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ENHANCING THE HOUSE PRICE INDEX MODEL IN MALAYSIA TOWARDS A MAQASID SHARIAH PERSPECTIVE: AN EMPIRICAL INVESTIGATION[1]

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Abstract

This study seeks to investigate the determinants of the existing house price index in Malaysia. House price index (HPI) is a statistical tool that measures changes in prices of residential houses. In Malaysia, house price index is made available in 1997 by the National Property Information Center (NAPIC). Having reviewed the current model of MHPI, it is currently found that this index is constructed based on the demand driven variables. Previous literature has discussed that the construction of house price index should also include the macroeconomic factors (income levels, interest rates, labor market) and supply factors. Hence, this study aims to offer evidence on the determinants of the HPI. The Autoregressive Distributed Lag model (ARDL) is adopted to explore the short and long-run dynamics between the variables. The data used in this study consists of quarterly data ranging from 2008 to 2015. The results suggest that supply and institutional factors are significant in determining HPI. Hence, we propose a new enhanced house price index which is inclusive of new demand and supply variables. This paper may provide evidences for the involved parties to have some policy ramifications to further monitor and take appropriate measures to control the property prices.

Keywords: Malaysian House Price Index (MHPI), Demand Factors, Supply Factors, Institutional Factors

1.0   Introduction

Over the years, the increase in house prices has attracted much attention and has been widely debated   by different segments of the population including the poor, the rich, investors and researchers. Change in residential house price is an important issue that could affect household consumption, the banking system and the economy. Due to its importance, most of the developed countries (e.g. UK, South Korea, US) have set up their own house price index to monitor the changes in house prices.

House price determination depends on macroeconomic (market-related) factors and microeconomic (house-specific) factors. Previous literature have shown that the house price index is determined by both the demand factors (disposable income, labour market trend, demographic and credit availability) and the supply factors. Past studies have also suggested that house prices are strongly related to other microeconomic house-specific demand factors for example physical, structural, locational, environmental and neighbourhood aspects[2].

Meanwhile, the supply factors include the construction cost, land supply index and geographical constraint. The interaction between these demand and supply factors will determine the equilibrium house price index[3].   The frequent changes of market

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[2] Marie-Theres Stohldreier, "The Determinants of House Prices in Chinese Cities." Master Thesis, University of Zurich, (2012); Tze San Ong and Yee Shan Chang, "Macroeconomic Determinants Of Malaysian Housing Market," *Human and Social Science Research*, 1, no.2 (2013), 119-127; Yen Keng Tan, "An Hedonic Model for House Price in Malaysia", *International Real Estate Conference*, 15, no.1, (2011), 12-15; Nicholas T. Longford, "A House Price Index Defined in the Potential Outcomes Framework", SNTL and UPF, Barcelona, Spain. Universitat Pompeu Fabra, Ramon Trias Fargas; Aminah Md Yusof, "Malaysian Housing Investment Information Price Modelling." 1st NAPREC Conference - INSPEN (2008), 1-30.

[3] Jinhai Yan, Lei Feng and Helen X. H Bao, "House Price Dynamics: Evidence from Beijing." *Front. Econ. China* 5, no. 1 (2010), 52–68; Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies." *International Journal of Central Banking,* (2011), 163-204; R. Sean Craig and Changchun Hua, "Determinants of Property Prices in Hong Kong SAR: Implications for

equilibrium contribute to the fluctuations in property values. However, the valuation of property value can be influenced by the issues of uncertainty that arise from various causes. It is thus required to recognize the main characteristics or elements that affect house prices and their significance in determining the house price index. Most of the developed countries (e.g. UK, South Korea, US, Canada) have developed their own house price index to monitor price changes. These indexes are used to evaluate the trends in house prices. Table 1 shows a list of the house price index for selected countries.

Table 1: List of House Price Index

Country	Name of House Price Index	Frequency
United States	1. OFHEO House Price Index 2. Freddie Mac Conventional Mortgage Home Price Index	Monthly, Quarterly
United Kingdom	1. Halifax House Price Index 2. Nationwide House Price Index	Monthly, Quarterly
Australia	Residential Property Price Index	Quarterly
Germany	1. Bulwiengesa Property Market Index 2. VDP Property Price Index 3. Destatis House Price Index	Annually, Quarterly
South Korea	1. Transaction-based Sales Price Indices 2. Housing Sales Price Index 3. Housing Jeonse Price Index	Annually, Monthly
China	Shanghai House Price Index	Monthly

Policy", Working Paper, *International Monetary Fund,* no.11/277 (2011), 1-15.

Thailand	House Price Index	Monthly
Malaysia	Malaysian House Price Index	Quarterly, Annually
Canada	1. Teranet National Bank House Index (NBHI) 2. New Housing Price Index NHPI 3. MLS® Home Price Index (HPI)	Monthly
India	NHB Residex	Quarterly

Source: Author's summary from various sources

In Malaysia, there is only one house price index available which serves as the main reference by policy makers as well as the public. There is no other house price index that could be used as a comparison to the existing Malaysian House Price Index (MHPI). Hence, an alternative house price index has been used as one of the references in monitoring house price changes[4]. A credible house price index is important because it reflects the determinants that contribute significantly to house price.

Meanwhile, from the Islamic perspective, the house price index or rental rate have also been suggested as an alternatives benchmark to Islamic home financing product[5]. By having HPI or

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[4] Norshazwani Afiqah, Mohd Lizam and Abdul Jalil, "The Revisited of Malaysian House Price Index." *Proceedings International Conference of Technology Management, Business and Entrepreneurship*, (2012).

[5] Ahamed Kameel Mydin Meera, Dzuljastri Abdul Razak and Razali Haron, "*Musharakah Mutanaqisah* and *Al-Bay' Bithaman Ajil* Contracts as Means for Homeownership: A Conceptual Comparison", paper presented at *Young Scholars Conference*, UITM and Islamic Development Bank, Langkawi, Malaysia, (April 2006); Rosylin Mohd Yusof, Salina Kassim, M. Shabri A. Majid and Zarinah Hamid. "Determining the viability of rental price to benchmark Islamic home financing products. Evidence from Malaysia", *Benchmarking: An International Journal* 18, no.1, (2011), 69-85; Rosylin Mohd Yusof, Medja Bahlous and Roszaini Haniffa, "Rental rate as an alternative pricing for Islamic home financing", *International Journal of Housing Markets and Analysis*, 9,no.4 (2016), 601-626; Rosylin Mohd Yusof, Akhmad Affandi Mahfudz, Ahmad Suki che Mohamad Arif and Norhayati Ahmad, "Rental index rate as an alternative to interest rate in Musharakah Mutanaqisah home financing: A simulation approach",

rental rate as a benchmark, it can give opportunity to the banks to have a justifiable pricing charge towards the parties involved in the contract since the index value differs according to locality[6].

