Inflation hedging property of housing market in Malaysia

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Abstract

This paper aims to examine the relationship between house prices and inflation to determine the inflation hedging ability of housing in Malaysian. We examine the long-run and short-run hedging ability of house prices against both consumer and energy inflation by using ARDL approach. Consumer inflation will be calculated from consumer price index while energy inflation is calculated from crude oil price. We find that, in the long-run, housing is a good hedge against consumer inflation but a poor hedge against energy inflation. In the short-run, housing is only partially hedge against energy inflation but not able to hedge against consumer inflation. The results show that housing is not a good investment asset in Malaysia.

Keywords: House prices; consumer inflation; energy inflation; hedge; Malaysia.

1. Introduction

Housing is the most expensive human needs because a large amount of money is needed for down-payment and a large proportion of income is spent on paying the instalment for housing loan. It is considered as the largest form of saving or investment for households and its value represents a person financial wea7lth. Besides serving as shelter, housing is considered as an investment good because it provides an excellent return to the homeowners in terms of rent and capital gains. Hence, housing is viewed as a good investment asset which can protect the wealth of property investors from increasing general price level. Nevertheless, Shiller (2005) disagrees that housing is a good investment because housing as consumption good needs maintenance and its real value will depreciate over time.

Historically, people invest in real estate because of its attractive return and its ability to hedge against inflation. Real estate market has lower volatility compare to equity market and the cash flows from property operation provides return on investment that grows with economy (Frankel and Lippmann, 2006). From the investment perspective, inflation risk is one of the major concerns for most property investors. This is because we cannot predict inflation with certainty. The presence of inflation could lower the real return of an investment, especially for long-term investment which has greater exposure to uncertainty in the economy (Arnott and Greer, 2006). Hence, to manage the risk of inflation, investors target assets that can effectively hedge against inflation. However, the real returns that an investment can sustain will change when inflation changes.

This study aims to examine the hedging ability of housing in Malaysia against both consumer inflation and energy inflation. During the period from 2010 to 2014, investment returns in housing surpassed the country's inflation (Table 1). Investment in residential real estate is seemed to offer greater return against the stable and low inflation rate in the country. However, Malaysian market is highly responsive to several events such as fluctuations in crude oil price and exchange rate. These events will cause unexpected changes in the general

price level and might have affected the real return of investment. For instance, oil price hikes will cause supply side inflation as a result of higher production and transportation cost. On the demand side, through the income effect, rising oil price leads to lower real disposable income and diminishes households' purchasing power (Kilian, 2008; Tsai, 2015; Breitenfellner et al., 2015). During period of rising energy inflation, investors require higher return as well to protect the purchasing power of savings.

Table 1: Annual growth in Malaysian house price index and consumer price index, 2010-2014

Annual growth (%)	2010	2011	2012	2013	2014
MHPI	6.7	9.9	11.8	11.6	10.7
CPI	1.7	3.2	1.6	2.1	3.4

Source: Bank Negara Malaysia

This paper contributes to the literature in several ways. First, in addition to consumer inflation, we also examine the hedging ability of housing against energy inflation. Considering the potential influence of oil price fluctuations on the country's general price level, we directly examine the relation between house price and oil price. Second, we present the study based on ARDL approach. Although the inflation hedging ability of Malaysian residential property has been investigated by Lee (2014), this study is based on Fama and Schwert (1977) framework to test the short-run hedging ability against expected and unexpected inflation while the long-run linkages between house prices and inflation is examined using dynamic OLS. The use of ARDL allows us to examine the long-run and short-run relationship simultaneously. Third, while Lee (2014) and Le (2015) both employs the sample period from 1999Q1 to 2012Q1 and from 1999Q1 to 2012Q3 respectively, we extend the sample period from 1999Q1 to 2015Q4. The recent oil price drops and depreciation of the Ringgit should have affected the general price level in the country and hence affect the returns of investment. As declared by Arnold and Auer (2015), the inflation is forecasted to increase in the near future resulting from the recent decrease in oil prices. In view of this, it is needed to continue monitor and understand whether housing sector in Malaysia is performing well against inflation over time.

The remainder of the paper is organized as follows. The next section provides literature review on inflation and house prices and the relationship between housing and oil markets. Section 3 discusses the data and methodology and Section 4 reports the empirical results. The last section concludes the study.

2. Literature Review

2.1 The relationship between inflation and house prices

Fama and Schwert (1977) is the first study to investigate the expected and unexpected inflation hedge of different assets such as residential real estate, bonds, treasury bills, common stock and household income. The results show that residential real estate provides a perfect hedge against both expected and unexpected inflation. Following Fama and Schwert (1977) framework, other studies in the developed countries like the U.S. and the U.K. include Rubens et al. (1989), Barkham et al. (1996), Bond and Seiler (1998), Stevenson (1999 & 2000), Anari and Kolari (2002). These studies find significant positive relationship between real estate returns and both expected and unexpected inflation. As such, residential real estate is found to be an effective inflation hedging asset in developed countries.

