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**ASSESSMENT OF EQUILIBRIUM HOUSING PRICES IN PENANG  
AFTER THE GLOBAL FINANCIAL CRISIS**

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*Abstract*

Penang – a unique island-mainland state in the northern region of Malaysia, experienced an abnormal growth of 205.7% in the past 27 years. This has raised the concern of housing affordability and market disequilibrium. An equilibrium model is developed to assess the Penang housing prices in the post-global financial crisis period. Both fundamental factors and speculative demand are taken into accounts. In the long run, the ARDL cointegration estimation reveals that housing prices are mainly driven by building cost and speculative demand, whereas fundamental factors such as household income, inflation and interest rate are trivial in decision of property investment. In the short run, only speculative demand is of significant. The cointegration regression further detects multiple market disequilibrium during the study period of 2009-2016. Nevertheless, the speed of adjustment is slow, suggesting that market corrections will take about 3 years to complete. The empirical results have provided a concrete diagnosis of Penang property market that market disequilibrium is on the rise due to demand-supply imbalances and speculative investments. This shall provide an early warning to both the market participants and regulators that a healthy market practice is to be promoted. A balance regime that meet the needs for housing affordability and investment earnings is necessary, to support public welfare and to prevent possible market failure.

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**Keywords:** ARDL cointegration, fundamental factors, speculative demand, market disequilibrium, global financial crisis.



## 1. Introduction

The process of urbanization in Malaysia has expedited in Malaysia in the past decades, due to the economy and employment shifts from agriculture to industry and services. The urban population in Malaysia has increased from around 66 percent in 2004 to 76 percent in 2017 (Statista, 2018). This is followed by the increasing demand for real estate development in the urban and suburban areas. At the same time, the growing global uncertainties and hedging strategy among investors have further witnessed the capital flows into real estates, especially during and after the global financial crisis in 2008. This is supported by the conventional wisdom that the property markets are less fragile, and real estate investment is able to hedge against financial risks and inflation (Lean & Smith, 2014; Chan, Woon, & Ruhani, 2016). In consequence, Malaysia property prices, along with other emerging markets, have experienced an upward trend that grows beyond the affordability of general public. The problem becomes more serious when Malaysia falls into the middle income trap (World Bank, 2016), with real business slowing down and salaries remain stagnant in recent years.

In near future there is no sign of descending in housing prices. Chin (2013) argued that the price surge of Malaysia properties will burden the new generation of home buyers and increase the housing unaffordability of the lower income group. The bottom-40% (B40) households suffer the most because the low cost housing projects unit price is now beyond their reach. At present, Malaysia has reached 32 million of population. According to the Population and Housing Census, 30% of the Malaysia populations is in the range of 20-40 years old. These group of people will most probably turn to be the first time home purchaser. The group is projected to grow to 11.3 million people by year 2020 and more socioeconomic problems are expected if the present housing issue is lightly taken unsolved.

Of all the states in Malaysia, Penang is identified as the study case in this paper. Penang is a unique island-mainland state. It is the most developed and economically important state in the northern region of Malaysia, but experienced an abnormal growth of 205.7% in real estate throughout 1990-2017 (Bank Negara Malaysia, 2018). In the same period, the salary growth was much slower. If we refer to the data from National Property Information Centre (NAPIC), Penang's recent average property price is valued at RM336,521. Whereas for the average middle income household, the affordable price is RM300,000 or below, even with the introduction of 50% stamp duty discount. And worst, the affordable housing scheme promoted by the authority is around RM400,000, which is well beyond the reach of middle income earners. By demographic distribution, the 20-40 age group in Penang is around 0.6 million people, which represent 36% of the state population. Most of them cannot afford and unqualified for housing loans.

## 2. Problem Statement

Aside from the housing affordability, another major concern is the housing market disequilibrium that may lead to asset bubble. Two reasons are supporting the fact of market disequilibrium. First, the recent calculated proportion of house price is equivalent to around 4.3 times of population growth rate. Second, there is oversupply of housing in Penang but the price surge has not ceased (MacDonald, 2011). If we assume the average household size remains at 4 people and supply of new housing stops after year 2015, it is foreseen there will be an excess of about 45,000 household units in year 2017 and follow by 22,000 units

in year 2020, as projected by Malaysia Property Incorporated (MPI). An increasing demand for properties with a potential of oversupply may sound irony, leading to the question whether the developer is building the correct types of properties at the right locations.