Previous studies have shown that a house price index can be explained by the interaction between demand and supply factors. However, in Malaysia, most of the studies have focused only on the macro and micro determinants that come from the demand side. Apart from the demand and supply factors, institutional factors also give an impact to the house prices movements and reflect differences in business environment and housing finance system arrangements[7].

This study aims to enhance the existing HPI model in Malaysia by introducing new variables including the demand and supply variables as well as the institutional factors. It is hoped that the proposed and enhanced house price index may serve as a more accurate indicator for potential developers, investors, house buyers and sellers in making strategic economic decisions such as investing

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International Journal of Islamic and Middle Eastern Finance and Management, 9, no.3, (2016), 397-416; Rosylin Mohd Yusof and Farell Haszan Usman, "Islamic Home Financing And The Real Sectors In Malaysia: An ARDL Bound Testing Approach To Cointegration", *International Journal of Economics, Management and Accounting,* 23, no.1, (2015), 79-107; Nur Harena Redzuan and Salina Kassim, "House Price Index as an Alternative Pricing Benchmark for Islamic Home Financing: Evidence of Malaysia", *European Journal of Islamic Finance,* no.6, (2017), 1-6.

[6] Rosylin Mohd Yusof, Medja Bahlous and Roszaini Haniffa, "Rental rate as an alternative pricing for Islamic home financing", *International Journal of Housing Markets and Analysis*, 9, no.4, (2016), 601-626; Rosylin Mohd Yusof, Akhmad Affandi Mahfudz, Ahmad Suki che Mohamad Arif and Norhayati Ahmad, "Rental index rate as an alternative to interest rate in *Musharakah Mutanaqisah* home financing: A simulation approach", *International Journal of Islamic and Middle Eastern Finance and Management*, 9, no.3, (2016), 397-416.

[7] Balázs Égert and Dubravko Mihaljek, "Determinants of House Prices in Central and Eastern Europe". BIS Working Papers, *Monetary and Economic Department,* no.236, (2007), 1-26; Maruška Vizek, "Short-run and Long-run Determinants of House Prices in Eastern and Western European Countries", *Economic Trends and Economic Policy,* 125, (2010), 27-59.

or owning a home. The next section of this paper (Section 2) elaborates further on the Malaysian house price index. Then, section 3 explains about the maqasid shariah perspectives while section 4 presents the proposed theoretical framework. Section 5 discusses the proposed methodology for developing a new House Price Index Model in Malaysia. Lastly, Section 6 concludes.

2.0 Literature Review

2.1 Overview of the Malaysian House Price Index

MHPI was first released by NAPIC in 1997 with 1990 as the base year. This index acts as a benchmark on the performance of Malaysian housing market. There are 123 series of quarterly and 123 series of annual house price index derived for 46 districts and 14 states in Malaysia. However, in 2003, the house price index have been reviewed and the base year was updated to 2000. Then, in the beginning of 2017, the MHPI has been revised again and the base year has been updated from 2000 to 2010[8].

The hedonic method is adopted by NAPIC to construct the MHPI. This method has been widely used in the construction of house price indexes. In the US, the hedonic method was applied in the construction of its house price index as early as 1982. Meanwhile in the UK, the Nationwide and Halifax also used the same method since 1983. Under this method, the house price will be valued based on its characteristics such as the quantity of rooms, size, age, land area and etc[9].

MHPI still using the same variables as in the 1997 regression models except for neighbourhood quality which has been replaced by neighbourhood classification based on the housing neighbourhood study. The variables include the land area (for landed property such as terraced, detached and high – rise unit), floor area, age of building, distance from the nearest town centre, floor level for subject property (for high – rise unit only), type of house, quality of building, tenure

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[8] Valuation and Property Services Department (NAPIC). *The Malaysian House Price Index 2017.*

[9] Norshazwani Afiqah, Mohd Lizam and Abdul Jalil, "The Revisited of Malaysian House Price Index." *Proceedings International Conference of Technology Management, Business and Entrepreneurship*,(2012).

type (freehold or leasehold) and neighbourhood classification[10].

Table 2 describes the factors that are used in principal component analysis of neighbourhood study. These factors are divided into three main group namely physical and environmental, social and economic factors.

Table 2: Factors Used in Analysis of Housing Neighbourhood Study

| Physical and Environmental Factors	Social Factors	Economic Factors
• Scheme Age • Local Authority Area • Location (Core, inner, middle, outer or fringe of a city/town) • Accessibility to Town/City, school, community retail centre and shopping complex • Playground/Open Space • Drainage (Frequency of flood occurrence in a particular scheme/neighbourhood) • Availability of Electricity, Water and Modern Sanitary Sewer • Quality of Entrance and Exit Roads • Availability and Type of Public Transport • Quality of Landscaping • Pattern of Land Use by Category • Quantity of Housing Units • Number of houses based on types • Lower Cost Unit Proportion • Type of Building Construction • Quality of Principal Structure • Average number of bedrooms and • Bathrooms per unit	• Ethnic Structure • Quality of Neighbourhood in the Surrounding • Type of Land Use in the Surrounding	• Household Income • Level of Occupancy • Frequency of Property Turnover/ Transaction

Source: NAPIC, (2015)

With regard to all the variables listed in Table 2 reveals that most determinants included in the construction of the house price index are only based on the demand side. The following is the regression model used to compute the index:

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[10] Valuation and Property Services Department (NAPIC). *The Malaysian House Price Index 2015*.

$$\ln HP_{it} = B_0 + B_1(t)\,x1_{it} + B_2(t)\,x2_{it} + \cdots + B_m(t)\,xm_{it} + e_{it}$$

Where $\ln HP_{it}$ is the natural logarithm of sale price for the i house sold during time t, $B_2(t), B_3(t), \dots, B_m(t)$ are the coefficients for the numerical and quality variables x1, …, xm, respectively, for period t. The model shows that physical and environmental factors (e.g. scheme age, location, distance, number of bedrooms and bathrooms), social factors (ethnic structure, quality of the surrounding neighbourhood and type of land use in the surrounding) and economic factors (income, occupancy level and frequency of property turnover) are used in determining the house price index in Malaysia. Using the hedonic method, the HPI is constructed. Figure 1 below shows the progress of MHPI from 1999 to 2014 based on the existing calculation of HPI.