Besides the hedge against expected and unexpected inflation, some authors also examine the hedge against inflation in the long-run and short-run. Barkham et al. (1996) suggest that housing in the UK is hedge against inflation in the long-run based on Johansen cointegration

and standard VECM approach. They also find that inflation Granger causes property prices in the U.K. Although Stevenson (1999) find no evidence of cointegration between residential real estate and inflation in the U.K., Stevenson (2000) provide a substantial different results where there is a strong evidence of cointegrating relationship between inflation and housing market and house prices lead inflation. Furthermore, Anari and Kolari (2002) find that house prices in the U.S. are a stable inflation hedge in the long-run using ARDL approach.

Similar studies in other countries have also reported varies results about the inflation hedging of residential real estate. Ganesan and Chiang (1998) and Lee (2013) find that Hong Kong residential real estate return is significantly related with both expected and unexpected inflation which show the ability of housing to hedge against inflation. On the other hand, Sing and Low (2000), Li and Ge (2008) and Amonhaemanon et al. (2013) show insignificant relationship between real estate return with both expected and unexpected inflation. They report the inability of housing to hedge against inflation in the respective countries.

In Malaysia, Lee (2014) examines the inflation hedging ability of residential real estate for the period between 1999 and 2012. The results conclude that residential real estate is able to hedge against expected inflation in the short-run and long-run but this is not for the unexpected inflation. Ibrahim et al. (2009) only focus residential real estate in Selangor between 2000 and 2006. They report residential real estate in Malaysia is a poor hedge against actual, expected and unexpected inflation. These authors provide different results on inflation hedging ability of Malaysian housing market which may due to different time period examined. The results reported by Ibrahim et al. (2009) that focus on a single state i.e. Selangor raise the concern of generalizability to the overall housing market in the country.

2.2 The relationship between oil and house prices

The study that directly examines the relationship between oil prices and house prices is relatively less. In the study between house prices and macroeconomic fluctuations, Beltratti and Monara (2010) find that oil price shocks have a statistically significant negative effect on house prices. Besides that, Breitenfellner et al. (2015) examine the direct relationship between energy inflation and house prices. Consistent with Beltratti and Monara (2010), they find significant negative relationship between changes in energy inflation and house prices in which they suggest that the increased price of crude oil in the past decade may be the reason that cause housing market crash in the U.S. in 2008. Both of these studies have evidenced a negative relationship between crude oil and house prices that show an increase in oil price leads to a decrease in house price.

More recently, Le (2015) attempts the link between house and oil prices in Malaysia. As an oil exporting country, Le (2015) explains that the increase in oil prices would increase the demand for housing and increase the price of housing. Le (2015) evidences a positive relation between oil and house prices in Malaysia for the period between March 1999 and September 2012. Although the author fail to find cointegration among oil price, inflation and labor force with house prices based on Gregory and Hansen (1996) test, Toda-Yamamoto (1995) test reveals that oil price and inflation lead the changes in house prices in Malaysia.

Overall, prior studies tend to find housing is as an effective hedge against consumer inflation in the long-run. The long-run hedging ability of housing against energy inflation remains unknown since none of the study attempted this question. Perhaps the significant negative relationship between oil price and house prices (Beltratti and Monara, 2010; Breitenfellner et al., 2015) would indicate the inability of housing to act as an effective hedge against energy inflation. However, due to the argument of Le (2015) where Malaysia is assumed to be an oil-

exporting country, the positive relationship found could be an indication that housing is hedge against energy inflation.

3. Data and Methodology

3.1 Data

The house price is proxy by House Price Index (HPI) collected from National Property Information Centre (NAPIC). We use the West Texas Intermediate crude oil price to proxy for energy price (WTI) which is expressed in Ringgit by multiplying with RM/USD exchange rate. According to Cunado and de Gracia (2005), the inflationary effect of oil price is more prevalent when oil price is defined in local currency[1]. Consumer inflation is calculated from Consumer Price Index (CPI). Control variables i.e. income and interest rate are proxy by nominal gross domestic product (GDP) and base lending rate (BLR). The CPI, GDP and BLR are collected from Bank Negara Malaysia. The sample period is from 1999Q1 until 2015Q4 with 68 observations. All data are transformed into natural logarithm series except BLR.

