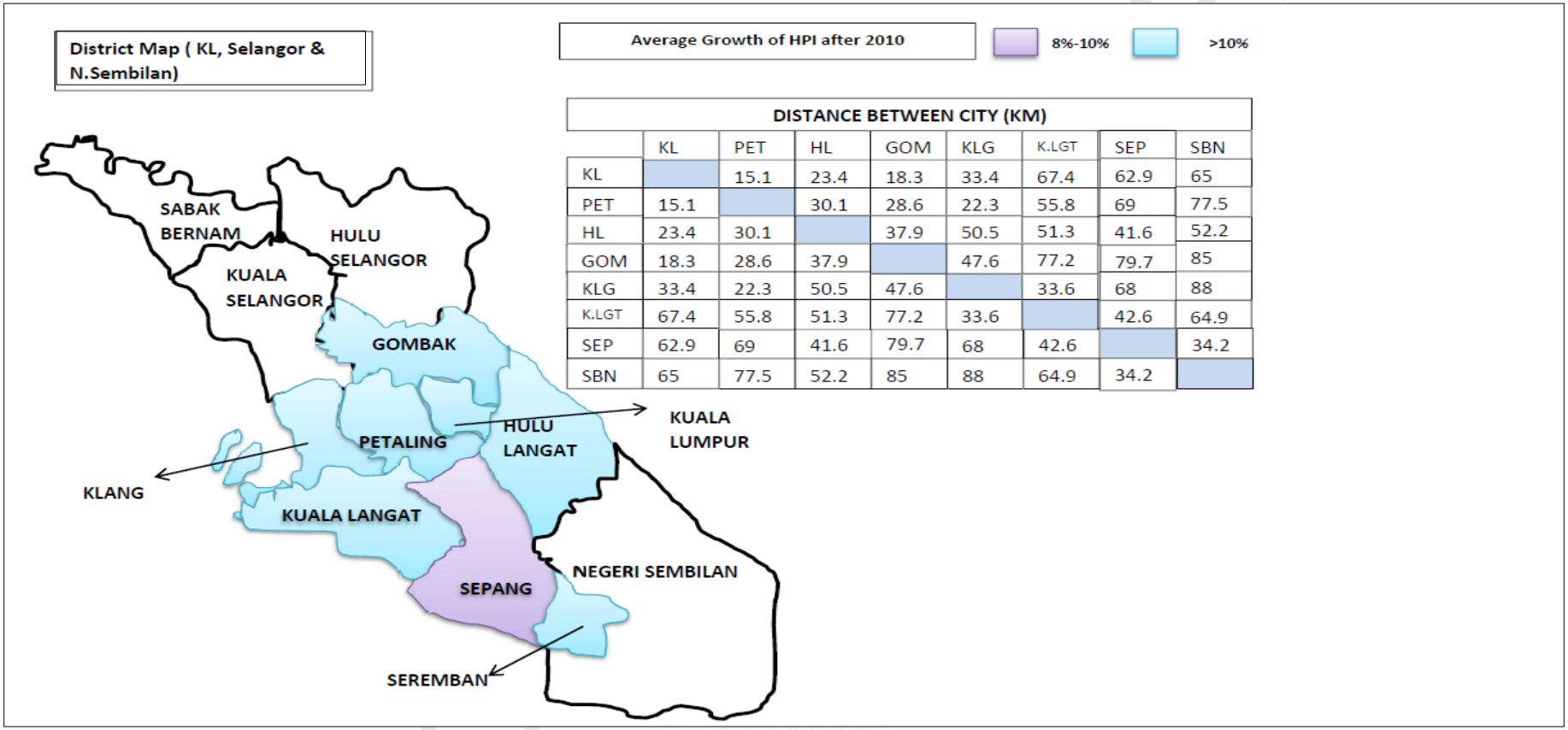
million in 2014. The World Bank Indicators also showed that the rural population decreased drastically from 50% in 1990 to 27.8% in 2010. Furthermore, Kuala Lumpur even achieved 100% level of urbanisation in 2010. This is followed by the states of Selangor and Penang, which reported 91.4%, and 90.8% level of urbanisation respectively. The uplift of infrastructure facilities has increased labor mobility and hence has boosted the manufacturing sector especially in the regions such as the Klang Valley and Penang. Between the year 2003 and 2013, there were approximately 70% of new manufacturing projects approved, and they were concentrated in Selangor and Penang. This explained a high demand for housing in these three states/territories. However, this excessive demand is not only pressuring the prices in the most developed states/territories, but also the surrounding states such as Negeri Sembilan, Perak and Kedah. Based on the annual house price growth analysis in the year 2011, there is a notable growth in these states (Negeri Sembilan, Perak and Kedah), but perhaps the magnitude is slower when compared to Kuala Lumpur, Selangor and Penang.

These spillovers effects may be even pronounced when we observe the changes of house prices in the local market. Figures 1.2 and 1.3, show that the majority of the districts which are located in the central and northern region have an annual growth of more than 10%. The prices of houses in Seremban, for instance the satellite town such as Seremban 2, has enjoyed rapid growth in the recent year. This is because the development of freeways has reduced the cost of commuting and has shortened the travel time from Seremban 2 to Kuala Lumpur City Centre, Kuala Lumpur International Airport, Cyberjaya and Putrajaya. By the same token, the effects of the sharp increase of the house prices in Penang have also propagated to the submarket areas such as Kulim, Kerian and Larut Matang, given their close geographical proximity.

In short, the movement of housing prices in various cities may have influenced the neighbouring markets. However, house prices are particularly high in only a few markets. While, the contiguous effect is belief to be spillovers from the developed state to the most adjacent state. In light of this, this study will analyse the issue of ripple effects and particular focus on the central region (Kuala Lumpur, Selangor and Negeri Sembilan) as well as the northern region (Penang, Kedah and Perak). However, the analysis does not include the southern region even though Johor's Iskandar property market is one of the hotspot. This is because a major influence on Johor's residential property market is Singapore. For instance, 74% of the foreign residential purchase in Johor's Iskandar was from Singapore.[1] Additionally, Fereidouni (2014) has reported that a co-movement of house price exists in Johor and Singapore.

[1] According to a UEM Sunrise report, Singaporeans made up the majority of the foreign purchase of Iskandar-Nusajaya project.

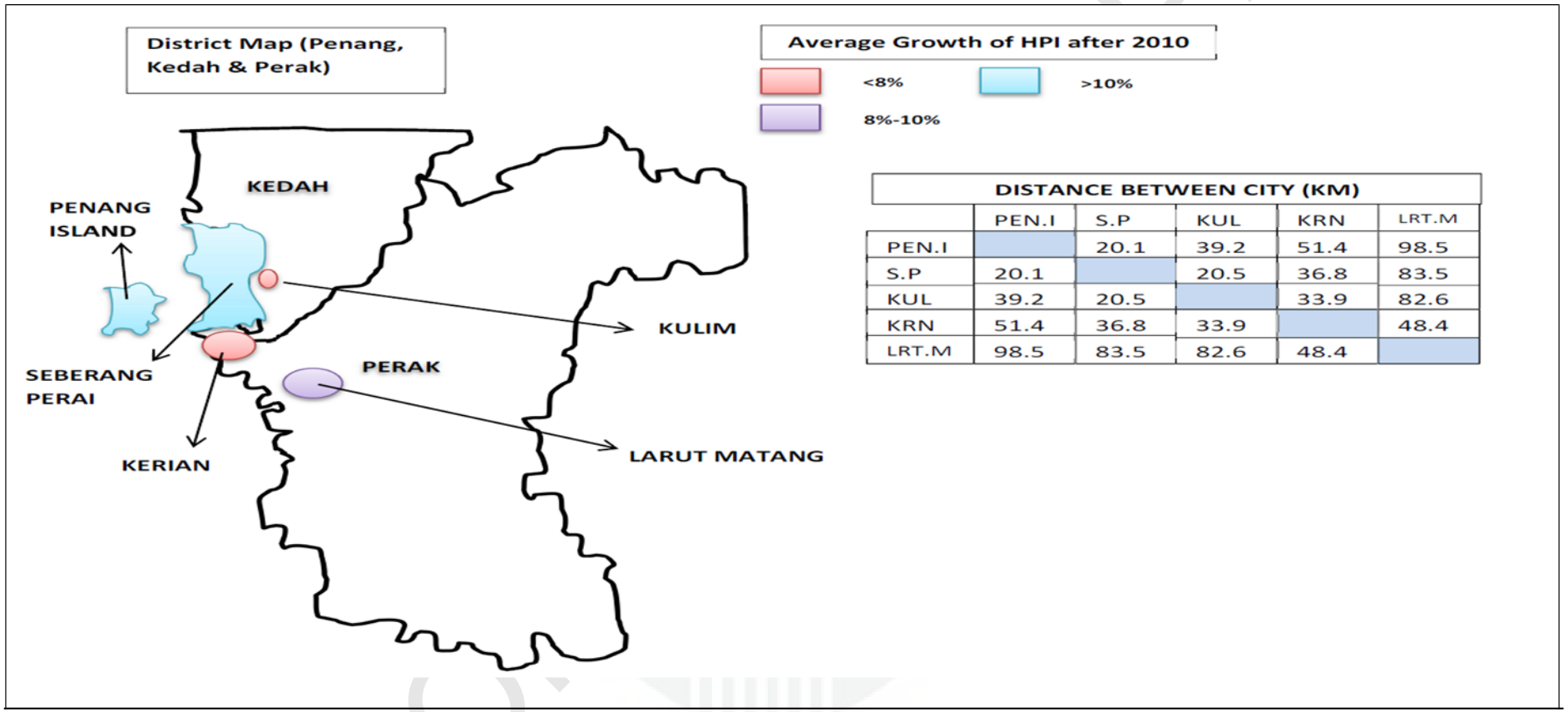
Apart from the analyses of the selected states, a chosen local market will also be included as well. The local market will be further divided into a selected districts located in the central region and northern region. To sum up, the district analysis for central region involve 8 districts, namely Kuala Lumpur, Petaling, Gombak, Hulu Langat, Klang, Kuala Langat, Sepang and Seremban. While, the Northern region, the analysis included the district of Penang Island, Seberang Perai, Kulim, Kerian and Larut Matang. Since location and the development of a city are often important elements that can influence the house prices, the distance between cities and the number of new dwellings will be accounted for in our analysis.



DISTANCE BETWEEN CITY (KM)

	KL	PET	HL	GOM	KLG	K.LGT	SEP	SBN
KL		15.1	23.4	18.3	33.4	67.4	62.9	65
PET	15.1		30.1	28.6	22.3	55.8	69	77.5
HL	23.4	30.1		37.9	50.5	51.3	41.6	52.2
GOM	18.3	28.6	37.9		47.6	77.2	79.7	85
KLG	33.4	22.3	50.5	47.6		33.6	68	88
K.LGT	67.4	55.8	51.3	77.2	33.6		42.6	64.9
SEP	62.9	69	41.6	79.7	68	42.6		34.2
SBN	65	77.5	52.2	85	88	64.9	34.2	

Figure 1.3 : Average growth of housing price after 2010 and distance between city-district analyses (KL, Selangor and Negeri Sembilan
(Sources : National Property Information Centre)



	PEN.I	S.P	KUL	KRN	LRT.M
PEN.I		20.1	39.2	51.4	98.5
S.P	20.1		20.5	36.8	83.5
KUL	39.2	20.5		33.9	82.6
KRN	51.4	36.8	33.9		48.4
LRT.M	98.5	83.5	82.6	48.4	

Figure 1.4 : Average growth of housing prices after 2010 and distance between city-district analyses (Penang, Kedah and Perak)
(Sources : National Property Information Centre)

1.4 Malaysia Housing Price and Macroeconomic Factors

In Malaysia, the homeownership rate recorded a high rate of more than 80% since the 1980s and up to 91.5% in 2005 (Kim, 2012).This implied that the housing asset is a significant wealth component for many households. Based on the historical trend, the researcher noted that Malaysia had experienced a stable growth in the housing market prior to the year 2010. This was followed by a sudden sharp hike in the housing price after year 2010. According to the Central Bank of Malaysia, this is mainly driven by fundamental factors (e.g. population growth, economic growth, inflation, construction cost, and interest rate).[2] Numerous international literatures have also suggested that housing prices are closely related to economic variables. (Miller, et al, 2011; Simo-Kengne et al, 2013; and Leung, 2003)

The behaviour of housing price and its interaction with economic growth are plotted in Figure 1.4. The Gross Domestic Product per capita (GDP per capita) and housing price generally show a positive growth. However, the GDP per capita has shown a higher variability compared to the housing price especially in the years of 1984, 1997 and 2008, given that Malaysia was hit by a financial crisis at these periods. Despite that, the economy reached a peak performance in the early 1980s, which was approximately 8.7% annually. The house prices spiked moderately after the year 1985 and grew along with Malaysia's economy. On the other hand, the annual change in GDP per capita surpassed the housing price growth prior to the year 2010. However, it is interesting that the annual changes of housing price have exceeded the growth of GDP per capita after the year 2010.