Figure 1: Malaysian House Price Index, 1999-2014.
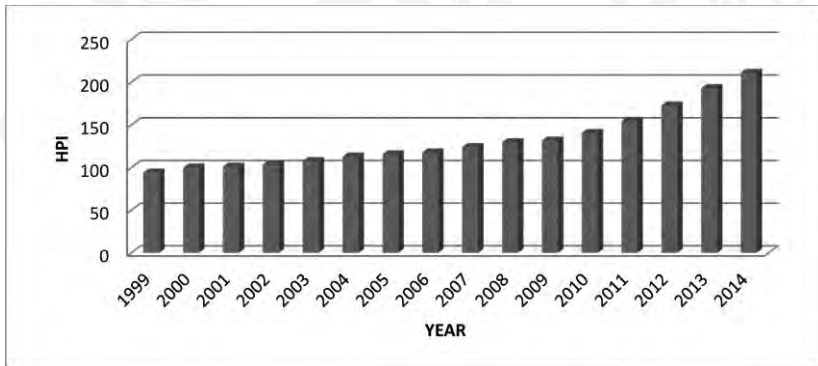
Source: NAPIC (2014)

Figure 1 shows the progress of MHPI since 1999 until 2014. There is an increasing trend in HPI in the Malaysian residential property market where the value was 94.3 in 1999 and rose to 211 in 2014[11]. The actual house price index is driven by the interaction between demand and supply factors. However, the current Malaysian house price index does not include the supply factors in the computation of the index. Previous studies have shown that supply factors also

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[11] Valuation and Property Services Department (NAPIC). *The Malaysian House Price Index 2014.*

provide impacts on the movement of house prices[12]. In the long run, house prices tend to respond to the cost of new construction which comprises the costs of land, the costs of materials and labour, and the associated financing and consenting costs. Besides that, an increase in land supply has a tendency to cut down the house prices. Previous studies have also shown that land supply has significant effect on house prices both in the long run and the short run. House prices also are generally more unstable in housing markets and more flexible business environment[13].

Institutional factors may be interpreted as proxy variables for the development in housing financing systems. The development of housing markets and housing finance appear to have a strong impact on real house price dynamics in Central and Eastern Europe. Countries that have implemented greater and faster improvements in these institutions have additionally tended to encounter speedier development of house prices[14].

Next, this paper reviews the previous literature on the determinants of house prices. The review will then be followed by a discussion on the variables that may contribute to the overall house price index.

2.2 Determinants of House Prices: A Review of Literature

Classical economists have viewed the growth of house prices as the

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[12] Lu Xu and Bo Tang, "On the Determinants of UK House Prices", *International Journal Of Economics and Research*, 5, no.2, (2014), 57-64; Atasya Osmadi, Ernawati Mustafa Kamal, Hasnanywati Hassan and Hamizah Abdul Fattah, "Exploring the Elements of Housing Price in Malaysia", *Asian Social Science*, 11, no.24, (2015), 26-38.

[13] Jinhai Yan, Lei Feng and Helen X. H Bao, "House Price Dynamics: Evidence from Beijing." *Front. Econ. China*, 5, no.1, (2010), 52–68; Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking,* (2011), 163-204; R. Sean Craig and Changchun Hua, "Determinants of Property Prices in Hong Kong SAR: Implications for Policy", Working Paper, *International Monetary Fund,* no.11/277 (2011), 1-15.

[14] Balázs Égert and Dubravko Mihaljek, "Determinants of House Prices in Central and Eastern Europe", BIS Working Papers, *Monetary and Economic Department,* no.236, (2007), 1-26.

natural interaction between the demand and supply of housing. This theoretical view implies that the price of housing is determined through the interaction of demand and supply relative to other goods and services[15]. Price is seen as the results of supply and demand processes in which individuals maximize their utility functions and producers expand their profits. Price is, therefore, likely to be based on these forces with a tendency to reach equilibrium based on the supply of houses and demand by individual buyers.

Hence, in this study, we look at the literature on the determinants of house prices. Table 3 was constructed based on the past literature on house prices in various countries. Information in the table was used as the basis to identify the appropriate factors that may be used in the construction of the Malaysian HPI.

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[15] Rosli Said and Rohayu Ab. Majid, "Housing Market: What does the Malaysian House Price Index tell us about the housing market performance?" *International Surveying Research Journal* 4, no.1 (2014), 45-54.

Table 3: Summary of literature on determinants of house prices

No	Author	Year	Country
1	Pillaiyan	2015	Malaysia
2	Osmadi, Kamal, Hassan and Abdul Fattah	2015	Malaysia
3	Tang and Tan	2015	Malaysia
4	Le	2015	Malaysia
5	Said and Ab.Majid	2014	Malaysia
6	Dziauddin	2014	Malaysia
7	Mohd Lizam, Afiqah, Abdul Jalil and Burhaida	2014	Malaysia
8	Ong and Chang	2013	Malaysia
9	Liew and Haron	2013	Malaysia
10	Mohd Lizam, Rosmera and Omar	2013	Malaysia
11	Afiqah, Mohd Lizam and Abdul Jalil	2012	Malaysia
12	Mohd Radzi, Muthuveerappan, Kamarudin and Mohammad	2012	Malaysia
13	Tan	2011	Malaysia
14	Abdul Aziz	2011	Malaysia
15	Tan	2010	Malaysia
16	Md Yusof	2008	Malaysia
17	Sabri	2005	Malaysia

The table classifies the determinants of house prices under the following groupings:

- **Micro (DD):** Physical Characteristics, Structural Characteristics, Neighbourhood, Environmental, Location, Oil price
- **Macroeconomics Variables (DD):** Demographic, Labor market trend, Income, Credit Availability, Inflation, GDP, CPI, Stock Prices / market, Interest rate, Money Supply, Exchanges Rates, Consumer Sentiment, Business Condition, Loan Approved, Housing stock, IPI / Product Rate, Housing loan, Base Lending Rate, Rental price index, household savings, Investments, Lending/ mortgage rates, User costs, Developer, Tax, Import and Export, Gold price
- **SS:** Construction cost, Land Supply
- **IF:** Institutional factors

No	Authors	Year	Country	Micro (DD)						Macroeconomics Variables (DD)																											SS		IF
				Physical Characteristics	Structural Characteristics	Neighbourhood	Environmental	Location	Oil price	Demographic	Labor market trend	Income	Credit Availability	Inflation	GDP	CPI	Stock Prices / market	Interest rate	Money Supply	Exchanges Rates	Consumer Sentiment	Business Condition	Loan Approved	Housing stock	IPI / Product Rate	Housing loan	Base Lending Rate	Rental price index	household savings	Investments	Lending / mortgage rates	User costs	Developer	Tax	Import and Export	Gold price	Construction cost	Land Supply	Institutional factors
18	Kuang and Liu	2015	China							✓		✓			✓	✓		✓	✓									✓	✓						✓				
19	Cheng and Fung	2015	H. Kong												✓	✓	✓																						
20	Zou and Chau	2015	China				✓	✓																															
21	Kim, Park, Lee and Xue	2015	Seoul					✓																															
22	Chen, Fu, Wu, Huang and Wong	2014	Taiwan	✓																																	✓	✓	
23	Chen, Gan, Hu and Cohen	2013	Beijing																																		✓	✓	
24	Stohldreier	2012	China											✓	✓	✓	✓		✓																		✓		✓
25	Craig and Hua	2011	Hong Kong																																			✓	
26	Glindro, Subhanji, Szeto and Zhu	2011	9 Asia Pacific			✓				✓	✓	✓			✓	✓												✓	✓								✓	✓	
27	Zhang, Hua and Zhao	2011	China												✓	✓										✓													
28	Yan, Feng, and Bao	2010	Beijing											✓			✓	✓	✓	✓					✓					✓									
29	Ibrahim, Padli and Baharom	2009	Thailand																																				
30	Glindro, Subhanji, Szeto and Zhu	2007	9 Asia Pacific														✓	✓		✓										✓									
31	Zhu	2006	6 Asia Pacific							✓		✓			✓	✓	✓	✓	✓	✓										✓	✓								
32	Fan, Ong and Koh	2006	Singapore	✓		✓	✓																														✓	✓	✓
33	Tcha	2005	Korea									✓			✓	✓								✓															
34	Tse and Love	2000	Hong Kong	✓									✓												✓	✓											✓		
35	Anop	2015	Sweeden Germany	✓						✓																													
36	Panagiotidis and Printzis	2015	Greece							✓			✓					✓	✓												✓								
37	Matongela	2015	Namibia															✓																					
38	Dröes and Minne	2015	Amsterdam															✓												✓							✓	✓	