Some scholars reveal that increase in housing price is beneficial for driving the domestic investments and hence economic growth. However, there are concerns that Penang housing price surges may not be fundamentally supported but has reflected the housing disequilibrium driven by speculative investment. Uncontrolled house prices will create financial chaos and potentially affected the optimal allocation of resources and hence deteriorate the national socioeconomic stability.

### **3. Purpose of the Study**

To assess Penang housing price mechanism through economic fundamentals and government policy instruments (e.g. income, inflation, interest rates). Coleman, LaCour-Little, and Vandell, (2008) model is modified to include the supply costs dynamic (such as building costs) and the speculative demand variable. The rest of the paper is organized as follows: Section 4 provides brief review of literature. Section 5 presents the methodology setting and data description. Section 6 then discusses the empirical results and some policy implications are being highlighted. Finally, in Section 7, we conclude.

### **4. Literature Review**

There are many studies that debate on the connection between house price and its macroeconomic determinants in various countries (Shiller, 2007; Lewis-Beck, Nadeau, & Elias, 2008; Rapach & Strauss, 2009; Hui & Yu, 2012; Zhang, Hua, & Zhao, 2012). Nevertheless, there appears to be no common consensus about what factors are the key determinants of the variation of house prices (Abelson, Joyeux, Milunovich, & Chung, 2005; Otto, 2007). In addition, the effect of factors may differ depending on the empirical methods or the setting of variables (e.g. error correction regression, autoregressive lag model, linear regression or others).

Furthermore, recent literature of Malaysia and Penang housing market is still limited and offers rooms for further investigation. Among them, studies by Chin, Ng, and Chau, (2004), Salleh and Yusof (2006), Tan (2011, 2012), Husain, Rahman, and Ibrahim (2011), MacDonald (2011), Heng (2013) and Ong (2013) have been reviewed. However, we observe that these studies did not empirically justify the housing price surges in the past decade despite a diminution of economic performance and employment, and the introduction of several restrictions on applying property loans. The authors also fail to arrive in consensus if the housing development is along the sustainable path, in the presence of speculative demand after the global financial crisis. This issue is essentially important for Penang which has always been the center of foreign investments in Malaysia. In light of this, we conduct the present study by assessing the Housing equilibrium, which is typically crucial in the pragmatics of viable living standards in Penang. It is hope that this study provides the adequate instruments for future diagnosis of housing prices.

## 5. Research Methods

### 5.1. Econometric Model Specification

Coleman (2008)'s model is modified to include supply cost that obtained from the Construction Industry Development Board Malaysia (CIDB). In line with the increased capital flows after Subprime crisis, we also include the speculative demand in the model, as inspired by Juan & Geoffrey (2017). The modified housing model consists of the housing demand and supply equations, which are represented by:

$$\text{Housing Demand} \quad Q_{dt} = \alpha_t + \beta_1 Q_{dt-1} + \beta_2 P_t + \beta_3 I_t + \beta_4 F_t + \varepsilon_{dt} \quad (1)$$

$$\text{Housing Supply} \quad Q_{st} = \delta_{1t} P_t + \delta_{2t} C_t + \varepsilon_{st} \quad (2)$$

where  $t$  is the time period,  $\alpha_t$  are intercepts,  $\varepsilon_{dt}$  and  $\varepsilon_{st}$  are the respective error term for demand and supply equations. For demand equations,  $P_t$  is housing price,  $I_t$  is interest rate (proxy by overnight policy rate) that represent the government policy instrument,  $F_t$  is inflation rate and lastly,  $Q_{dt-1}$  represents the speculative demand by lagged effect. As for supply equation,  $P_t$  remains as housing price and  $C_t$  is the building cost. Since the equilibrium condition is  $Q_{dt} = Q_{st}$ , a reduced form equation for housing model with housing price taken as endogenous variable is derived as:

$$\text{Equilibrium Model} \quad P_t = \theta_t + \varphi_1 Q_{dt-1} + \varphi_2 I_t + \varphi_3 F_t + \varphi_4 C_t + \mu_t \quad (3)$$

All variables are similarly defined as in equation (1) and (2). The equilibrium model will be estimated based on the ARDL cointegration procedure.