[2] Risk Development and Financial Stability in 2012. (assessed May 1, 2014). Taken from The Financial Stability and Payment System Report, BNM publication.

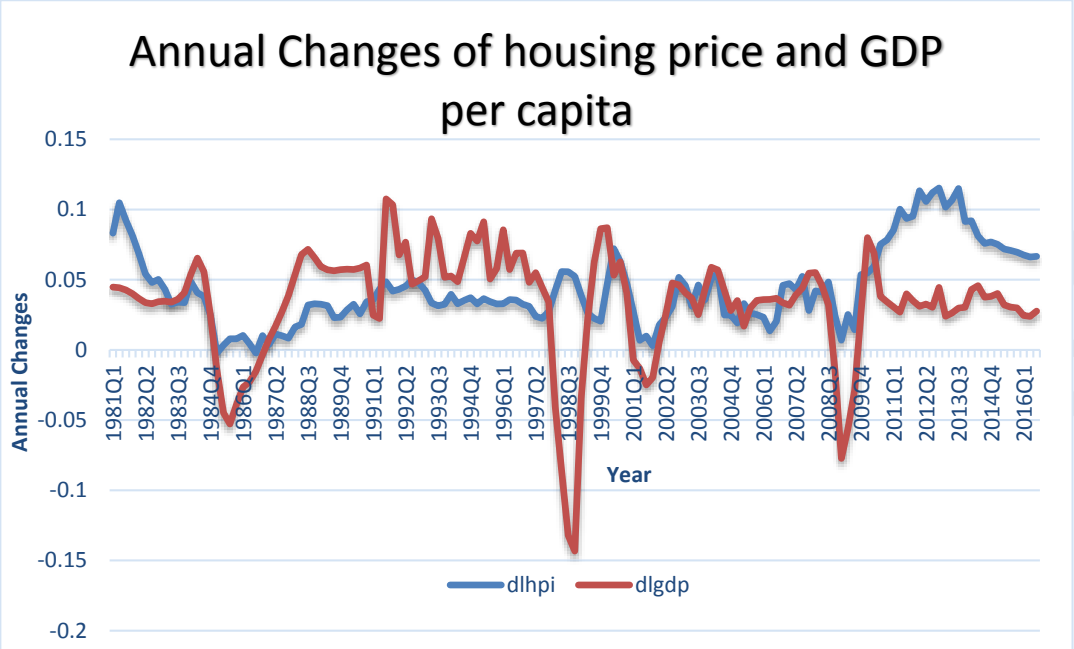


Figure 1.5 : Annual changes of housing price and economic growth, for the period of Q1 1981 to Q3 2016
(Sources **:** Datastream International. October, 2016. Available: Datastream International/Economics)

According to past literatures, the relationship between inflation and housing price has been inconclusive. Theoretically, real estate and land shouldn't be permanently affected by the price of consumer goods as a house is perceived as both consumer durable good and fixed asset at the same time. Meanwhile, the consumer theory does not seem to fit with reality. There are numerous researches done which address the impact of inflation on the housing price. Generally, inflation has a negative impact on the demand of houses and building activities especially houses that are financed by mortgages. This is because higher inflation rate or higher anticipated inflation may translate into a higher interest rate, thereby raising the annual mortgage payment which will affect the household decision to own a house. In the meantime, inflation could also increase the house price when input cost (e.g. construction, land prices and labor wages) rises.

According to the historical trends of both inflation and housing price in Figure 1.5, there is a remarkable relationship between both variables. There is a similar pattern that emerges between housing price and consumer price index prior to the year 2000. The global crisis coupled with the inflationary pressure due to the increase in global oil price in the early 1980s, poses a hard time to the Malaysian government. Hence, the Malaysian government tightened the monetary policy in 1982 to restrain inflation. Given the higher interest rate and slow economic growth, the Malaysia housing price declined until the year 1988.

The recovery of the economic growth in Malaysia includes the rebounds in housing price and an average 3% inflation after the year 1988. The sharp depreciation of the Ringgit in 1997 explains a high inflation rate and housing price. While this event did not persist long, the housing price started to drop in 1998. After the year 2000, there is large positive fluctuation of housing price and an inflation trend. However, the inflation rate was at a minimum rate which was approximately 1.7% per annum after the Malaysian Ringgit was pegged to the US dollar, and this cooled off both the supply and demand force. Then, the price level started to surge when the pegged Malaysia Ringgit to the US dollar ended in 2005. Until Q3 2009, the consumer price index dropped approximately 3%, and it was due to the shrinkage of the global growth. Despite that, the growth of housing price outstripped the growth of the general level of prices after the year 2010.

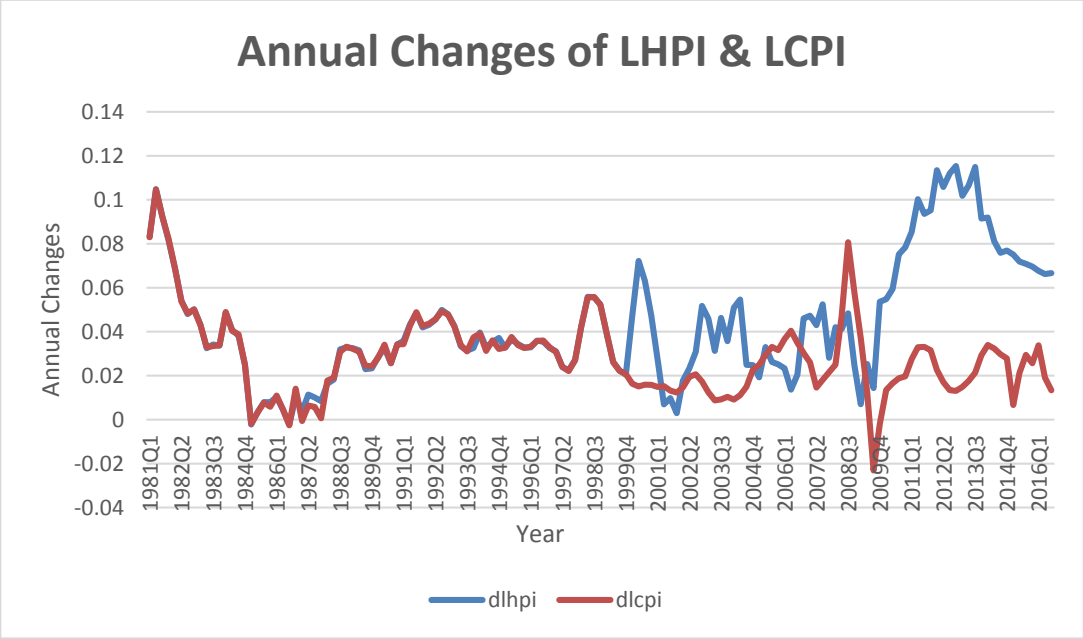


Figure 1.6 : Annual changes of housing price and inflation for the period of Q1 1981 to Q3 2016
(Sources **:** Datastream International. October, 2016. Available: Datastream International/Economics)

Since a house is recognised as an asset, a house price is equal to the present value of the expected income that can be earned from the given asset by the household. Whereby, the interest rate is an important element which influences this expectation. When interest rate increases, the borrowing cost increases, then this is reflected with a decrease in the housing demand. Conversely, with a lower interest rate, housing becomes more affordable, and this leads to a higher demand for houses as housing loans are less costly. In Malaysia, we can observe a relatively high interest rate loans during the period of 1983 to 1986 which recorded an average of 11% and the highest rate of

12.1% in 1998. Coincidentally, an inverse movement can be observed in the housing price during this period. Thereafter, the bank interest rate is reported to be in the range of 5.5-7%, the lowest rate was in the year 2009 due to the global financial crisis. Initially the drastic drop in the bank interest rate after the year 1998, has been consistent with the rise of the housing prices. However, the housing price has fluctuated between the years 2000 and 2009. The growth of housing price then reached a double digit after the year 2009, but the interest rate sustained at about 6%. When the correlation between the interest rate and housing price is analysed, it is found to be 0.6, which suggests a negative relationship between these two variables, which supports the theory.

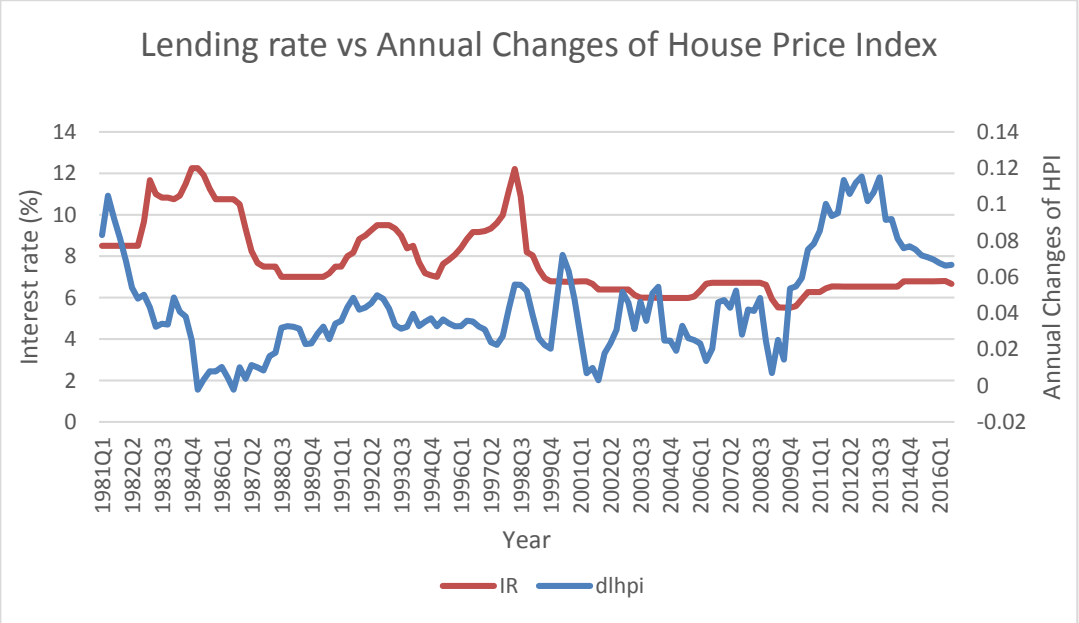


Figure 1.7 : Lending rate and annual changes of housing price for the period of Q1 1981 to Q3 2016
(Sources : Datastream International. October, 2016. Available: Datastream International/Economics)

In an open economy, the real effective exchange rate does affect the house price. The relationship between exchange rate and house price is highlighted in the studies of Abelson et al. (2005), Mahalik and Mallick (2011), Liu and Hu (2012). The phenomenon of globalization increases the international investment and makes the house price prone to be affected by the exchange rate. Since Johor is located next to Singapore, it is not surprising that the property value in this region is affected by the cross-border economic activities and the changes of the exchange rate. This can be illustrated by the fact that Johor has been the recipient of cross-border investments from Singapore for many years. (Henderson & Phillips, 2007). While, the currency value is one of the important consideration for a foreign investor. Our study employed the real

effective exchange rate as the proxy to measure the movement of Malaysian Ringgit against the weighted average of foreign currency, and analyse the possible interaction between exchange rate and house price. The index is calculated as the price level of foreign good relative to price level of domestic good. An increase in real effective exchange rate implies appreciation of Malaysian ringgit. The correlation between house price and the real effective exchange rate is plotted in figure 1.8.