No	Authors	Year	Country	Micro (DD)						Macroeconomics Variables (DD)																												SS		IF
				Physical Characteristics	Structural Characteristics	Neighbourhood	Environmental	Location	Oil price	Demographic	Labor market trend	Income	Credit Availability	Inflation	GDP	CPI	Stock Prices / market	Interest rate	Money Supply	Exchanges Rates	Consumer Sentiment	Business Condition	Loan Approved	Housing stock	IPI / Product Rate	Housing loan	Base Lending Rate	Rental price index	household savings	Investments	Lending/ mortgage rates	User costs	Developer	Tax	Import and Export	Gold price	Construction cost	Land Supply	Institutional factors
39	Kaya and Atan	2014	Turkey						✓		✓	✓	✓		✓			✓	✓																				
40	Xu and Tang	2014	UK										✓		✓			✓	✓																		✓	✓	
41	Hoxha and Salaj	2014	Kosovo and Slovenia															✓	✓																		✓		
42	Oduwole and Eze	2013	Nigeria		✓	✓		✓																															
43	Watson	2013	Aukland	✓	✓	✓				✓																													
44	Algieri	2013	5 main Euro area														✓				✓																	✓	
45	Nneji, Brooks and Ward	2013	US		✓	✓								✓	✓	✓		✓												✓									
46	Falzon and Lanzon	2013	Malta	✓	✓	✓		✓			✓			✓	✓	✓																							
47	Bilozor and Wiśniewski	2012	Europe	✓	✓					✓	✓					✓																							
48	Galati, Teppa and Alessie	2011	Netherlands							✓	✓			✓	✓	✓																							
49	Meidani, Zabihi and Ashena	2011	Iran									✓							✓	✓																			
50	Ali and Metin	2011	Dubai							✓								✓	✓					✓													✓	✓	
51	Madsen	2011	OECD countries							✓																						✓						✓		
52	Andrews	2010	OECD countries								✓	✓				✓		✓												✓								✓		
53	Adams and Fuss	2010	OECD countries												✓			✓	✓																		✓		
54	Vizek	2010	Eastern & Western european								✓							✓							✓								✓				✓		
55	Tumbarello and Wang	2010	Australia							✓					✓	✓																				✓			
56	Borowiecki	2009	Swiss	✓	✓					✓																													
57	Ozsoy and Sahin	2009	Istanbul	✓	✓			✓																													✓		

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No	Authors	Year	Country	Micro (DD)						Macroeconomics Variables (DD)																												SS		IF
				Physical Characteristics	Structural Characteristics	Neighbourhood	Environmental	Location	Oil price	Demographic	Labor market trend	Income	Credit Availability	Inflation	GDP	CPI	Stock Prices / market	Interest rate	Money Supply	Exchanges Rates	Consumer Sentiment	Business Condition	Loan Approved	Housing stock	IPI / Product Rate	Housing loan	Base Lending Rate	Rental price index	household savings	Investments	Lending /mortgage rates	User costs	Developer	Tax	Import and Export	Gold price	Construction cost	Land Supply	Institutional factors
58	Lee	2009	Australia	✓						✓	✓	✓				✓																							
59	Longford	2009	New Zealand	✓	✓	✓	✓	✓				✓																										
60	Selim	2008	Turkey	✓	✓			✓																															
61	Gudnason and Jonsdottir	2008	Iceland	✓	✓			✓																															
62	Egert and Mihaljek	2007	Europe							✓		✓	✓		✓																								
63	Berglund	2007	Stockholm Sydney	✓		✓	✓											✓	✓																				
64	Zietz, N.Zietz and Sirmans	2007	World	✓				✓																							✓								
65	Sabal	2005	Spain							✓		✓		✓	✓			✓																	✓			✓	
66	Tsatsaronis and Zhu	2004	Europe							✓			✓	✓	✓			✓																				✓	

DD: Demand factors; **SS**: Supply factors; **IF**: Institutional factors; **Demographic**: Population, Migration trend and Size of household; **Labor Market trend**: Employment growth and unemployment rate; **User costs**: maintenance costs, expected net capital gains; **Investments**: Foreign direct investment, Investment on fixed assets; **Institutional factor**: the business freedom index, the financial freedom index, the corruption index, and the property right index; **Physical**: e.g. Number of bedrooms, bathrooms, floor, age, floor level and etc.; **Structural**: e.g. size, design and structural quality of the building, insulation and heating, state of disrepair and decoration; **Location**: e.g Core, inner, middle, outer or fringe of a city/town, proximity to school, workplace, shopping centre, etc.; **Neighbourhood**: e.g garden and other land that belongs to the property, fencing, access to the roads and local services and general ambience; **Environmental**: fresh air or natural beauty, polution level and etc.; **Income**: Average household income, income increment rate, per capita income, disposable income, net national income, etc.; **Credit availability**: Bank credit, housing credit, it refers to the amount of money that can be borrowed at a given time; **Inflation**: the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling.; **GDP**: Real GDP, GDP index, GDP per capita and GDP growth.; **CPI**: an index of the variation in prices paid by typical consumers for retail goods and other items.; **Stock prices/market**: KLSE, TAIEX, Shanghai Stock Exchange, stock price index, Stock Exchange of Thailand Composite Index and etc.; **Money Supply**: M1, M2 and M3; **Exchange rate**: foreign exchange rate is the price of a nation's currency in terms of another currency; **Interest rate**: the rate at which money can be borrowed.; **Business condition**: a statistical compilation that provides a context for economic or financial conditions; **Loan approved**: number of loans approved for the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets.; **Consumer sentiment** : a statistical measurement and economic indicator of the overall health of the economy as determined by consumer opinion; **Housing stock**: The total number of dwelling units that are available in a defined area.; **IPI/Product rate**: An index covering production in mining, manufacturing, services, residential property purchases; **Housing loan**: Total of housing loan.; BLR: rate set by the central bank based on how much it costs to lend money to agriculture and construction, which are used as a main short term economic indicator; **Household savings**: the outstanding amount of savings deposit of urban and rural residents; **Lending/mortgage** other Financial Institutions; **Rental price index**: chonsei price, Actual Rentals for housing; **Household savings**: the outstanding amount of savings deposit of urban and rural residents; **Lending/mortgage rates**: The rates of interest charge on a mortgage; **Developer**: amounts of premiums that developers need to pay to the federal and state government for every housing project; **Tax**: value added taxes, stamp duties, property tax rates, income tax rates; **Import and export**: domestic export, re-export, import, terms of trade; **Gold price**: the price at which gold is being traded on the gold market; **Construction cost**: cost of material, labour, technology, machinery, land (area), and transportation; **Land Supply**: square meters sold at land auctions, building permit index in most countries and amount of land available in an area.