3.2 Methodology

We first perform the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root test to examine the stationarity properties of the data. We then analyze the long-run and short-run relationship among the variables based on Autoregressive Distribution Lag (ARDL) (Pesaran et al., 2001). The unrestricted ECM is formulated as follows:

$$\Delta HPI_t = \alpha + \beta_1 HPI_{t-1} + \beta_2 CPI_{t-1} + \beta_3 GDP_{t-1} + \beta_4 BLR_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta HPI_{t-1} + \sum_{i=0}^{q} \theta_i \Delta CPI_{t-1} + \sum_{i=0}^{r} \phi_i \Delta GDP_{t-1} + \sum_{i=0}^{s} \gamma_i \Delta BLR_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta HPI_t = \alpha + \beta_1 HPI_{t-1} + \beta_2 WTI_{t-1} + \beta_3 GDP_{t-1} + \beta_4 BLR_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta HPI_{t-1} + \sum_{i=0}^{q} \theta_i \Delta WTI_{t-1} + \sum_{i=0}^{r} \phi_i \Delta GDP_{t-1} + \sum_{i=0}^{s} \gamma_i \Delta BLR_{t-1} + \varepsilon_t \quad (2)$$

where Equation (1) shows the relationship between house price and consumer price while Equation (2) shows the relationship between house price and energy price. HPI represents house price index while CPI and WTI represent consumer and energy prices respectively. GDP and BLR are added to control for income and interest rate effect. Income and interest rate have been found to show significant relationship with house prices in the long-run (e.g. Chen et al., 2007; Ibrahim and Law, 2014). The β_i in both equations are the long-run parameters. The optimum lag order of the estimation is selected based on Schwarz Information Criteria (SIC) with a maximum lag of four. F-test is used to examine the presence of cointegration among the variables by comparing the F-statistic with the critical values provided by Narayan (2005). In Equation (1) and (2), the long-run coefficient for both consumer and energy prices is $-(\beta_2/\beta_1)$ and the short-run coefficient is $\Sigma\theta_i$.

Brown and Matysiak (2000) highlight that an asset with high rate of real returns does not necessary means that it hedges against inflation. To adequately hedge the inflation, the return of an asset must be positive related with inflation. The role as an inflation hedge must be at least examined by the positive correlation between an asset's return and inflation (Bekaert and Wang, 2010). Arnold and Auer (2015) add that a positive relation between asset returns and inflation rates implies that asset returns compensate a rising inflation rate. Applying this concept in our analysis, we expect positive long-run and short-run coefficients for both consumer and energy prices i.e. $-(\beta_2/\beta_1)$ and $\Sigma\theta_i$ to be positive and statistically significant to consider housing as an effective hedge against consumer and energy inflation respectively.

[1] Ibrahim (2015) and Le (2015) are both studies that express crude oil price in *Ringgit*.

4. Results

The summary statistics of the data are presented in Table 2. The mean house price is relatively higher than the consumer prices but lower than energy prices over the sample period. The standard deviation of energy price is higher than the consumer price indicates that energy price is more volatile than consumer price. The results of Jarque-Bera statistic show the null hypothesis of normal distribution is rejected for all variables except WTI.

Table 2: Descriptive statistics

Variables	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
HPI	4.8926	0.2621	0.6701	2.2574	6.6518**
CPI	4.5392	0.1158	0.0980	1.6342	5.3940*
WTI	5.2417	0.4870	-0.6150	2.4316	4.5065
GDP	11.9550	0.4333	-0.1781	1.7215	4.9907*
BLR	6.4532	0.4228	0.0948	5.0840	12.4073***

Note: All data are expressed in natural log except BLR. ***, ** and * indicate significant at 1%, 5% and 10% level respectively.

The results of ADF and PP unit root tests presented in Table 3 show that WTI and BLR are I(0) while all other series are I(1). The results of the ARDL bounds test for cointegration are reported in Table 4. The F-statistic shows that variables in Equation (1) are cointegrated. This finding is consistent with Lee (2014) who finds evidence to support the hypothesis of the cointegration between Malaysian housing market and inflation over the long-run by using Johansen cointegration test. Anari and Kolari (2002) and Lee (2012 and 2013) also provide evidence to support the hypothesis of long-run relationship between house price and inflation using ARDL approach. Similarly, the F-statistic for Equation (2) shows the existence of cointegration among the variables. In contrast, Le (2015) fails to find cointegration among crude oil price and Malaysian house prices based on Gregory and Hansen (1996) cointegration test which is able to account for the presence of structural break.