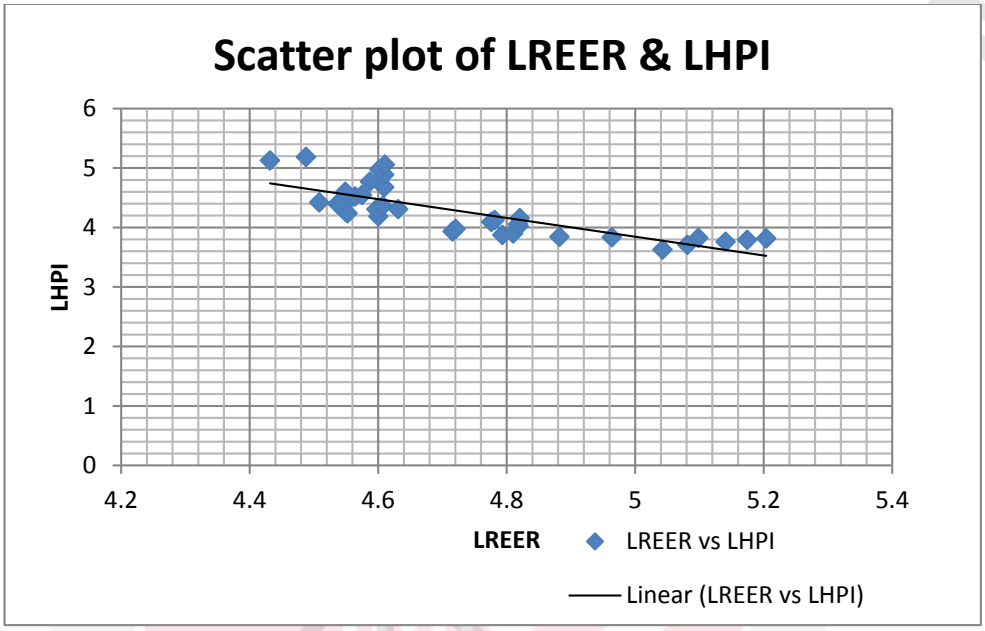


Figure 1.8 : Correlation plots for housing price and real effective exchange rate for the period of Q4 1980 to Q3 2016
(Sourcesb **:** Datastream International. October, 2016. Available: Datastream International/Economics

In figure 1.8, correlation plot shows a negative relationship between the changes in housing price and real effective exchange rate. For instance, the computed correlation between housing price and the real effective exchange rate is found to be -0.795. This implies that the depreciation of the Malaysian Ringgit against the foreign currency has a positive impact on the Malaysian housing price. We provide two explanations regarding the negative relationship. First, the weaker Malaysian Ringgit makes Malaysia property more attractive for the foreigner, and push up the price. This study has no attempt to argue that international buyers are the major players in the market. In fact, this explanation is sensible with some evidence of an influx of foreign home buyers. Property in Kuala Lumpur, Johor and Penang are the primary interest of the international buyers. For instance, the residential project in Forest City itself has recorded a sales RM11.54 billion in 2016, by which 70% of the buyers are China nationals. Whereby, Singaporean buyers contribute 25% to the entire Iskandar project, and 35% was from the Chinese investors

(Ng and Lim, 2017). Despite weak demand in the recent residential market, the asking price in some of the high-end residential project in Kuala Lumpur recorded a rise. In fact, an approximate 40% of these units were sold to the foreign buyers. (Knight Frank Research, 2016). Besides that, the launch of the MM2H programme in the year 2002 has attracted more foreigners to stay in Malaysia. The accumulated numbers of participants achieved 30,526 in 2016. About 83% of MM2H applicants have purchased houses in Malaysia (Lee et al., 2010). According to the Minister of Tourism and Culture, the applicants of MM2H programme contribute RM4.9 billion in the property purchase since 2012 (Koh, 2017). With no doubt, the MM2H applicants is benefited when the local currency depreciated.

From another standpoint, the depreciation of the Malaysian Ringgit could raise the cost of import. The increase in the price of raw materials has led to a higher construction cost and thereby has increased the house price. In Malaysia, cost of the raw material made up of 67% of the construction cost for the residential building. The greatest share of material used are derived from bricks, steel, sand, cement, and concrete. In the above list of material, some are imported. For example, 20% of the steel bar and 64% of wire rods that were used in the building construction are imported (MISIF, 2016). Also, the imported refractory bricks, blocks, and tile amounted to 51,838 million USD in 2016 (United Nations Statistic Division, 2016). To put it differently, the movement of Malaysian Ringgit could pass through to the changes in the imported price of building material.

1.5 The role of the Banking system

1.5.1 Housing Loan Growth

Over the last two decades, Malaysia has witnessed a stable growth in the housing market. Despite the fact that the Asian Financial Crisis and Global Financial Crisis had hit negatively on the Malaysia economy and housing market, the setback to the housing sector was temporary.

Moreover, the ample liquidity in the banking system has increased the demand for housing and subsequently this has led to a higher price for housing. From the perspective of banking exposures of property market, it is noted that the property loans, particularly the residential ones, remain highly concentrated of the total amount of bank lendings. In Malaysia, the majority of the housing finances have originated from commercial banks, which accounted for nearly 86% in 2014. Refer to Table 1.2, bank lending over RM716 billion was attributed to the property sector in Q3 2016 which included loans for the purpose of purchasing residential property, non-residential property and construction. In the year 2014, the total bank lending to the property sector was the highest, which almost 50% of the total amount of financing. Over the

period of 1997 through 2014, the bank lending for the purpose of purchasing residential property has grown substantially, from RM51.16 billion to RM390.18 billion. The loans to the property sector only dropped during the 1997 Asian Financial Crisis and Global Financial Crisis. However, there is evidence of higher loan growth after the year 2009 when changes were made to the government policy to lower the RPGT.

In short, bank lending for the purchase of residential property remains the largest portion. Nevertheless, it is not uncommon to have high bank lending in developing economies. The outstanding housing loan to GDP in Malaysia recorded a 33% of the GDP in the year 2014, which is the highest in the emerging economies but it lagged behind Singapore. (IMF, World Economic Outlook Database). This implies that the banking sector in Malaysia has widely impacted the residential property market.

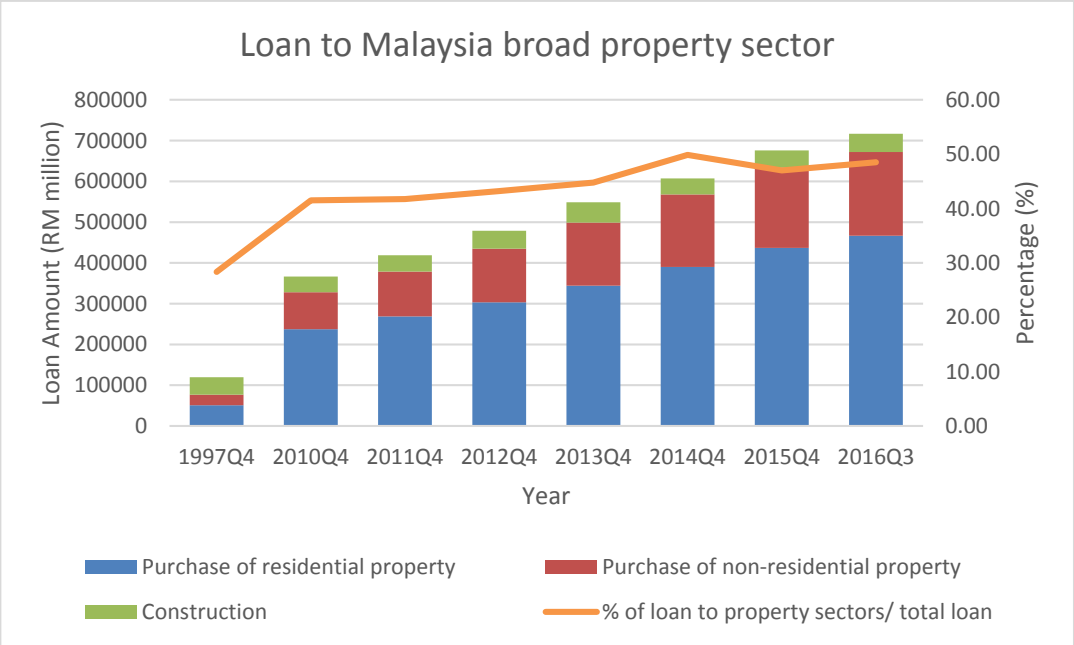


Figure 1.9 : Loans for the broad property sector for the period of Q4 1997 to Q3 2016
(Sources : National Property Information Centre)

Table1.2 : Direction of Bank Lending from Q4 1997 to Q3 2016. (Values are in RM billion)

	1997Q4	2008Q4	2009Q4	2010Q4	2011Q4	2012Q4	2013Q4	2014Q4	2015Q4	2016Q3
Purchase of residential property	51.16	192.09	210	237.75	269.11	303.84	344.39	390.18	436.78	466.56
Purchase of non-residential property	27.65	66.36	73.86	90.56	109.83	131.23	154.55	177.61	196.71	205.22
Construction	37.44	16.58	18.88	21.58	25.27	30.67	33.55	39.34	42.54	44.86
Total loans to property sectors	116.25	275.03	302.74	349.89	404.21	465.73	532.49	607.13	676.03	716.64
Total loans to all sector	398.15	721.80	779.28	878.44	998.19	1101.55	1217.51	1332.29	1438.22	1477.10
(% of loan to property sectors/ total loan)	29.2	38.10	38.85	39.83	40.49	42.28	43.74	49.87	47.00	48.52

(Sources : Ministry of Finance, Bank Negara Malaysia)
*Authors own calculation

1.5.2 Stability of Conventional Bank: Analysis of Z-score Index

The identification of key indicators that signals a banking risk has been a major concern for the central bank and the relevant authorities. As stated by Deutsche Bundesbank (2003), the banking stability can be defined as the ability of the financial system to perform its key function efficiently. As such, the stability and soundness of the banking system are connected.

Despite that, a proper, preserved financial soundness is essential in order to provide an environment for a sustainable economic growth. Generally, there are five factors that could affect the solvency of a bank, namely macroeconomic shock, credit risk shock, market risk shock, external funding risk shock, balance sheet and income projection (fee-based income shock). Meanwhile, the changes in the housing prices may affect the banking system. The related theory that explains the relationship between housing price and bank are collateral value hypothesis and deviation hypothesis (Koetter & Poghosyan, 2010). The collateral hypothesis refers to higher housing price, where the bank is more stable as the collateral value has increased. Whereas, deviation hypothesis is when there is a big growth in the house price that `the price drifts away from its intrinsic values which may increase banking risks.

Past literature suggests several approaches to measure the bank stability; these are included qualitative and quantitative methods (Wahid and Dar, 2016). In the beginning, research on bank stability had utilized the qualitative approach due to the limitation on data availability. The evolution of data collection technologies enables the use of the quantitative method. Z-score index is one of the most popular indicators. In fact, there is no best measure of bank stability. Nevertheless, the analysis of z-score index has an advantage over other types of stability measures, in which z-score index reveals the individual bank's fundamental financial health. Following the previous literature, the z-score index is used as the indicator of financial soundness. We collected the financial report from 8 conventional banks in Malaysia and computed the z-score index as the sum of return to asset (ROA) and equity ratio relative to the return volatility. A higher z-score index implicates that the bank is more resistant to insolvency. The average z-score index from 1998 to 2016Q3 is plotted in figure 1.10.

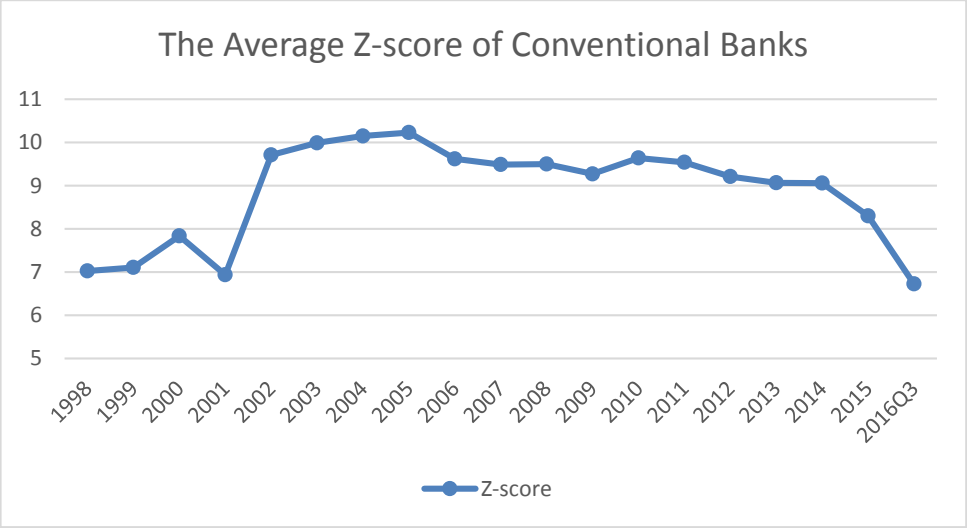


Figure 1.10 : The average Z-score for the conventional bank from 1998 to Q3 2016
(Sources : Individual Bank's Annual report. Author's own calculation)

Based on the figure 1.10, the average z-score index has been relatively low in 1998 to 1999. Having suffered the worst financial crisis, non-performing loans have increased sharply. As a result, banks are significantly affected. Thus the government has set up Danaharta, an asset management company to acquire non-performing loans from the financial institutions. With the manageable limit of non-performing loans and a strengthened Malaysian economy, bank became stable. For this reason, the z-score index shows improvement after the crisis. In the year 2004, new bank measures were introduced to strengthen financial soundness. As such, Z-score continued to rise until it reached its peak in 2005, and it was followed by a drop. A possible reason to explain this decline is the restructuring plan of the banking sector and the closure of Danaharta operations (BNM, 2002). Following the bank mergers with financial companies, the bad loan portfolios acquired by the finance companies were absorbed by the commercial banks. Evidently, the total number of non-performing loans in the banking system had reduced, but the total number of non-performing loans of conventional bank was reported to have risen by RM3 billion in 2005. (World Bank, 2005). Indeed, the z-score index is considered stable until 2014. The tightening credit that put in place by the Central Bank Malaysia has resulted in a weaker bank's profit. In addition to that, the slowdown of the economy also put the bank under pressure. This translate into a reduction in the z-score index after 2014.