Table 3 shows a summary of previous studies on the determinants of house prices in various countries. Overall, 72 studies were reviewed. The literature review reveals that house prices are determined by macroeconomic and microeconomic factors which can be classified as demand variables, supply factors, and institutional factors.

2.3 Demand factors

2.3.1 Macroeconomic variables

A summary of previous studies shown in Table 3 shows that house prices in various countries have been influenced by many macroeconomic variables. These factors include GDP growth, demographic structure, bank credit or money supply, disposable income, interest rates, inflation, taxation and others. Based on the 72 studies reviewed, it was found that GDP, CPI and demographic factors were commonly used in determining house prices.

Most studies show that GDP is significantly and positively correlated with house prices and increase in housing prices can have a positive effect on real GDP in various countries[16]. Tze San and Yee Shan (2013)[17] review studies on the determinants of house prices in Malaysia from 2000 until mid 2012. The determinants comprise of

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[16] Eloisa T Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Are Asia-Pacific Housing Prices too High for Comfort?" *Working Paper, Economic Research Department, Bank of Thailand*, no.11, (2007), 1-58; Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking,* (2011), 163-204; Arnold C. S Cheng and Michael K. Fung, "Determinants of Hong Kong's Housing Prices", *Journal of Economics, Business and Management,* 3, no.3, (2015), 352-355; R. Sean Craig and Changchun Hua, "Determinants of Property Prices in Hong Kong SAR: Implications for Policy", Working Paper, *International Monetary Fund,* no.11/277, (2011), 1-15; Balázs Égert and Dubravko Mihaljek, "Determinants of House Prices in Central and Eastern Europe". BIS Working Papers, *Monetary and Economic Department,* no.236, (2007), 1-26; Martijn Dröes and Alex van de Minne, "Time-Varying Determinants of Long-Run House Prices", *Working Paper, Amsterdam School of Real Estate,* no.08, (2015), 1-39.

[17] Tze San Ong and Yee Shan Chang, "Macroeconomic Determinants Of Malaysian Housing Market," *Human and Social Science Research,* 1, no.2, (2013),119-127.

macroeconomic factors of house prices. Their findings show that only real GDP rate is significant in determining the house price index compared to consumer price index and income increment rate. Meanwhile, Aminah (2008)[18] shows that more than 80 percent of the house price index variations in every model of the house price movement in Malaysia are explained by GDP.

Analysis by Ryan, Christopher, Baiding and David (2013)[19] reveals that the Beijing house price index from 2004 to 2007 are significantly influenced by economic fundamentals such as inflation, income, interest rate and construction cost. Nicholas (2003)[20] examines the dynamic effects of specific macroeconomic factors (mortgage rates, inflation and employment) on the price of new houses sold in Greece. The findings show that employment, mortgage rates and inflation positively influence real housing prices. Meanwhile, Yen Keng (2011)[21] uses the Hedonic model to analyze the factors that are correlated with house prices in Malaysia. Based on the analysis, four key determinants are found to be significant namely, real per capita income, unemployment rate, total loans and KLSE CI.

2.3.2 Microeconomic variables

House prices are strongly related to microeconomic house-specific factors. These factors can be divided into several categories namely physical (size, design and quality of structural for the building, heating and insulation system, state of deterioration and embellishment), locational (employment and recreational, educational facilities, the local rates of taxation and zero crime and dilapidation), environmental (pollution level including sound),

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[18] Aminah Md Yusof, "Malaysian Housing Investment Information Price Modelling." 1st NAPREC Conference-INSPEN, (2008), 1-30.
[19] Ryan Dong Chen, Christopher Gan, Baiding Hu and David A. Cohen, "An Empirical Analysis of House Price Bubble: A Case Study of Beijing Housing Market", *Research in Applied Economics*, 5, no.1, (2013), 1-21.
[20] Nicholas Apergis, "Housing Prices and Macroeconomic Factors: Prospects within the European Monetary Union", *International Real Estate Review*, 6, no.1, (2003), 63-74.
[21] Yen Keng Tan, "An Hedonic Model for House Price in Malaysia", *International Real Estate Conference,* 15, no.1, (2011).

surroundings and neighbourhood (garden, fencing, access to the roads and local services) and general environment[22].

A number of studies have highlighted three characteristics that influence house prices namely, physical, structural and location[23]. Meanwhile, other studies have considered physical, structural, location and neighbourhood factors as being important in determining house prices (e.g. Joseph & David, 2013; Joachim, Emily & G. Sirmans, 2007[24]). Similarly, many studies have shown that the number of bedrooms, land area, location, quantity of rooms, size of house, building type, floor area and floor level as the most important factors contributing to property values[25]. Meanwhile, Teck-Hong (2010)[26] highlights the importance of neighbourhood

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[22] Nicholas T. Longford, "A House Price Index Defined in the Potential Outcomes Framework", *SNTL and UPF*, Barcelona, Spain. Universitat Pompeu Fabra, Ramon Trias Fargas, Barcelona (n.d.)

[23] Onur Ozsoy and Hasan Sahin, "Housing Price Determinants in Istanbul, Turkey. An application of the classification and regression tree model", *International Journal of Housing Markets and Analysis*, 2, no.2, (2009), 167-178; Sibel Selim,"Determinants of House Prices in Turkey: A Hedonic Regression Model", *Dogus University Journal,* 9, no.1, (2008), 65-76; Jonathan McCarthy and Richard. W Peach, "Are Home Prices the Next "Bubble?" *FRBNY Economic Policy Review,* 10, no.3, (2004)*,* 1-17.

[24] Joseph Falzon and David Lanzon,"Comparing Alternative House Price Indices: Evidence from Asking Prices in Malta", *International Journal of Housing Markets and Analysis*, 6, no.1, (2013), 98-135; Joachim Zietz, Emily Zietz, and G. Sirmans, "Determinants of House Prices: A Quantile Regression Approach", *Department of Economics and Finance Working Paper Series*, (2007), 1-27.