### 5.2. Autoregressive Distributed Lags (ARDL) Cointegration Procedure

Pesaran & Shin (1998) and Pesaran, Shin, and Smith (2001) advocated the ARDL method, that has been widely used in modern analysis. According to Adom, Bekoe, and Akoena (2012), ARDL can be used to test for a level relationship for variables that are either  $I(0)$  or  $I(1)$  as well as for a mix of  $I(0)$  and  $I(1)$  variables. However, non-stationary variables integrated of order two  $I(2)$  is not suitable for ARDL. As financial times series often are either  $I(1)$  or  $I(0)$ , the likelihood to integrate  $I(0)$  and  $I(1)$  variables is a great advantage. In addition, the ARDL approach combines short-term effects of a given variable with a long term equilibrium using patches without discarding long-running information. Finally, the ARDL method provides strong and consistent results for small sample size estimation (Pesaran et al. 2001; Adom et al., 2012), which is appropriate for our study.

### 5.3. Data Collection and Sources

This study utilizes the monthly data from year 2009 to 2016 – a post subprime crisis period with large investment in property market. All data used in this study, including the Penang housing price index, the inflation rates, the overnight policy rates and building cost index are all sourced from the Department of Statistics, CIDB and the NAPIC. All data are converted to natural logarithm ( $\ln$ ) series except for inflation rates and overnight policy rates.

## 6. Findings

Table 1 shows the estimated results of bound test, long run coefficients, short run adjustment and diagnostic tests. The ARDL optimal lags are selected as (6,1,4,1,1) based on the AIC criteria. The bound

test with F-statistics of 9.0633 is significant at 1% level, thus confirming the cointegration relationship among the housing price index and independent variables such as the inflation (INF), building cost (BD), interest rate (OPR) and speculative demand (SD). The econometric estimates show that positive influences of building cost and speculative demand are well recognized and contribute the highest of variation to the dependent variable (housing price) if compared to others. On the other hand, inflation rate and interest rate play some minor and insignificant roles in the housing price.

The housing elasticity of building cost is reported high at 3.33, suggesting that housing prices are sensitive to raw material and labour cost changes. A slight increase in building cost will eventually leads to an exponential growth in Penang housing price in the long-run. In this case, the exchange rate regime is important as imported materials and foreign labours accounted for most of the building cost. Since 2013, Malaysia foreign exchange has depreciated more than 30% and pressured the cost management in real estates (Bank Negara Malaysia, 2018). In most cases, the material costs due to exchange rate depreciation have been shifted to house buyers. Likewise, having a clear foreign labour policy is also vital in real estates. By nature, the construction sector is labour-intensive and Malaysia has been relying on foreign labours from neighbouring countries since 1990s. In 2017, the construction needs 1.2 million labour forces but was facing a shortage of 600,000 – 800,000 workers due to the revision of foreign labour policy (New Straits Times, 2018). The shortage has caused delays of project and extra costs were bared by industry players.

**Table 01.** ARDL cointegration results

<b>Model: ARDL (6, 1, 4, 1, 1)</b>		
<b>Bounds test-F-statistics</b>	<b>9.0633</b>	
<b>Long-run:</b>	<b>Coefficient</b>	<b>Probability</b>
BC	3.3318	0.0195
INF	-0.0685	0.2192
OPR	0.2796	0.2092
SD	0.0419	0.0147
Constant	-10.8273	0.0683
<b>Short-run:</b>	<b>Coefficient</b>	<b>Probability</b>
BC	0.5950	0.1056
INF	0.0005	0.7889
OPR	-0.0259	0.1567
SD	0.0022	0.0004
ECT	-0.0282	0.0000
<b>Diagnostic Test</b>		
Heteroskedasticity Test	0.1389	
Serial correlation, LM	0.0654	
Normalilty Test, Jarque-Bera	31.399	

On the other hand, speculative demand (SD) is the only variable that reported positive and significant coefficients in both the long- and short-run. This would suggest that Penang housing market is an important investment options for wealth creation or possible hedging against macro uncertainties, due to financial crisis. Property transaction was very aggressive in Penang housing market since 2008, especially after Georgetown is declared as UNESCO world heritage site. Short term speculative investors can easily earn handsome profit within months and the annual return is usually more than 20%.