Overall, the banking sector in Malaysia plays an important role in fostering the growth of the housing market. However, the recent growth of the Malaysian housing market has exceeded the growth rate of most of the macroeconomic variables. In fact, this is partly driven by speculative purchases. This can be seen when a 15.8% growth was recorded in the number of borrowers with at

least three outstanding housing loans in the year 2010. The highest level of household debt to GDP was at 87.9% in the year 2014. As a result, the banks are poses to a higher default risk when a correction in the housing market was made.

1.6 Government Policy

In line with the 10th Malaysia Plan, which emphases the strategies of achieving a high income country, the National Housing Policy (NHP) was launched on 10 February 2011 in order to increase the quality of housing, ensure sustainable development of housing sector, and focus on the issue of affordability especially for the low-income group. According to the 10th Malaysia Plan, the government has targetted to build 78,000 units of affordable houses. Following that, a total amount of RM500 million was allocated for the service and maintenance fees for the public and private low-cost housing.

Since the impressive growth of the housing prices in year 2010 was found to be partly contributed by speculative purchases, BNM has taken an initiave to reduce the maximum loan-to-value ratio (LTV) to 70% for house buyers who have taken more than three mortgage loans. This was expected to moderate the effects of speculative purchases that can result in a higher housing price. Apart from this, the Malaysian government has also introduced the real gain property tax (RPGT) to curb speculative activity. The real gain property tax refers to the tax that is chargeable from the capital gained when the property is sold off. The real gain property tax initially had a two tier system which charged citizens and non-citizens. Although this system were abolished during the economic recession, it resumed on October 27, 1995. Subsequently, the tax rate was raised according to the Budget 2014 announcement. For instance, the RPGT rate was increased to 30%, 20% and 15% respectively, if the holding period of the property is within 3, 4 and 5 years, and it involved both citizens and companies. Nevertheless, a 30% tax is chargeable on non-citizens for a holding period within 5 years. However, for the subsequent year, there are no tax charged on citizens, whereby companies and non-citizens are still taxed at 5%.

The issue of foreign ownership of land has become a major concern after the government introduced, ‘Malaysia My Second Home Programme (MM2H)’. Hence, the National Land Code (NLC) has been amended a few times in the past few years to prohibit foreigners from buying landed homes. According to the latest amendment in October 2013, which is effective from the year 2014, the minimum price for the purchase of property in the region of Kuala Lumpur, Johor and mainland Penang has been increased from RM500,000 to RM1 million, and it is limited to two units. While in the region of Penang Island, the minimum price for the purchase of property is RM2 million.

On the other hand, given the exponential growth of house prices, the government has offered a few schemes to help young house buyers. These include the myHome programme, my Home1, my Home 2, and PR1MA. More specifically, PR1MA aimed to provide a more affordable houses at the selling price between RM100,000 to RM400,000. Apart from this, these schemes also provided financial support for upfront costs, mischelaneous costs, and even offered 100% financing to these first time home buyers.

In a nutshell, numerous initiatives have been offered by the government to maintain a balance in the housing sector. However, the government's actions were not without criticism. Since the state land is involved in the PR1MA programme, there is a question of how much land should the government release to help this particular group in the long run. Moreover, the definition of affordable is also a subject of debate. According to International Demographia, housing is defined as affordable when the house price is below or at least three times of the median annual household income. By comparison, the median monthly household income for Malaysians was recorded at RM4585 in 2014 (Department of Statistic Malaysia, 2015). The paradox is although the Housing and Local Government (MHLG) has defined affordable housing price at RM300,000, this house price has still exceeded approximately 5.5 times of the median annual household income. In other words, the Malaysia rating for affordability has fallen into the category of severely unaffordable. This implied that the affordable price that is set by the government is incompatible to the lower income group in Malaysia. Hence, a greater government support is needed to tackle the issue of affordability.

1.7 Problem Statement

Real estate market has been playing an important role in determining the economic growth. The boom and bust of real estate market initially should be a good indicator of economic growth and rising living standards. When it comes to affordability, the rising housing prices seems to sour the dreams of many. In Malaysia, the property market contributes a large portion to the national wealth. Apart from the sharp increase in housing price, the transaction value had also climbed up to the peak at RM216.64 billion in 2014Q3. Almost 46% of bank lending from banks or other financial intermediaries is a mean for the broad property sector.

Recent research on housing markets has highlighted the importance of exploring the features of regional house prices and their interrelationship. Theoretically, the co-movement of housing prices at the regional level is uncommon, in view of the strong belief that the housing price is determined by both the demand and supply force. The study done by Ashworth & Parker (1997) has also addressed the variation of regional income and the disparity in the structure of regional housing market, and they have explained why each

regional housing price has a different pricing trend. In fact, the house price in each region does not definitely diverge from each other. It is observed that certain economic factors such as migration, equity transfer, spatial arbitrage and spatial patterns have affected the housing price, and eventually the rise of the house price in the central area is likely to spread to its surrounding area, and this is followed by the peripheral regions (Meen, 1999).

In Malaysia, there is a sharp increase in housing prices particularly in the more developed states. The house price in Kuala Lumpur, Selangor and Penang had recorded the highest among the fourteen states, while the state of Perak and Negeri Sembilan are catching up to this upward trend. Apart from this, the relationship across the specific local housing market is equally important. Since the housing price in the central region is higher and has a higher demand, this will boost the demand in the local market, particularly the adjacent neighborhood. Moreover, the supply for land could be elastic in some of the less developed areas of the state, making the house price not responsive to the decreasing commuting cost and the ripple effects (Lean & Smyth, 2013). Therefore, the estimation of the ripple effects at the state level, may not be sufficient to describe the house price movement.

On the other hand, the house price is not only affected by its own characteristics but also the features found in the adjacent housing areas. More specifically, the positive changes in the adjacent areas will function as a positive feedback of the housing market. This is referred to as the spatial dependence in the housing market (Can, 1990). As to the empirical studies of Malaysian's house price, the ripple effects effect taking account of the role of geographical information has not been evaluated. In particular, the direction of price transmission pattern across different spatial location either national or local market has been disregarded in the past study done in Malaysia. Thus, the objectives of this study are to investigate whether 'ripple effects' exist in Malaysia and the house price diffusion patterns at different aggregate levels.

Generally, housing prices are driven by the forces of demand and supply. The demand is influenced mainly by household incomes, demographic structures, tax rate levels, interest rate levels, and the total amount of loans approved by the banks. The supply is influenced mainly by the amount of land available, costs of construction, investment of existing housing stock, and changes in available housing stock. As has been stated, housing prices increased greatly after 2010. Without a doubt, the increase in housing prices increased the wealth and boosted consumer spending, but, at the same time, it widened income inequalities. Buying a more expensive house indicates that the household debt will be higher. In Malaysia, the household debt as a percentage of the gross domestic product (GDP) reached 89% in 2016; this is the highest percentage reported in the entire Asian region (Soh et al., 2017). The greatest composition was contributed by the housing credit. An upsurge

in housing prices could make the economy vulnerable to “future shock.” It is therefore essential to identify the factors that have significantly determined Malaysian housing prices.

Most studies in the past have explored the relationship between housing prices and macroeconomic variables using a linear framework. There is little reason to believe that housing prices behave asymmetrically in different phases of an economy. Because home ownership is a positive necessity for some, housing prices could respond more rapidly to positive changes of income growth. The primary justification for the asymmetric response is that homebuyers may be afraid that prices will overshoot if they wait. Additionally, most macroeconomic variables tend to exhibit nonlinear behaviour if an extreme economic event occurs, such as a financial crisis. This is because consumers may respond asymmetrically to macroeconomic news. For instance, McQueen and Roley (1990) show that stock prices respond asymmetrically to some news releases, particularly during times of economic boom and bust. Chowdhury and Maclenan (2014) argue that the shock of an expansionary monetary policy has a greater impact on housing prices than contraction. Judging from historical trends in housing prices and macroeconomic variables, housing prices have undergone larger adjustments during times of economic growth (Figure 1.5). Comparably, the housing market slowed in 1998, but with a much smaller magnitude during the Asian Financial Crisis of 1997. Housing prices recovered quickly after this time, with an average growth of 3.4% until 2010. Similarly, Figure 1.6 shows that housing prices adjusted quickly when the interest rate decreased rather than increased. In an open economy, changes in exchange rates can potentially affect housing prices. It is reasonable to assume that the exchange rate affects international buyers’ willingness to hold an asset in Malaysia. The exchange rate also exerts an influence on construction costs because some building materials are imported. Housing prices could respond asymmetrically to changes in the exchange rate during two scenarios: (1) when firms act as oligopolists and jointly set prices and (2) when foreign buyers have heterogeneous beliefs. Based on the above factors, this study will attempt to show that the relationship between housing prices and macroeconomic variables may be subject to nonlinearity.

Apart from the analysis of house price changes, the analysis of demand behaviour is equally important. Moreover, the transacted sales values show the behaviour of the housing demand in Malaysia. For instance, even though the demand is weakened in the past two years, house prices tend to be “sticky”. This is mainly due to house price’s response to a lag. Therefore, the transacted sales may provide additional information on the movement of the housing market. However, the information on the magnitude and the drivers of the large increase in the housing prices in Malaysia is still ambiguous. In essence, this study will determine what drives the Malaysia house price and the possibility of asymmetric adjustments between the house price and

macroeconomic variables. The question of whether the house prices and sales will explain the asymmetric adjustments differently will also be investigated.

Several studies have argued about the negative impacts of the movement of house prices on the national economy and the banking sector. In fact, many of the banking distresses are related to the slump in the value of banking asset. One of the most notorious examples is the U.S Subprime Mortgage Crisis in the year 2007. The collapse of the asset price led to bank losses. When the collateral value of the assets dropped, the bank credits shrank. Consequently, the bankruptcies were widespread (von Peter, 2009). Alternatively, a substantial growth of the housing price could increase the wealth of the borrowers but bonded with a higher mortgage burden at the same time. This also indicated that excessive lending to the housing market at a competitive low rate is likely to occur during the real estate booms. (Bernanke & Gentler, 1995). Moreover, there are two standpoints regarding the skyrocketing house prices. The pessimists have suggested that the rapid expansion of the housing market in Asia has alerted consumers of the possibility of a housing bubble due to excessive speculation, and that government intervention is necessary. While the optimists have alleged that the bust in the housing market is due to the correction of the real estate, and that it was a good indicator of the recovery of the economy from the recent crisis. Hence the real estate prices contain powerful information and can be a forewarning for banking crises.