[25] Xin Janet, Ge and Yue, Du, "Main Variables Influencing Residential Property Values Using the Entropy Method – the Case of Auckland", proceedings of the *5th International Structural Engineering and Construction Conference*, Shunan, Japan, (2007); Sibel Selim, "Determinants of House Prices in Turkey: A Hedonic Regression Model", *Dogus University Journal,* 9, no.1, (2008), 65-76; H. K. Oduwole and H. T. Eze, "A Hedonic Pricing Model on Factors that Influence Residential Apartment Rent in Abuja Satellite Towns", *Mathematical Theory and Modeling*, 3, no.12, (2013): 65-73; Gang-Zhi Fan, Seow Eng Ong and Hian Chye Koh, "Determinants of House Price: A Decision Tree Approach", *Urban Studies*, 43, no.12, (2006), 2301-2315.

[26] Teck-Hong Tan, "Base Lending Rate and Housing Prices: Their Impacts on Residential Housing Activities in Malaysia", *Journal Of Global Business*

factors such as gated-guarded and freehold in determining house prices. Other than that, the existence of parking garage also has a strong effect while the view of graveyard gives a negative effect on the value of property[27].

2.4 Supply factors

From the supply side, the factors that influence house prices can be categorised into land supply index, planning policy and construction costs. Previous studies on house prices have shown that a lot of researchers also include the cost of construction and land supply as important components of the supply side variables[28]. Increase in the construction cost will have a major influence on the rise of house prices. The higher financial cost of construction will decrease construction and housing stocks, the lower level of housing space will then generate higher rents and higher house prices[29].

And Economics, 1, no.1, (2010), 1-14.

[27] Raymond Y. C. Tse and Peter E. D. Love, "Measuring Residential Property Values in Hong Kong", *Property Management*, 18, no.5, (2000), 366-374.

[28] Martijn Dröes and Alex van de Minne, "Time-Varying Determinants of Long-Run House Prices", *Working Paper, Amsterdam School of Real Estate,* no.08, (2015), 1-39; Jakob. B. Madsen, "A q Model of House Prices", *Discussion Paper, Monash University*, no.03, (2011); Dennis R. Capozza, Patric H. Hendershott, Charlotte Mack and Christopher J. Mayer, "Determinants of Real House Price Dynamics", *NBER Working Paper Series*, no.9262, (2002), 1-35; Jinhai Yan, Lei Feng and Helen X. H Bao, "House Price Dynamics: Evidence from Beijing", *Front. Econ. China*, 5, no.1, (2010), 52–68; Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking,* (2011), 163-204; R. Sean Craig and Changchun Hua, "Determinants of Property Prices in Hong Kong SAR: Implications for Policy", *Working Paper, International Monetary Fund,* no.11/277, (2011), 1-15.

[29] Lu Xu and Bo Tang, "On the Determinants of UK House Prices", *International Journal of Economics and Research*, 5, no.2, (2014), 57-64; Atasya Osmadi, Ernawati Mustafa Kamal, Hasnanywati Hassan and Hamizah Abdul Fattah, "Exploring the Elements of Housing Price in Malaysia", *Asian Social Science*, 11, no.24, (2015), 26-38; Cindy Liew and Nurul Azam Haron, "Factors Influencing The Rise of House Price In Klang Valley", *International Journal of Research in Engineering and Technology,* 2, no.10, (2013), 261-272; Elizabeth Watson, "A Closer Look at Some of

Attempts have been made by Cindy and Nurul Azam (2013) and Atasya et al., (2015) to incorporate the supply variables (construction cost) in the HPI model in Malaysia. Cindy and Nurul Azam (2013) found that rising construction cost is among the most influencal factors behind the increase in house prices in the Klang Valley. This cost include land price, high technology and heavy machinery, materials, project period, difficulty in building and labour. Atasya et al. (2015) reveals that the costs of material and land are important in determining house price in Malaysia. Furthermore, an increase in land supply has a tendency to cut down house prices. Existing literature show that land supply has significant impact on house prices both in the long run and the short run. House prices also incline to be more unstable in housing markets and more flexible business environment (Jinhai, Lei & Helen, 2010; Eloisa et al., 2011; R Sean & Changchun, 2011).

2.5 Institutional factors

According to Eloisa et al., (2007)[30] institutional factors include housing regulatory framework, housing finance system, economic structure and local conditions aspects. Eloisa et al., (2011)[31] analyse the impact of institutional factors on house price dynamics by conducting a principal component analysis of four institutional indexes namely the business freedom index, financial freedom index, corruption index and property rights index in nine Asian economies. The findings show that institutional factors are important in explaining house prices in the nine Asian economies. Meanwhile, Balázs and Dubravko (2007)[32] study the impact of institutional

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the Supply and Demand Factors Influencing Residential Property Markets", *Reserve Bank of New Zealand Analytical Note Series*, (2013), 1-31.

[30] Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Are Asia-Pacific Housing Prices too High for Comfort?" *Working Paper, Economic Research Department, Bank of Thailand*, no.11, (2007), 1-58.

[31] Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking,* (2011), 163-204.

[32] Balázs Égert and Dubravko Mihaljek, "Determinants of House Prices in Central and Eastern Europe", *BIS Working Papers, Monetary and Economic Department,* no.236, (2007), 1-26.

factors on house prices in Central and Eastern Europe (CEE) by using the indicators of banking reform, interest rate liberalisation, indicators of security markets and non-bank financial institutions' reform Maruška (2010)[33] uses housing loans as a proxy for the availability of housing financing. Based on the review of the previous literature, we have come out with a framework as shown in Figure 2.

Based on figure 2, it is assumed that demand factors (Employment, OPR and CPI), supply factors (Construction Cost and Land Supply) and Institutional factor (Housing loan) are significantly influence MHPI.

Figure 2: Framework
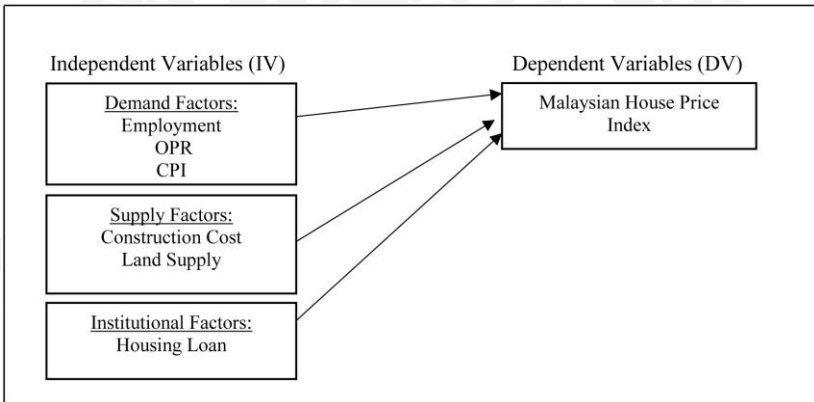
3.0 *Maqasid Shari'ah* Perspective

Owning a shelter, clothing, maintenance and food become a necessity in order to fulfill the goals of *shariah* which is welfare, benefit and happiness. However, the increase in house prices indirectly effects homeownership in Malaysia. The households from lower and middle income have difficulties in buying a house (Nor Suzylah et al., 2015)[34].