Table 3: Unit root test

	Level		First diff	
	ADF	PP	ADF	PP
HP	3.1969	3.0031	-1.9858	-6.8296***
CPI	0.5431	0.9425	-7.4639***	-7.6571***
WTI	-2.8776*	-2.8600*	-6.7846***	-6.5240***
GDP	-0.9060	-2.3230	-5.1484***	-9.3929***
BLR	-2.6976*	-4.0925***	-6.6782***	-6.6782***

*** and * indicate significant at 1% and 10% level respectively.

We report the long-run and short-run coefficients of Equation (1) and (2) in Table 4. The long-run coefficient of house price with respect to consumer price is greater than one but statistically insignificant. This implies that housing is an effective hedge against consumer inflation in the long-run. On the other hand, the energy price affects house price negatively in which its long-run coefficient is less than zero. This implies that housing is a poor hedge against energy inflation in the long-run.

Table 4: ARDL cointegration results

Equation (1): ARDL(1,0,0,0)		Equation (2): ARDL(1,1,0,0)	
Bounds test			
F-statistic	20.5488***	F-statistic	21.0657***
Long-run coefficient:			
CPI	25.8159	WTI	-3.3867
GDP	1.1132	GDP	13.7697
BLR	0.5633	BLR	0.9546
Constant	-120.2497	Constant	138.3780
Short run coefficient:			
ECT_{t-1}	-0.0014***	ECT(-1)	-0.0013***
CPI	-0.1428	WTI	0.0194*
GDP	0.0695**	GDP	0.0268
BLR	0.0088	BLR	0.0071
Diagnostic test			
Normality test, Jarque-Bera	1.9136	Normality test, Jarque-Bera	0.1202
Serial correlation, LM(4)	5.1976	Serial correlation, LM(4)	4.9778
Heteroskedasticity, ARCH(4)	3.6871	Heteroskedasticity, ARCH(4)	5.3508

***, ** and * indicate significant at 1%, 5% and 10% level respectively. The optimum lags are selected based on Schwarz Information Criteria. The critical values for F-test with k=3, n=64, case II given by Narayan (2005): 4.056–5.158 (1% level), 2.976–3.896 (5% level) and 2.492–3.350 (10% level).

The coefficient of the error-correction term (ECT_{t-1}) for both consumer and energy prices is negative and statistically significant. It demonstrates that there is a long-run relationship between house price and both consumer and energy inflation. Besides that, the error-correction term represents the speed of adjustment of house prices to the long-run equilibrium. House prices adjust slowly to restore to the long-run equilibrium in response to consumer and energy inflation with adjustment speed of 0.14% and 0.13% respectively. The short-run coefficients are negative for consumer inflation but significantly positive for energy inflation. This shows that housing is a poor hedge against consumer inflation in the short-run but a partial hedge against energy inflation in the short-run.

Our results reveal that Malaysian residential real estate is a good hedge against consumer inflation in the long-run but a poor hedge against consumer inflation in the short-run. The increasing price level in the country would lower the real return of investment in the housing market. For the energy inflation, although housing in Malaysia could not hedge against energy inflation in the long-run, it is only a partial hedge against energy inflation in the short-run. With positive coefficient for CPI in the long-run, the hedging ability of Malaysian housing is more effective for consumer inflation than the energy inflation. Property investors may lose their purchasing power over increasing price of energy due to the negative link between house price and energy price in the long-run. This shows that buying a house in Malaysia is not for short-term speculation. Investors should target other form of financial assets to gain short-term return. Besides that, government policy should seriously aim at curbing speculation in the housing market and providing more affordable housing for the people.

As discovered by Lee (2014), housing market in Malaysia could not provide a complete hedge against actual inflation. Unlike housing market in the developed countries, Malaysian housing market offers a poor hedge against consumer inflation in the short-run. Real returns from residential property will decline if inflation rises. This finding has important implication for property investors and policymakers. Rising inflation resulted from increasing crude oil prices would threaten the desired level of real housing returns. On the other hand, the

implementation of Goods and Services Tax (GST) could lead to higher consumer inflation in the country and seriously impact on the housing returns. The real return from housing investment may not be well sustained under these circumstances.

5. Conclusion

This study examines the inflation hedging ability of Malaysian residential property by investigating the relationship between house prices and both consumer and energy prices. We would like to determine whether residential property in Malaysia is a hedge against consumer and energy inflation over 1999-2015 periods. From the ARDL results, we find that Malaysian residential property provides a complete hedge against consumer inflation over the long-term sample period. However, it is not hedge against energy inflation in the long-run. In the short-run, housing is able to hedge against energy inflation partially but not the consumer inflation. Investors should consider both consumer and energy inflation in their decision making process. Inflation risk arises from increasing oil price could reduce the wealth of property investors. Investors seeking inflation protection should be aware of the degree of hedging ability against energy inflation. Malaysian residential property is not a good investment asset that providing protection on investors' wealth against energy inflation.

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