According to Khor and Kee (2008), prolong of the surge of house price, and credit expansion could distort the market. In the context of Malaysia, there is a strong growth of mortgage loan lending in Malaysia's banking sector which grew from 33.2% in 1997 to the peak of 49.8% in 2014. Whereby, the Malaysia residential market has shown sign of imbalances after eight consecutive quarter of approximate 10% growth (quarter-on-quarter). The total unsold residential unit is reported to be 83,647 units in 2016Q2, in which rise by 17.4% compared to the historical average of 70,610 units per year between 2004 to 2015 (NAPIC, 2016). The implication is Malaysian banking sector could poses risk to the instability. The negative impact of excessive growth of house prices on bank stability have been well-documented in the existing literature, such as Hilbers et al. (2001), Koetter & Poghosyan (2010), and Borgy et al. (2014). Despite this strong evidence, Daglish (2009) and Niinimäki (2009) argue the positive relationship between house prices and bank stability supports the collateral value hypothesis. In order to reconcile these contradictions, this study examine the relationship between house price and bank stability from the nonlinear perspective. Bank could be stable when house price increase initially, but bank could be instable after a threshold point due to the overheated in the market. Indeed, many of the studies suggest an asymmetric relationship between banks and asset prices (Pan & Wang, 2013; Gennaioli et al., 2012; Dieci & Westerhoff, 2012). The nonlinear relationship can be described by the idea of local thinking. These studies argue that investors are subject to limited ability and rely on a simple heuristic in predicting the return.

The “local thinking”, which was introduced by Gennaioli & Shleifer (2010), explained that not all the contingencies are included in the decision making. In short, the research question of whether the increase in housing price affects banking stability, and the threshold level that could trigger bank instability will be of major interest in this study.

1.8 Objective of the study

The general objective of this study is to examine the co-movement of the regional housing price and the selected factors that drive Malaysian house price, while highlighting the link between bank stability and the housing market over the period of 1980 through 2016.

More specifically, the aims of the study include the following:

a) to investigate the ripple effects in Malaysian house price for selected states and districts.
b) to determine the asymmetric relationship of both housing price and sales with the macroeconomic variables such as economic growth, exchange rate, inflation and interest rate
c) to examine the impacts of housing price on banking stability

1.9 Significance of the study

This section will briefly describe the various significances of this study which will contribute to the existing literature. In fact, this study is motivated by several interesting features. To begin with the interrelationship between the house price movements across the nation will be investigated. In essence, it is crucial to analyse these relationships in order to have a better understanding of the various economic issues such as wealth distribution and the mobility of the labor market, (Alexander & Barrowe, 1994). For instance, the Malaysian house prices in the major developed states have witnessed a sharp increase in the recent years. However, these effects can be felt in other regions as other states have also exhibited an obvious increasing trend. Besides that, this study not only addressed the ripple effects at the subnational or state level, but also the local market (district level). This is because the house price is contiguous within the local market. Even though there are several studies done on the issue of ripple effects in Malaysia, an analysis of the local market has not been done. Furthermore, most of the past studies have ignored the presence of spatial autocorrelation. Since the cross-sectional data is used throughout the study, the co-movement in the properties within the geographic space is likely to occur. However, the omission of spatial autocorrelation could produce unreliable conclusions. To fill the literature gap, a methodology is made by adopting the spatial VAR in the study. In short, this research herein will provide

comprehensive information on how the ripple effects disseminate over various regions and economic zones by observing the movements of the regional housing price and considering the positive effects created by neighbourhood at the same time.

The second objective is to study the relationship between house price changes and the macroeconomic variables, and a scant empirical literature on Malaysian house price is presented. In fact, there are large scales of studies that examine the role of housing sector in national economy development and the determinants of housing prices. Previously, the movement of the housing price in the UK and the US has been a major interest in these literatures. However, only a small amount of literature is concerned with the housing markets in Malaysia. There are only a few studies that have highlighted the potential causes of Malaysian house price thus far, such as Hii et al., (1999), Ong & Chang (2013), and Glindro et al., (2007). Although the house price behavior and the relationship with macroeconomic variables are emphasised in this study, the proxy variable such as sales is also examined. In fact, the transacted sales can provide more information as time-lag delays the responsiveness to house price shock. As such, the adjustment behavior for both the housing price and sales values with the presence of macroeconomic variables can be different. Additionally, the house price modeling used linear framework in most of the empirical studies. In Malaysia, there is evidence that house price rises like rockets but falls like feathers. This means that house price is most likely asymmetrically adjusted to the shock. In this study, the researcher would like to contribute to the existing studies by addressing the possibility of intrinsic nonlinearities. However, it is important to understand the nonlinear features of house prices especially for policy makers. The event known as housing bubble can prolong if the house price incorporates nonlinearities.

When the banking system plays a role of the main lender to the residential market, and banks secure loans by using properties as collaterals, the unsustainable boom in the real estate market may adversely affect the banking sector and the economy. Alternatively, the soaring housing price will also positively affect the bank as the value of collateral increases, and this will further strengthen the bank. However, the existing work on the relationship between housing and the banking sector is rather limited. In the case of Malaysia, the banking sector is highly vulnerable to the housing market. To reiterate, the Malaysian bank sector is likely affected by the housing market, and the banking performance may deteriorate when the housing price drops significantly. However, in the case of Malaysia, there is no consensus regarding the positive or negative relationship between these two variables. Although residential properties have been the key element in the recent financial turmoil, the present study seeks to contribute to the literature from an empirical perspective. As the relationship between bank stability and house price changes to non-monotonic, this study will explore the relationship between house prices and bank stability in the long run and the short run while addressing the issue whether the growth in house price is too aggressive and has adverse effects on the banks.

To sum up, the study of the Malaysian housing market is crucial and will contribute greatly to the existing literatures in several perspectives. In addition, there will be a few different methods applied in this study to obtain a more accurate conclusion. Furthermore, the study is expected to shed some light on policy implications by explaining the relationship between the selected macroeconomic variables and the Malaysian house price, and its link to bank risks, while examining the house price diffusion patterns, among selected states and districts.

1.10 Organisation of the study

The organisation of this study is structured as follows. Chapter one describes an overview of the housing market, government intervention, economic background in Malaysia, bank lending and property sector, problem statement, objective and the significance of the study. In chapter two, previous literatures on the ripple effects on house price are elaborated. This is followed by the relationship between economic growth, inflation, interest rate, exchange rate and the housing price, and the impact of the housing price on banking stability. In addition to that, chapter three discusses the theoretical model, model specification, methodology and source of data in this study. Chapter four on the other hand, reports the empirical findings and discussions of the study. Lastly, chapter five presents the conclusions, limitations of the study and several policy recommendations.

REFERENCES

Abelson, P., Joyeux, R., Milunovich, G., & Chung, D. (2005). Explaining house prices in Australia: 1970-2003. *The Economic Record,* 81(255), 96-103.

Adams, Z., & Fuss, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics,* 19, 38-50.

Alexander, C., & Barrow, M. (1994). Seasonality and cointegration of regional house prices in the UK. *Urban Studies,* 31(10), 1667-1689.

Allen, F., & Gale, D. (2001). *Comparing financial systems.* Cambridge, MA:MIT Press.

Alonso, W. (1964). *Location and Land Use.* Cambridge: Harvard University Press.

Andrew, M. & Meen.G. (2003). Housing transactions and the changing decisions of young households in Britain: The microeconomic evidence. *Real Estate Economics,* 31, 117-138.

Anselin, L. (1988). *Spatial Econometrics: Methods and Models.* Dordrecht: Kluwer.

Anselin, L., & Kelejian, H. H. (1997). Testing for spatial error autocorrelation in the presence of endogenous regressors. *International Regional Science Review,* 20(1&2), 153-182.

Aoki, K., Proudman, J., & Vlighe, G. (2004). House prices, consumption, and monetary policy: a financial accelerator approach. *Journal of Financial Intermediation,* 13, 414-435.

Arestis, P. (2017). House price overvaluation in Hong Kong: Identifying the market fundamentals and understanding the "Bubbles". *International Journal of Housing Markets and Analysis*, 10(2), 282-304.

Arrow, K. J. (1982). Risk perception in psychology and economic. *Economic Inquiry,* 20(1), 1-9.

Ashley, R.A., & Patterson, D.M. (2006). Evaluating the effectiveness of state-switching models for U.S. real output. *Journal of Business and Economics Statistics*, 24(3), 266-277.

Ashworth, J., & Parker, S.C. (1997). Modelling regional house prices in the UK. *Scottish Journal of Political Economy*, 44(3), 225-246.

Ayuso, J., & Restroy, F. (2003). House prices and rents: An equilibrium asset pricing approach. *Journal of Empirical Finance, 13*, 371-388.

Ball, L., & Mankiw, N. G. (1994). Asymmetric price adjustment and economic fluctuations. *The Economic Journal,* 104, 247-261.

Barros, C., Gil-Alana, L. A., & Payne, J. (2012). Comovement among U.S. state housing prices: Evidence from fractional cointegration. *Economic Modelling,* 29, 936-942.

Beck, T., Demirgüc-Kunt, A, & Merrouche,O. (2013). Islamic vs Conventional banking: Business model, efficiency and stability. *Journal of Banking and Finance*, 37(2), 433-447.

Beenstock, M., & Felsenstein, D. (2007). Spatial Vector Autoregressions. *Spatial Economic Analysis,* 2(2), 167-196.

Benassy, J.P. (2004). Competitiveness, market power and price stickiness: A paradox and a resolution (CEPREMAP). Retreived from http://idei.fr/sites/default/files/medias/doc/conf/mac/papers_2005/benassy.pdf

Benson, E. D., L, H. J., Schwartz Jr, A. L., & Smersh, G. T. (1997). The influence of Canadian Investment on U.S Residential Property Values. , Vol.13, No.3. *Journal of Real Estate Research,* 13(3), 231-249.

Benson, E. D., L, H. J., Schwartz Jr, A. L., & Smersh, G. T. (1999). Canadian/ U.S. exchange rates and nonresident investors: Their influence on residential property. *Journal of Real Estate Research,* 18(3), 433-461.

Bernanke, B., & Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives,* 9(4), 27-48.

Bernstein, P.L. (1996). Dividens: The puzzle. *Journal of Applied Corporate Finance*, 9(1), 16-22.

BNM. (2002). *Bank Negara Malaysia annual report 2002.* Retrieved from http://www.bnm.gov.my/files/publication/ar/en/2002/ch04.pdf

Bogart,W.T. (1998). *The economics of cities and suburbs*. US: Prentice Hall

Bongini, P., Claessens, S., & Ferri, G. (2001). The political economy of distress in East Asian financial institutions. *Journal of Financial Services Research,* 19(1), 5-25.

Borgy, V., Clerc, L., & Renne, J. (2014). Measuring aggregate risk: can we robustly identify asset price boom and bust cycle? *Journal of Banking and Finances*, 46, 132-150.

Borio, C., & Lowe, P. (2002). *Assessing the risk of banking crises.* BIS Quarterly Review,Dec 2002. Retrieved from https://www.bis.org/publ/qtrpdf/r_qt0212e.pdf

Bowden R.J. (1980). *Equilibrium and disequilibrium in models of the housing market: a survey.* National Housing Economics Conference 1978, Australian Government Publishing Service (AGPS)

Boyd, J. H. & De Nicolo, G. (2005). The theory of bank risk taking and competition revisited. *The Journal of Finance*, 60(3), 1329-1343.

Brock. A., Dechert, W.D., Scheinkman, J.A., & LeBaron, B. (1996). A test for independence based on the correlation dimension, *Econometric Review*, 153, 197-235.

Brock, W., & Sayers, C. (1988). Is the business cycle characterized by deterministic chaos? *Journal of Monetary Economics,* 22, 71-90.

Burdekin, R. C., & Tao, R. (2014). Chinese real estate market performance. *The Chinese Economy,* 2, 5-26.

Calomiris, C. W., & Mason, J. R. (2003a). Consequences of bank distress during the Great Depression. *American Economic Review,* 93(3), 937-947.

Calomiris, C. W., & Mason, J. R. (2003b). Fundamentals, panics, and bank distress during the depression. *American Economic Review,* 93(5), 1615-1647.

Calvo,G. (1983). Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics*, 12, 383-398.

Campbell, J. Y., & Cocco, J. F. (2007). How do house prices affect consumption? Evidence from micro data. *Journal of Monetary Economics,* 54(3), 591-621.

Can, A. (1990). The measurement of neighbourhood dynamics in urban house prices. *Economic Geography*, 6(3), 254-272.

Can, A. (1992). Specification and estimation of hedonic housing price models. *Regional Science and Urban Economics*, 22(3), 453-474.

Canarella,G., Miller, S. & Pollard, S. (2012). Unit roots and structural change: an application to US house price indices. *Urban Studies*, 49, 757-776.

Case, B., Wachter, S. (2003). *Real estate price indexes as financial soundness indicators: methodological issues*. Paper presented at the IMF/BIS conference on real estate indicators and financial stability, Washington. Switzerland, Bank of International Settlements.

Case, K. E., Shiller, R. J., & Quigley, J. M. (2005). Comparing wealth effects: The stock market versus the housing market. *Advances in Macroeconomics,* 5(1), 1235-1235.