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[33] Maruška Vizek, "Short-run and Long-run Determinants of House Prices in Eastern and Western European Countries", *Economic Trends and Economic Policy*, 125, (2010), 27-59.

[34] Nor Suzylah Sohaimi, Alias Abdullah, Syafiee Shuid and Azila Ahmad

Ahamed Kameel et al., (2006)[35] indicate in their study that individuals fulfil this need by building a home on their own, buying it or leasing it from others. Since individuals are not in a position to pay for their houses in a lump sum, the availability of mortgage loan is one way to ensure homeownership (Hanira, 2012)[36]. In order to avoid interest *(riba)* while reducing the cost of houses and the duration of financing, prior studies suggested to use house price index or rental rate as a benchmark to determine the price of Islamic home financing product (Rosylin et al, 2016; Rosylin, 2011; Ahamed Kameel et al., 2006).

By having HPI or rental rate as a benchmark, it can give opportunity to the banks to have a justifiable pricing charge towards the parties involved in the contract since the index value differs according to locality (Rosylin et al., 2016). Besides that, it also in line with objectives of *shariah* to allows people with limited initial capital to own homes. In doing so, it promotes the welfare of the society (Ahamed Kameel et al., 2006).

The *maqasid shariah* can help to achieve justice and well-being of all people through certain guidelines (Hanira, 2012). According to Mohd Azmi et al., (2010)[37] benchmark pricing is used as guide and indicator for pricing. Having a benchmark for pricing is accordance with the objectives of *shariah* which is to establish justice and fairness in financial transactions.

Sarkawi, "An Overview of *Masaqid Al-Syariah* on Homeownership and Young Graduate's Wellbeing through Sustainable Affordable Housing", *Social Sciences Postgraduate International Seminar*, (2014).

[35] Ahamed Kameel Mydin Meera, Dzuljastri Abdul Razak and Razali Haron, "Musharakah Mutanaqisah and Al-Bay' Bithaman Ajil Contracts As Means For Homeownership: A Conceptual Comparison", Paper presented at *Young Scholars Conference*, UITM and Islamic Development Bank, Langkawi, Malaysia, (April, 2006)

[36] Hanira Hanafi. "Critical Perspectives on *Musharakah Mutanaqisah* Home Financing in Malaysia: Exploring Legal, Regulative and Financial Challenges", Doctoral theses, Durham University, (2012).

[37] Mohd Azmi Omar, Azman Md Noor, Ahamed Kameel Mydin Meera, Turkhan Ali Abdul Manap, M Shabri Abdul Majid, Sharifah Raihan Syed Zain and Md. Ali Sarip, "Islamic Pricing Benchmarking". *ISRA Research Paper*, no.17, (2010).

In contrast to the interest rate, a house price index will be directly linked to the asset (Ahamed Kameel et al., 2006). A benchmark is not meant to fix a price but rather acts an indicator and a guide to pricing (Mohd Azmi et al., 2010). Establishing a benchmark also may help the regulator to ensure fraud and manipulation do not occur in the market and in line with the principle of *shariah*. Futhermore, having a benchmark for pricing is also supported by the fact that Islam honours the ownership of individual property and the freedom to utilize it whilst not violating the rights of others.

4.0 Methodology

The aim of this study is to examine the determinants of HPI in Malaysia. In doing so, we employ secondary data covering the period of 2008:Q1 to 2015:Q4. Data is extracted from various sources namely NAPIC, BNM, DOSM and CIDB. The measurements of variables used in this study are summarized in Table 4.

Table 4: Measurement of Variables

Variables	Measurement	Sources
House Price Index (HPI)	Malaysian House Price Index	NAPIC
Construction Cost (CC)	Building Cost Index	CIDB
Land Supply (LS)	Housing Permit Approvals	BNM
Employment (EMPT)	Employed Persons by Industry	BNM, DOSM
Housing Loan (HLN)	Housing Loan Approved	BNM
Inflation	Consumer Price Index	BNM
Interest rate	OPR	BNM

Table 4 depicts the proxies and sources of the variables used in this study. Since CC and LS are the supply factors that were widely used in the literature, we include both variables in our analysis as the determinants of HPI. Besides, one institutional variable namely HLN is also included in the model.

4.1 Empirical Model

a) Unit Root Test

In this study, unit root test is utilized to check whether all the chose

factors are stationary at level $I(0)$ or at first differences $I(1)$. The presence of a unit root show that a certain variable is not stationary. This study applies the Augmented Dickey Fuller (ADF) test in order to test for the presence of a unit root in all variables. The regression of ADF serves to solve the issue of serial correlation at the first differences.

b) Autoregressive Distributed Lag (ARDL)

In this analysis, we adopt the bound testing and autoregressive distributed lag (ARDL) model which was developed by M Hashem, Yongcheol and Richard (1996)[38]. The explanation for choosing this approach is because it is straightforward and does not require all variables to be $I(1)$ like Johansen. Besides, this approach is also more reliable for a small sample and our study only have 32 observations. Furthermore, Paresh Kumar (2005)[39] reaffirms that ARDL model approach is systematic and unbiased. At the same time, this cointegration model is also able to fully capture the short run and long run components of the model simultaneously.

Generally, ARDL requires a standard procedure which includes stationary test and cointegration test. Stationary test can be carried out through unit root test while cointegration test can used the ARDL bound testing approach. ARDL bound testing approach requires a few stages. Firstly, the cointegration between the selected variables need to be identified through the Error Correction Model (ECM) process. Secondly, we need to estimate the long-run relationship between house price index and the selected variables. Lastly, by using residual diagnostic test, we have to check for serial correlation, functional form, normality and heteroscedasticity for the analysis model. Besides that, in order to test the stability of our variables, the cumulative sum of recursive residual (CUSUM) and cumulative sum of square recursive residual (CUSUMSQ) have been

[38] M Hashem Pesaran, Yongcheol Shin and Richard J. Smith, "Testing for the existence of a long-run relationship", *Working Paper, Department of Applied Economics, University of Cambridge*, Cambridge, no.9622, (1996).
[39] Paresh Kumar Narayan, "The saving and investment nexus for China: evidence from cointegration tests". *Applied Economics,* 37, no.17, (2005), 1979-1990.

performed. The optimal lag length selected is based on the Akaike Information Criteria (AIC) which is considered to be equal to 2. The ARDL model used in this study can be articulated as follows:

$$HPI = \alpha_0 + \alpha_1 EMPT + \alpha_2 CPI + \alpha_3 OPR + \alpha_4 CC + \alpha_5 LS + \alpha_6 HL + e_t$$