On the contrary, the housing price-inflation rate (INF) nexus is inconclusive and the coefficients of INF are insignificant in both the long- and short-run. This indicates that Penang housing market is relatively immune to the changes of general level of prices for goods and services. In addition, the overnight policy rate (OPR) which represents the monetary policy is also insignificant in the housing price assessment. OPR policy was ineffective and the most likely reason is that investors are comfortable with the past-returns on properties and optimistic about the future returns on Penang properties. Therefore, an increase in the interest rate will not discourage them to continue invest in the property market. In brief, investors were profit-driven and the interest rate policy has been less effective on the Penang housing market. As such, some extent of housing disequilibrium is expected, but subjected to further analysis.

In addition, the error correction term (ECT) in the short-run is negative and highly significant, indicating some shock responses and adjustments towards the long run equilibrium. However, the coefficient of ECT is relatively small suggesting that the speed of adjustment is slow. On average, housing price in Penang will slowly adjusted to regain equilibrium at the rate of 2.8% monthly. It is expected to take about 36 months for Penang housing market to adjust to equilibrium price, in response to shocks. The shocks could be positive or negative and housing prices could be overvalued or undervalued, depending on the modelling. Given that our study period covers 2009-2016. If market was distorted until 2016, the housing prices will be adjusted back to equilibrium price by 2019.

What follows next is the graphical analysis on market disequilibrium. From Table 1, we summarize the estimated housing equilibrium price as  $HP = -10.2873 + 3.3319(BC) - 0.686(INF) + 0.2796(OPR) + 0.0419(SD)$ . We then plot the equilibrium price and compare with the actual Penang house price index. Figure 1 indicates the difference of fundamental (equilibrium) vs market (actual) price in Penang. The graphical presentation shows multiple housing disequilibrium in Penang property market. As we observe, price misalignments during 2009-2011 and 2013-2016 are more evident. During the periods, market prices are higher than the equilibrium prices. Short term investors should be cautious because the market adjustments are slow in respond to shocks. In brief, housing price misalignments are confirmed and the authority needs to monitor and respond fast against potential market failure.



**Figure 01.** Estimated and Fundamental Housing Price Index from 2009 to 2016

Our findings shall shed some new insights on the housing policy and investment strategies. For sustainable housing development, a long term master plan should be inclusive to incorporate both the market mechanism and authority monitoring. While free market is allowed, government needs to intervene when the price deviates from equilibrium. At national level, the exchange rate regime and foreign labour policy are of great concerns as they directly impact the costs of construction labours and imported materials. The recent labour shortage and levy imposed for hiring foreign labours have further worsened the housing supply. In addition, the GST and minimum wages did pressure the developers or contractors in sustaining cost efficiency. Moreover, the market mechanism has not fully justified the presence of speculative demand. The present mortgage financing scheme should be revised to prevent large-scale speculative investment. The authority may increase the levy of 2% on property sold within 3 years from the date of the sale and purchase agreement (SPA) to 5% and such rules also apply for affordable housing. At the same time, short term speculators should be cautious. While the returns are attractive during housing booms, the market disequilibrium could be disastrous for short term investors as the market corrections are slow. Then, at state level, the local authority government needs to monitor the land issue, stamp duties, construction permits, environmental and community assessment to sustain the housing development. In Penang, the housing market should be segmented to serve different group of household income, instead of focusing on the luxury high-rise properties.

## 7. Conclusion

This study explores the housing price mechanism in Penang during the post-subprime crisis period. In addition to economic fundamental factors, we also emphasise on government policy intervention and speculative demand. The ARDL results reveal that the fluctuations of Penang property prices are mainly driven by building cost and the investment activities in the long run. However, in the short-run, only speculative demand is of significant. Housing price disequilibrium are more evident during 2009-2011 and 2013-2016, but the shock adjustments are relatively slow. The empirical results have provided a concrete diagnosis of Penang property market that market disequilibrium is on the rise due to demand-supply imbalances and speculative investments. Land issues and construction permits, along with community and environmental assessment are to be enforced effectively. All in all, the research outcome is expedient to the fundamental building of an early warning system against economic instability. Both the market participants and regulators should aware that a healthy market practice is to be promoted. A balance regime that meet the needs for housing affordability and investment earnings is necessary, to support public welfare and hedge against possible market failure.

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