Cebula, R., Koch, J., & Fenili, R. (2011). The bank failure rate, economic conditions and banking statutes in the U.S., 1970–2009. *Atlantic Economic Journal,* 39(1), 39-46.

Chandler,D., & Disney,R. (2014). *Measuring house prices: A comparison of different indices* (Briefing Note BN146). Institute of Fiscal Studies. https://www.ifs.org.uk/bns/bn146.pdf. Accessed 8 June 2017.

Checherita, C., & Rother, P. (2010). *The impact of high and growing government debt on economic growth: An empirical investigation for the euro area* (*ECB Working Paper Series*, No. 1237). Retrieved from European Central bank website: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1237.pdf

Chen, J., Guo, F., & Zhu, A. (2010). The housing-led growth hypothesis revisited: Evidence from the Chinese Provincial Panel Data. *Urban Studies,* 48(10), 2049-2067.

Chen, N-K. (2001). Bank net worth, asset prices and economic activity. *Journal of Monetary Economics*, 48, 415-436.

Chen, P.-F., Chien, M.-S., & Lee, C.-C. (2011). Dynamic modeling of regional house price diffusion in Taiwan. *Journal of Housing Economics, 20*, 315-332.

Chen, Y.(2013). New approach for calculating Moran's index of spatial autocorreltion. *PLoS ONE,*8(7): e68336. https://doi.org/10.1371/journal.pone.0068336.

Chien, M.-S. (2010). Structural breaks and the convergence of regional house prices. *Journal Real Estate Financial Economic,* 40, 77-88.

Clapp, J.M., & Giacotto, C. (1994). The influence of economic variables on local house price dynamics. *Journal of Urban Economics*, 36(2), 161-183

Clapp, J. M., & Tirtiroglu, D. (1994). Positive feedback trading and diffusion of asset price changes: Evidence from housing transactions. *Journal of Economic Behavior and Organization,* 24, 337-355.

Collyns, C., & Senhadji, A. (2002). *Lending booms, real estate bubbles and the Asian crisis* (IMF Working Paper, No.WP/02/20). Retrieved from International Monetary Fund website: https://www.imf.org/external/pubs/ft/wp/2002/wp0220.pdf

Conley, T. G. (1999). GMM estimation with cross sectional dependence. *Journal of Econometrics*, 1-45.

Conley, T. G., & Topa, G. (2002). Socio-economic distance and spatial patterns in unemployment. *Journal of Applied Econometrics,* 17(4), 303-327.

Cook,S. (2003). The convergence of regional house price in the UK. *Urban Studies,* 40(11), 2285-2294.

Cook, S. (2005). Regional house price behaviour in the UK: application of a joint testing procedure. *Physica A: Statistical Mechanics and its Applications,* 345(3-4), 611-621.

Cook, S., & Thomas, C. (2003). An alternative approach to examining the ripple effect in UK house prices. *Applied Economics Letters,* 10, 849-851.

Costello, G., Fraser, P., & MacDonald, G. (2014). Monetary policy influences in Australian housing markets. *International Journal of Housing Markets and Analysis,* 8(2), 265-286.

Crockett, A. (1997). *The Theory and Practice of Financial Stability.* Princeton, NJ: Princeton University.

Cushman & Wakefield. (2017). *China now Malaysia's largest foreign real estate investor*. Retrieved from: http://www.cushmanwakefield.sg/en-gb/news/2017/03/2017-china-now-malaysias-largest-foreign-real-estate-investor/

Daglish, T. (2009). What motivates a subprime borrower to default? *Journal of Banking and Finance,* 33, 681-693.

Davis,S.J. (1987). Fluctuations in the pease of labor reallocation. *Carnegie-Rochester Conference Series on Public Policy*, 27, 335-402.

Davis, E. P. (2001). *Multiple channels of intermediation, corporate finance and financial stability* (IMF Working Paper , 01/115). Retrieved from International Monetary Fund website: https://www.imf.org/external/pubs/ft/wp/2001/wp01115.pdf

Davis, E., & Karim, D. (2008). Comparing early warning systems for banking crises. *Journal of Financial Stability,* 4, 89-120.

DeLong, J. B., Andrei, S., Lawrence, H. S., & Robert, J. W. (1990). Positive feedback investment strategies and destabilizing rational speculation. *Journal of Finance,* 45(2), 379-395.

Demirgüc-Kunt, A., & Detragiache, E. (1998). *Financial liberalization and financial fragility* (IMF Working Paper , WP98/83). Retrieved from International Monetary Fund website: https://www.imf.org/external/pubs/ft/wp/wp9883.pdf

Deutsche, B. (2003). *Report on the stability of system.* Monthly Report, December.

De Wit, E., Englund, P., & Francke, M.K. (2013). Price and transaction volume in the Dutch housing market. *Regional Science and Urban Economics*, 43(2), 220-241.

Dhar, S., & Bakshi, A. (2015). Determinants of loan losses of Indian banks: a panel study. *Journal of Asia Business Studies,* 9(1), 17 - 32.

DiPasquale, D., & Wheaton, W. (1992). The markets for real estate assets and space: a conceptual framework. *Journal of American Real Estate and Urban Economics Association,* 20(1), 181-197.

DiPasquale, D., & Wheaton, W. (1996). *Urban economics and real estate market.* Prentice-Hall incorporated: New Jersey.

Dolado,J.J., Jenkinson, T., & Sosvilla-Rivero, S. (1990). Co-integration and unit roots. *Journal of Economic Survey*, 4(3), 249-273.

Dougherty, A., & Van Order, R. (1982). Inflation, housing costs, and the consumer price index. *The American Economic Review,* 72(1), 154-164.

Duffy, D., FitzGerald, J.D., & Ida,K. (2005). *Rising house price in an open labour market.* (ESRI, Working Paper). Retrieved from The Economic and Social Research Institute website: https://core.ac.uk/download/pdf/6239738.pdf

Eisdorfer, A. (2008). Empirical evidence of risk shifting in financially distressed firms. *The Journal of Finance,* 2, 609-637.

Ellis, L. (2005). Disinflation and the dynamics of mortgage debt. BIS paper chapters, in: Bank International Settlements (ed.), *Financial system and the real economy*, 22, 5-20.

Engle,R.F.(1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica*, 50, 987-1007.

Engle,R.F.,& Granger, C.W.J. (1987). Co-integration and error correction: Representation, estimation and testing. *Econometrica*, 55(2), 251-276.

Englund,P., Gordon, T.M.,& Quigley, J.M. (1999). The valuation of real capital: a random walk down Kungsgatan. *Journal of Housing Economics*, 8, 205-216.

Estrella, A., Park, S., & Peristiani, S. (2000). Capital ratio as predictors of bank failure. *Economic Policy Review*, 6(2), 33-52.

Falk, B. (1986). Further evidence on the asymmetric behavior of economic time series over the business cycle. *Journal of Political Economy,* 94, 1096-1109.

Farmer, R.E.A. (1991). Sticky Prices. *The Economic Journal,* 101, 1369-1379

Fereidouni, H. G., Al-Mulali, U., Lee, J. Y., & Mohammed, A. H. (2014). Dynamic Relationship between Housing Price in Malaysia's Major Economic Region and Singapore House Price. *Regional Studies Association*, 1-14.

Ferguson, R.W.Jr. (2002). *Should financial stability be an explicit central bank objective?* Challenges to Central Banking from Globalized Financial Systems Conference, IMF, Washington, D.C. Retrived from https://www.imf.org/external/pubs/ft/seminar/2002/gfs/eng/ferguson.pdf

Fisher, E.M., & Fisher, R.M. (1954). *Urban real estates*. (Henry Holt, New York).

Fisher, J. D. (1992). Integrating research on markets for space and capital. *Journal of American Real Estate and Urban Economics Association,* 20(1), 161-180.

Foot, M. (2003). What is 'Financial Stability' and how do we get it? The Royal Bridge Memorial Lecture, London, Financial Service Authority, April 3.

Friedman, M. (1957). The Permanent Income Hypothesis. In *A Theory of the Consumption Function* (pp. 20-37). Princeton University Press.

Gao, A., Lin, Z, Na, C.F. (2009). Housing market dynamics: Evidence of mean reversion and downward rigidity. *Journal of Housing Economics*, 18(3), 256-266.

Gimeno,R., & Martinez-Carrascal,C. (2010). The relationship between house prices and house purchase loans: The Spanish case. *Journal of Banking and Finance*, 34(8), 1849-1855.

Gennaioli, N., & Shleifer, A. (2010). What comes to mind. *Quarterly Journal of Economics,* 125(4), 1399–1433.

Gennaioli, N., Shleifer, A., & Vishny, R. (2012). Neglected risks, financial innovation, and financial fragility. *Journal of Financial Economics,* 104(3), 452–468.

Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability,* 20, 93-104.

Giacomini,R., & Granger C.W.J. (2004). Aggregation of space-time processes, *Journal of Econometrics*, 118, 7-26.

Gillen, K., Thibodeau, T.G. & Wachter, S. (2001). Anisotropic autocorrelation in house prices. *Journal of Real Estate Finance and Economics*, 23(1), 5-30.

Girouard, N., & Blöndal, S. (2001). *House prices and economic activity* (OECD Economic Department Working Paper, 279). Retrieved from OECD website: https://www.oecd-ilibrary.org/economics/house-prices-and-economic-activity_061034430132

Giussani, B., & Hadjimatheou, G. (1991). Modelling Regional House Prices in the United Kingdom. *Papers in Regional Science,* 70(2), 201–219.

Glindro, E. T., Subhanij, T., Szeto, J., & Zhu, H. (2007). *Are Asia-Pacific housing prices too high for comfort? .* Asia Research Program, Bank for International Settlements.

Goodwin, R. W. (1951). The nonlinear acceleration and the persistence of business cycles. *Econometrica,* 19(1), 1-17.

Gordon,R.J. (1990). What is new-Keynesian economics? J*ournal of Economic Literature,* 1115-1171,

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica,* 37(3), 424-438.

Granger, C.W. & Newbold,P. (1974). Spurious regression in Econometrics. Journal of Econometrics, 2(2), 111-120.

Grether, D. M. (1992). Testing bayes rule and the representativeness heuristic: Some experimental evidence. *Journal of Economic Behavior and Organization,* 17(1), 31-57.

Gupta, R., & Miller, S. (2012). "Ripple effects" and forecasting home prices in Los Angeles, Las Vegas, and Phoenix. *The Annals of Regional Science,* 48, 763-782.

Helbling, T., & Terrones, M. E. (2003). Real and financial effects of bursting asset price bubbles. *IMF World Economic Outlook*.

Henderson, J., & Phillips, R. (2007). Unintended consequences: social policy, state institutions and the 'stalling' of the Malaysian industrialization project. *Economy and Society,* 36(1), 78-102.

Hicks, J. R. (1950). *A contribution to the theory of trade cycle.* Oxford: Oxford University Press.

Hii, W., Ismail, A. L., & Annuar, M. N. (1999). Lead-lag relationship between housing and gross domestic product in Sarawak. . *The International Real Estate Society Conference.*

Hilbers, P.,Lei,Q., & Lisbeth, Z. (2001). *Real estate market developments and financial sector soundness* (IMF Working Paper, No.01/129). Retrieved from International Monteary Fund website: https://www.imf.org/external/pubs/ft/wp/2001/wp01129.pdf

Hoelscher, D. (2006). *Bank restructuring and resolution.* International Monetary Fund: Monetary and Financial System.

Holly, S., & Jones, N. (1997). House prices since the 1940s: Cointegration, demograph yand asymmetries. *Economic Modelling,* 14, 549-565.

Holly, S., Pesaran, M., & Yamagata, T. (2011). The spatial and temporal diffusion of house prices in the UK. *Journal of Urban Economics,* 69, 2-23.

Holmans, A. (1990). *House price changes through time at national and sub-national level* (Government Economic Service Working Paper, 110). London: HMSO.

Hort, K. (2000). Price and turnover in the market for owner-occupied homes. *Regional Science and Urban Economics*, 30(1), 99-119.

Hsiao, C. (2007). Panel data analysis- advantages and challenges. *Test,* 16(2), 1-22.

Hurlin, C., & Venet, B. (2001). *Granger causality tests in panel data models with fixed coefficients* (Eurisco *Working Paper*, 2001-09). Paris: University Paris IX Dauphine.

Hviid, S.J. (2017). *A regional model of the Danish housing market.* (Danmarks National Bank Working Paper No.121). Retrieved from Danmarks National bank's website: https://www.nationalbanken.dk/da/publikationer/Documents/2017/11/WorkingPaper_nr121.pdf

Iacoviello, M. (2005). House prices, borrowing constraints and the monetary policy in the business cycle. *American Economic Review, 95*(3), 739-764.

Ibrahim, M. H., & Law, S. H. (2014). House prices and bank credits in Malaysia : An aggregate and disaggregate analysis, *Habitat International*, 42, 111–120.

Im, K.S., Pesaran, M.H., & Shin, Y. (2003). Testing for unit roots in heterogenous panels. *Journal of Econometrics*, 115, 53-74.

Inglesi-lotz, R., & Gupta, R. (2013). The long-run relationship between house prices and inflation in South Africa: an ARDL approach. *International Journal of Strategic Property Management,* 17(2), 188-198.

Jacobsen, D. H., & Naug, B. E. (2005). *What drives house prices?* Norges Bank Economic Bulletin. Retrieved from http://www.norges-bank.no/Upload/import/english/publications/economic_bulletin/2005-01/jacobsen.pdf.

Jensen, M., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics ,* 3(4), 305-360.

Johansen, S., & Juselius. (1990). Maximum likelihood estimation and inference on cointegration and applications to demand for money. *Oxford Bulletin of Economics and Statistics*, 52, 169-210.

Johnes, G., & Hyclak, T. (1994). House prices, migration and regional labour market. *Journal of Housing Economics*, 3, 312-329.

Joseph, B.L., Harvey, J.T., & Hunt, H. (2003). Exchange-rate risk mitigation with price-level-adjusting mortgages: The case of Mexican UDI. *Journal of Real Estate Research*, 25(1), 23-41.

Kain, J.F., & Quigley,J.M. (1975). A theory of urban housing markets and spatial structures. In *Housing markets and racial discrimination: A microeconomic analysis* (pp.9-55).New York, NY: National Bureau Economic of Research.

Kaminsky, G., & Reinhart, C. (1999). The twin crises: The causes of banking and balance-of-payments problems. *The American Economic Review,* 89(3), 473-500.

Katrakilidis, C., & Trachanas, E. (2012). What drives housing price dynamics in Greece: New evidence from asymmetric ARDL cointegration. *Economic Modelling,* 29, 1064-1069.

Karantininis K, Katrakylidis K, Persson, M. (2011). *Price transmission in the Swedish pork chain: Asymmetric non linear ARDL*, EAEE, 2011 Congress, Zurich, Switzerland.

Keeton, W. (1999). Does faster loan growth lead to higher loan losses? *Economic Review,* 84(2), 57-75.

Kelejian, H. H., & Prucha, I. R. (1999). Generalized Moments Estimator for the Autoregressive Parameter in a Spatial Model. *International Economic Review,* 40, 509-533.

Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money.* Cambridge: Macmillan Cambridge University Press.

Kim, K. H. (2012). Real estate volatility and macroeconomic stability: An East Asian persepctive. Paper presented at 6th International Real Estate Research Symposium, April 24-25, INSPEN 2nd Campus, Selangor, Malaysia.

Kim, S.-W., & Bhattacharya, R. (2009). Regional housing prices in the USA: An empirical investigation of nonlinearity. *Journal of Real Estate Finance Economics,* 38, 443-460.

Kindleberger, C. P. (2000). *Manias, Panics, and Crashes: A history of financial crisis.* (4th ed.). New York: John Wiley & Sons.

Kiyotaki, N., & Moore, J. (1997). Credit Cycles. *Journal of Political Economy, 105*(2), 211-247.

Klein, N. (2013). *Non-performing loans in CESEE: Determinants and impact on macroeconomic performance* (IMF Working Paper, 13/72). Retrieved from International Monetary Fund website: https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Non-Performing-Loans-in-CESEE-Determinants-and-Impact-on-Macroeconomic-Performance-40413

Koh, S.Y. (2017). *Race, education, and citizenship: Mobile Malaysians, British colonial legacies, and a culture of migration.* US: Palgrave Macmillan

Koudstaal, M.,& van Wijnbergen, S.(2012). *On risk, leverage and banks: Do highly leveraged banks take on excessive risk?* (Tinbergen Institute Discussion Paper TI 12-022/2/DSF31). Retrieved from Duisenberg School of Finance, SSRN website: http://dx.doi.org/10.2139/ssrn.2170008

Koetter, M., & Poghosyan, T. (2010). Real estate prices and bank stability. *Journal of Banking and Finance,* 34, 1129-1138.

Kuang, W., & Liu, P. (2015). Inflation and house prices: Theory and evidence from 35 major cities in China. *International Real Estate Review,* 18(1), 217-240.

Leamer, E. E. (2007). *Housing is the business cycle* (NBER Working Paper, No.13428). Retrieved from National Bureau Economic Research website: https://www.kansascityfed.org/publicat/sympos/2007/PDF/Leamer_0415.pdf

Lean, H., & Smyth, R. (2013). Regional house prices and ripple effect in Malaysia. *Urban Studies,* 50(5), 895-922.

Lee, L. S., Choong, W. W., & R, R. B. (2010). Ten years review of Malaysia My Second Home Programme (MM2H). *International Real Estate Research Symposium.* Kuala Lumpur, Malaysia.

Lepetit, L., Nys, E., Rous, P., & Taraz, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal of Banking & Finance,* 32, 1452–1467.

LeSage, J., & Pace, R. K. (2009). *Introduction to Spatial Econometrics.* Florida: CRC Press/Taylor and Francis.

Leung, C.K.Y. (2003). Economic growth and increasing house prices. Pacific Economic Review, 8(2), 183-190.

Levin, A., Lin, C.F., & Chu, C.S.J. (2002). Unit root test in panel data: Asymptotic and finite-sample propeties. *Journal of Econometrics*, 108, 1-24.

Li, Y.J.(2015). *Geography of crime in China since the economic reform of 1978: A multi scale analysis*.UK: Cambridge Scholar Publishing

Lind, J. T., & Mehlum, H. (2010). With or Without U? The appropriate test for a U-Shaped relationship. *Oxford Bulletin Economics Statistics,* 72(1), 109-118.

Lipscomb, B, J., Harvery, J. T., & Hunt, H. (2003). Exchange-Rate risk mitigation with price-level-adjusting mortgages: The case of the Mexican UDI. *Journal of Real Estate Research,* 25(1), 23-42.

Liu, H., & Hu, Z. (2012). On correlation between RMB exchange rate and real estate price based on financial engineering. *Systems Engineering Procedia, 3*, 146-152.

Liu, Y.-C., & Zhang, S. (2013). Econometric Analysis on the Relationship Between RMB Exchange Rate and Real Estate Price by VAR Model. *2nd International Conference on Science and Social Research* (pp. 428-430). Beijing, China: Atlantis Press.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance, 36*, 1012-1027.

Ma, L., & Liu, C. (2013). Ripple effects of house prices: considering spatial correlations in geography amd demography. *International Journal of Housing Markets and Analysis,* 6(3), 284-299.

Madsen, J. B. (2012). A behavioral model of house prices. *Journal of Economic Behavior & Organization,* 82, 21-38.

Mahadi, Z., Mohamad, R.J., & Sino.H. (2017). Public development sustainability values: A case study in Sepang Malaysia. *Akamedika*, 87(2), 31-44.

Mahalik, M.K., &Mallick, H. (2011). What causes asset price bubble in an emerging economy? Some empirical evidence in the housing sector of India. *International Economic Journal*, 25(2), 215-237.

Martinez-Pages, J., & Maza, L.A.(2003). *Analysis of house prices in Spain* (Banco de Espana Working paper 0307). Retrieved from Bank of Spain website: https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosTrabajo/04/Fic/dt0421e.pdf

Mayer, C., Pense, K., & Sherlund, S.M. (2009). The rise in mortgage default. *Journal of Economic Perspective,* 23(1), 27-50.

Mc Donald, J. F., & Stokes, H. H. (2013). Monetary policy, mortgage rates and the housing bubble. *Economics & Finance Research,* 1(1), 82-91.

McLeod, A.I., & Li, W.K.(1983). Diagnostic checking ARMA time series model using squared-residual autocorrelations. *Journal of Time Series Analysis*, 4, 269-273.

McQueen, G., & Thorley, S. (1993). Asymmetric business cycle turning points. *Journal of Monetary Economics,* 31, 341-362.

Meen, G. (1999). Regional house prices and ripple effects: a new interpretation. *Housing studies,* 14(6), 335-346.

Meidani, A.A.N., Zabihi, M., & Ashena, M. (2011). House prices, economic output and inflation interactions in Iran. *Research in Applied Economics*, 3(1), 1-12.

Messai A, S., & Gallali, M. (2015). Financial Leading Indicators of Banking Distress: A Micro Prudential Approach - Evidence from Europe. *Asian Social Science,* 11(21), 78-90.

Miller, N., Peng,L.,& Slarz,M.A. (2011). House prices and economic growth. *Journal of Real Estate Finance Economic,* 42, 522-541.

Miller, N. G., Sklarz, M. A., & Ordway, N. (1988). Japanese purchases, exchange rates and speculation in residential real estate markets. *Journal of Real Estate Research, 3*(3), 39-49.

Minsky, H. P. (1982). Can "it" happen again? Essays on instability and finance. *Journal of Economic Issues,* 18(4), 1260-1262.

MISIF (2016). *Country Report-Malaysia*. Retrieved from: http://seaisi.org/seaisi2017/file/file/full-paper/Malaysia%20Country%20Report.pdf

Mishkin, F. S. (1999). Lessons from the Asian crisis. *Journal of International Money and Finance*, 18(1999), 709-723.

Moinescu, B-G. (2012). Determinants of nonperforming loans in Central and European Countries: Macroeconomics Indicators and Credit Discipline. *Review of Economic and Business Studies*, 5(2), 47-58.

Moran, P. (1950). A test for serial independence of residuals. *Biometrika*, 37, 178-181.

Moscone, F., Tosetti, E., & Canepa, A. (2014). Real estate market and financial stability in U.S metropolitan areas: A dynamic model with spatial effects. *Journal of Regional Science and Urban Economics,* 49, 129-146.

Muellbauer, J., & Murphy, A. (1994). *Explaining regional house prices in the UK*. (UCD Working paper W P94/21). Retrieved from University College Dublin Centre for Economic Research website: http://hdl.handle.net/10197/1764

NAPIC (2016). *Residential property stock table Q4 2016*. Putrajaya, KL: NAPIC.

Narayan, P. (2006). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics,* 37(17), 1979-1990.

Neftci, S. (1984). Are economic time series asymmetric over the business cycle? . *Journal of Political Economy, 92*(2), 307-328.

Nelson,C.R.,& Plosser,C.R.(1982). Trends and random walks in macroeconomic time series: Some evidence and implications. *Journal of Monetary Economics,* 10(2), 139-162.

Newey,W., & West, K.D. (1987). A simple,positive semi-definite, heteroscedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55(3), 703-708.

Ng,K.K., & Lim. G. (2017). Beneath the venner: The polictical economy of housing in Iskandar Malaysia, Johor. In *Trends in South East Asia* (pp.1-28). Singapore: ISEAS.

Niinimaki, J.-P. (2009). Does collateral fuel moral hazard in banking? *Journal of Banking and Finance,* 33, 514-521.

Nkusu, M. (2011). *Non-performing loans and macrofinancial vulnerabilities in advanced economies* (IMF Working Paper, 11/161).Retrieved from International Monetary website : https://www.imf.org/external/pubs/ft/wp/2011/wp11161.pdf

Norris, M., & Coates, D. (2014). How housing killed the Celtic tiger: anatomy and consequences of Ireland's housing boom and bust. *Journal of Housing and the Built Environment*, 29(2), 299-315.

O'Sullivan, A. (2009). *Urban economics.* Singapore: the McGraw-Hill Companies.

Oikarinen, E. (2012). Empirical evidence on the reaction speeds of housing prices and sales to demand shocks. *Journal of Housing Economics,* 21, 41-54.

Ong, T. S., & Chang, Y. S. (2013). Macroeconomic determinants of Malaysian housing market. *Human and Social Science Research,* 1(2), 119-127.

Panagiotidis,T.,& Printzis, P. (2015). *On the macroeconomic determinants of the housing market in Greece: A VECM approach* (GreeSE Paper No.88). Retrieved from European Institute Research website: http://www.lse.ac.uk/europeanInstitute/research/hellenicObservatory/CMS%20pdf/Publications/GreeSE/GreeSE-No88.pdf

Pan, H., & Wang, C. (2013). House prices, bank instability, and economic growth: Evidence from the threshold model. *Journal of Banking & Finance,* 37, 1720-1732.

Perron, P. (1989). The great crash, the oil price shock and the unit root hypothesis. *Econometica*, 57(6), 1361-1401.

Perron, P. (1997). Further evidence of breaking trend functions is macroeconomic variables. *Journal of Econometrics*, 80(2), 355-385.

Pesaran, M. H., & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In *Storm, S. (Ed.), Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Cambridge: Cambridge University Press.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationship. *Journal of Applied Econometrics,* 16, 289-326.

Phillips, P.C.B.,& Hansen, B.E. (1990). Statistical inference in instrumental variables regressions with I(1) process. *Review of Economic Studies*, 57, 99-125.

Phillips, P.C.B, & Perron, P.(1988). Tesing for a unit root in time series regression. *Biometrika*, 335-346.

Pillaiyan, S. (2015). Macroeconomic drivers of house prices in Malaysia. *Canadian Social Science*, 1(9), 119–130

Pollakowski, H. O., & Ray, T. S. (1997). Housing price diffusion patterns at different aggregation levels: An examination of housing market efficiency. *Journal of Housing Research,* 8(1), 107-124.

Posedel, P., & Vizek, M. (2011). Are house prices charaterized by threshold effects? Evidence from developed and post-transition countries. *Journal of Economics and Finance,* 61(6), 586-600.

MyCC (2017). *Market review of building materials in the construction industry under competition Act 2010.* Retrieved from: http://www.mycc.gov.my/sites/default/files/media-review/Market%20Review%20of%20Building%20Materials%20in%20the%20Construction%20Industry_0.pdf

Reilly, B., & Witt, R. (1993). Regional House Prices and Possessions in England and Wales: An Empirical Analysis. , vol. 28,. *Regional Studies,* 28, 475-482.

Reinhart, K. S. (2008). Banking Crises: An Equal Opportunity Menace. *Journal of Banking & Finance* , 4557-4573.

Reinhart, K. S., & Rogoff, K.S. (2008). *This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises* (NBER Working Paper No. 13882). Retrieved from National Bureau of Economic Research website: http://www.nber.org/papers/w13882

Rojas-Suarez, L. (2002). Rating banks in emerging market: What credit rating agencies should learn from financial indicators. In: Levich R.M., Majnoni G., Reinhart C.M. (eds) *Ratings, Rating Agencies and the Global Financial System*. The New York University Salomon Center Series on Financial Markets and Institutions, 9, Springer, Boston, MA. doi.org/10.1007/978-1-4615-0999-8_11

Ross, S. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory,* 13, 341-360.

Rotemberg,J.J. (1982). Monopolistic price adjustment and aggregate output. *The Review of Economic Studies*, 49(4), 517-531.

Salas, V., & Saurina, J. (2002). Credit Risk in Two Institutional Regimes: Spanish Commercial and Savings Banks. *Journal of Financial Services Research,* 22(3), 203-224.

Salman, K. (2011). Using the SUR model of tourism demand for neighbouring regions in Sweden and Norway. In Advances in Econometric- Theory and Applications(pp.97-116). Rijeka, Croatia: InTech.

Sarantis, N. (2001). Nonlinearitis, cyclical behavior and predictability in stock markets: International evidence. *Internatial Journal of Forecasting,* 17(3), 459-482.

Sarath, D., & Pham, D. (2015). The determinants of Vietnamese bank's lending behavior: A theoretical model and empirical evidence. *Journal of Economic Studies,* 42(5), 861-877.

Schabenberger, O & Gotway, C.A .(2005). *Statistical Methods for Spatial Data Analysis*, Boca Raton: Chapman and Hall.

Segoviano, M. A., & Goodhart, C. (2009). *Banking stability measures* (IMF Working Paper , No.WP/09/04). Retrieved from International Monetary website: https://www.imf.org/external/pubs/ft/wp/2009/wp0904.pdf

Sheldon, G. (1996). Capital asset ratios and bank default probabilities: An international comparison based on accounting data. *Swiss Journal of Economics and Statistics* , 132(4/2), 709-734.

Shi, S., Jou, J.-B., & Tripe, D. (2014). Can interest rates really control house prices? Effectiveness and implications for macroprudential policy. *Journal of Banking and Finance,* 47, 15-18.

Shi,S.,Yang,Z.,& Zhang,H. (2015). Uncertainty and new appartment price setting: A real options approach. *Pacific-Basin Finance Journal*, 35, Part B, 574-591.

Shi, S., Young, M., & Hargreaves, B. (2009). The ripple effect of local house price movement in New Zealand. *Journal of Property Research,* 26(1), 1-24.

Shiller, R. J. (1990). Speculative prices and popular models. *The Journal of Economic Perspectives,* 4(2), 55-65.

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2013). 2013. Modelling Asymmetric Cointegration and Dynamic Multiplier in a Nonlinear ARDL Framework. In *Horrace , William,C., Sickles, Robin.C.(Eds.), Festschrift in Honor of Peter Schmidt.* New York: Springer Science & Business Media.

Sichel, D. (1989). Are busincess cycle asymmetric? A correction. *Journal of Political Economy,* 97, 1255-1260.

Signorelli, J.N. (2014). *Modelling the ripple effects of prices in the Melbourne housing market* (Bachelor Degree Dissertation). Retrieved from https://www.business.unsw.edu.au/About-Site/Schools-Site/Economics-Site/Documents/JSignorelli_Thesis.pdf

Simo-Kengne,B.D., Gupta, R.,& Bittencourt M. (2013).The impact of house prices on consumption in South Africa: Evidence from provincial-level panel VARs. *Journal of Housing Studies,* 28*(8)*, 1133-1154.

Sims, C. (1980). Macroeconomics and reality. *Econometrica,* 58, 1-48.

Sirmans, S., Macpherson, D., & Zietz, E. (2005). The composition of hedonic pricing models. *Journal of Real Estate Literature, 13*, 1-44.

Smith, A. (1759). *The theory of moral sentiments.* London: A. Millar .

Soh,J.M., Chong,A., & Chuah, K-P. (2017). Household credit, growth, and inequality in Malaysia: Does the type of credit matter? BIS paper chapters, in: Bank International Settlements (ed.), *Financial system and the real economy*, 91, 39-59.

St. Clair, R. (2004). *Macroeconomic determinants of banking financial performance and resilence in Singapore* (MAS Staff Paper No.38). Retrieved from Monetary of Authority Singapore website: http://www.mas.gov.sg/~/media/resource/publications/staff_papers/MAS_Staff_Paper_No_38_RSTC_V3.pdf

Stevenson, S. (2004). House price diffusion and inter-regional and cross-border house price dynamics. *Journal of Property Research ,* 21(4), 301-320.

Sutton, G. D. (2002, September). *Explaining changes in house prices.* Bank for International Settlements. BIS Quarterly Review. Retrieved from http://www.bis.org/publ/r_qt0209f.pdf.

Taylor, A. M., (2001). Potential pitfalls for the purchasing power parity puzzle? Sampling and specification biases in mean reversion tests of the law of one price. *Econometrica,* 69, 473-498.

Terrones, M., & Otrok, C. (2004). *The global house price boom.* IMF World Economic Outlook.

Tirtiroglu, D. (1992). Efficiency in housing market: temporal and spatial dimensions. *Journal of Housing Economics,* 2, 276-292.

Tobin, J. (1972). Inflation and unemployment. *American Economic Review*, 1-18.

Tsai, I.-C. (2013). The asymmetric impacts of monetary policy on housing prices: A viewpoint of housing price rigidity. *Economic Modelling*, 31, 405-413.

Tsai, I.-C. (2014). Ripple effect in house prices and trading volume in the UK housing market: New viewpoint and evidence. *Economic Modelling,* 40, 68-75.

Tsai, I.-C. (2015). Monetary policy and bubbles in the national and regional UK housing. *Urban Studies,* 52(8), 1471-1488.

Tsatsaronis, K., & Zhu, H. (2004). *What drives housing price dynamics: cross country evidence.* Bank for International Settlements, BIS Quarterly Review. Retrieved from https://www.bis.org/publ/qtrpdf/r_qt0403f.pdf

Tsay, R.S. (1986). Nonlinearity tests for time series. *Biometrika*, 73, 461-466.

Tse, C.-B., Rodger, T., & Niklewski, J. (2014). The 2007 financial crisis and the UK residential housing market: Did the relationship between interest rates and house prices change? *Journal of Economic Modelling, 37*, 518-530.

Tu, Y. (2004). The dynamics of the Singapore private housing market. *Urban Studies,* 41(3), 605-619.

Tu, Y., Yu, S. and Sun, H., (2004). Transaction-based office price indexes: A spatiotemporal modeling approach. *Real Estate Economics*, 32(2), 297-328.

United Nation Statistic Data (2016). *Commodity trade statistic database*. Retrieved April 10, 2018, from United Nation Statistic Data Online database.

Vansteenkiste, I., & Hiebert, P. (2011). Do house price developments spillover across euro area countries? Evidence from a global VAR. *Journal of Housing Economics,* 20, 299-314.

Vogiazas, S. D., & Nikolaidou, E. (2011). Investigating the Determinants of Nonperforming Loans in the Romanian Banking System: An Empirical Study with Reference to the Greek Crisis. *Economics Research International*, 1-13.

von Peter, G. (2009). Asset prices and banking distress: A macroeconomic approach. *Journal of Financial Stability,* 5, 298-319.

Ward, MD & Gleditsch, K. (2008). *Spatial Regression Models*. London: SAGE.

Warren, M., McGeoach, M.A., & Chown, S.L.(2009). The detection of spatial structure in populations and communities: An empirical case study. *Ecoscience*, 16(1), 95-110.

Weeken, O. (2004). *Asset pricing and the housing market.* Bank of England Quarterly Bulletin, Spring.

Whitehead, C. M. (1971). A model of the UK housing market. *Bulletin of the Oxford University Institute of Economics & Statistics,* 33(4), 245-266.

Whittle, P. (1954). On stationary processes in the plane. *Biometrika, 41*, 434-449.

Wingo, L. J. (1961). *Transportation and Urban Land Use.* Washington, DC: The Johns Hopkins Press.

Wood, R. (2003). *A comparison of UK residential house price indices*. Paper presented at the IMF/BIS conference on real estate indicators and financial stability, Washington. Switzerland, Bank of International Settlements.

World Bank. (2005). *Malaysia: Firm competitiveness, Investment Climate and Growth.*

Wu, J.L. & Lee, H.Y. (2009). A revisit to the non-linear mean reversion of real exchange rates: evidence from a series-specific non-linear panel unit-root test. *Journal of Macroeconomics*, 31, 591-601.

Yang, Z., G. Aydin, V. Babich, and D. R. Beil. (2012). Using a dual-sourcing option in the presence of asymmetric information about supplier reliability: Competition vs. diversification.” *Manufacturing and Service Operations Management* ,14 (2), 202–217.

Yusof, Z. A., & Bhattasali, D. (2008). *Economic Growth and Development in Malaysia:Policy Making and Leadership.* (Commission on Growth and Development, Working Paper No.27). Retrieved from World Bank website: http://documents.worldbank.org/curated/en/183111468050085348/Economic-growth-and-development-in-Malaysia-policy-making-and-leadership

Zhang, C. (2013). Money, housing, and inflation in China. *Journal of Political Economy,* 35(1), 75-87.

Zhang, F., & Morley, B. (2014). The convergence of regional house prices in China. *Applied Economic Letters, 21*(3), 205-208.

Zhang,L., Hui, E.D., & Wen, H. (2017). The regional house price in China: Ripple effect or differentiation. *Habitat International*, 67, 118-128.

Zhang, Y. B., Hua, X. P., & Zhao, L. (2012). Exploring determinants of housing price: A case study of Chinese experience in 1999-2010. *Economic Modelling, 29*, 2349-2361.

Zhu, H. (2005). The importance of property market for monetary policy and financial stability. BIS papers chapters, in: Bank International Settlements (ed.), *Real estate indicators and financial stability*, 21, 9-29.

Zivot, E., & Andrews, D.W.K. (1992). Further evidence on the great crash, the oil price shock and the unit root hypothesis. *Journal of Business and Economic Statistics*, 10, 251-270.

Zou, G. L., & Chau, K. W. (2015). Determinants and sustainability of house prices: The case of Shanghai, China. *Sustainability, 7*, 4524-4548.