HPI	= House Price Index
EMPT	= Employment
CPI	= Consumer Price Index (Inflation)
OPR	= Overnight Policy Rate
CC	= Construction Cost
LS	= Land Supply
HLN	= Housing Loan
e_t	= Error term

The ARDL approach to cointegration involves estimating the conditional error correction (EC)[40]. The ARDL model for house price index and its determinants are:

$$
\begin{aligned}
\Delta\, HPI_t = a_0 &+ \sum_{j=1}^{k1} b_j\, \Delta\, HPI_{t-j} + \sum_{j=0}^{k2} c_j\, \Delta \ln EMPT_{t-j} + \sum_{j=0}^{k3} d_j\, \Delta\, OPR_{\,t-j} \\
&+ \sum_{j=0}^{k4} e_j\, \Delta\, CPI_{t-j} + \sum_{j=0}^{k5} f_j\, \Delta\, CCI_{t-j} + \sum_{j=0}^{k6} f_j\, \Delta \ln LS_{t-j} \\
&+ \sum_{j=0}^{k7} f_j\, \Delta \ln HLN_{t-j} + n_1\, HPI_{t-1} + n_2 \ln EMPT_{t-1} \\
&+ n_3\, OPR_{t-1} + n_4\, CPI_{t-1} + n_5\, CCI_{t-1} + n_6 \ln LS_{t-1} \\
&+ n_7 \ln HLN_{t-1} \\
&+ \epsilon_t
\end{aligned}
$$

The error-correction dynamics is represented by the terms with the summation signs, while the long-run relationship is represented by second part. ϵ_t, which refers to the random error term.

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[40] M Hashem Pesaran, Yongcheol Shin and Richard J. Smith, "Bounds testing approaches to the analysis of level relationships", *Journal of Applied Econometrics,* 16, no.3, (2001), 289-326.

5.0 Findings and Analysis

This section discusses the results of the methodology used in this study. We first tested the descrriptive analysis of this study and the result are presented in table 5 below then the stationarity of all the variables used have been tested by using Unit Root Test. The results of the methodology used are discussed in the following sub-section.

a) Descriptive Analysis

Table 5: Summary of Descriptive Analysis

	LNHPI	LNEMP	OPR	CPI	CCI	LNLSI	LNHLN
Mean	4.832	2.524	2.937	105.120	96.908	4.518	3.104
Median	4.841	2.536	3.000	104.900	98.322	4.528	3.078
Maximum	5.125	2.648	3.500	112.600	104.758	4.889	3.480
Minimum	4.529	2.367	2.000	99.500	89.181	4.118	2.401
Std. Dev.	0.186	0.102	0.458	3.554	4.986	0.191	0.289
Skewness	-0.064	-0.350	-0.937	0.410	-0.113	-0.400	-0.920
Kurtosis	1.806	1.727	2.909	2.418	1.682	2.451	3.180
Jarque-Bera	1.922	2.813	4.684	1.348788	2.386	1.257	4.562
Probability	0.383	0.245	0.096	0.509465	0.303	0.533	0.102
Sum	154.620	80.781	94.000	3363.830	3101.056	144.565	99.318
Sum Sq. Dev.	1.068	0.320	6.500	391.5965	770.503	1.134	2.595
Observations	32	32	32	32	32	32	32

The table of descriptive analysis above shows that the mean and median values for all variables vary with minimal standard deviation and suggest that that the data are distributed evenly. Kurtosis values of close to 3 or less further reflect that the data are all normally distributed.

b) Unit Root Test

Unit root test is used to confirm whether all the selected variables are

stationary at level, I (0) or at first difference, I (1). The existance of a unit root demonstrates that a certain variable is not stationary. This study applies the Augmented Dickey Fuller (ADF) test to test for the occurrence of a unit root in all variables.

Table 6: Summary of Unit Root Test

Variables	$I(0)$ level		$I(1)$ 1st Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
HPI	-0.221	-2.580	-5.022***	-5.353***
EMPT	-1.886	-1.623	-5.731***	-5.790***
CPI	0.021	-11.728***	- 4.971***	-5.279***
OPR	-1.327	- 5.065**	-5.384***	-5.343**
CCI	-2.012	- 3.570*	-6.724***	-6.651***
LS	-1.487	-1.253	-5.609***	-5.635***
HLN	-2.670	-1.452	-4.625***	-5.097**

Null Hypothesis (H₀): There is a unit root.
***significant at 1 percent level
**significant at 5 percent level
*significant at 10 percent level

Table 6 presents the results of the unit root test for the variables in the study. According to Table 6, it can be concluded that it is in line with M Hashem et al., (2001), the results recommend that the selected variables are significance at $I(0)$ or $I(1)$ and thus justify the ARDL cointegration test.

c) Results of the ARDL Model

Table 7: Results of Bound Testing Procedure

Cointegration Hypotheses	F-Statistics
$HPI = \alpha_0 + \alpha_1 EMPT + \alpha_2 CPI + \alpha_3 OPR + \alpha_4 CC + \alpha_5 LS + \alpha_6 HLN + e_t$	6.912***

Notes: *F-statistics exceeds the ***1 percent upper bounds; the relevant critical value bounds are taken from Paresh Kumar's (2005).*

As is evident in Table 7, the computed F-statistics for the model suggests that there are cointegrating relationships among all the selected variables at the selected lag length. The findings also imply that HPI is significantly influenced by the independent

variables in the long run. The next step is to estimate the long-run coefficients of the ARDL model. Table 7 presents the findings for each model.

Table 8: Results of Long Run ARDL Model

	Coefficient	SE	Prob.
EMPT	0.855908	0.169297	0.0001***
OPR	0.155865	0.025419	0.0000***
CPI	0.028786	0.003164	0.0000***
CCI	0.001050	0.001976	0.6029
LS	0.301687	0.090833	0.0047**
HLN	-0.197656	0.084691	0.0339*
C	-1.662112	0.588680	0.0128*

***significant at 1 percent level
**significant at 5 percent level
*significant at 10 percent level

As evidenced in Tables 8, EMPT, OPR, CPI, LS and HLN are found to be significantly related to HPI. The findings also indicate that in the long run, all the independent variables except CCI are related to HPI. The finding that CCI is not significant in determining HPI is consistent with Visar and Alenka Temeljotov (2014)[41], which found construction cost did not support the validation of construction costs as a significant determinant of housing prices in Kosovo. Meanwhile, Lu and Bo (2014)[42] found the construction cost is less sensitive compared with other countries in the UK. Interestingly, supply-side factor (land supply) is found to be significant in determining the HPI. This result is consistent with Jinhai, Lei and Helen (2010), Eloisa et al., (2011) and R. Sean and Changchun (2011)[43] who evidenced that

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[41] Visar Hoxha and Alenka Temeljotov Salaj, "Fundamental Economic Factors that Affect Housing Prices: Comparative Analysis between Kosovo and Slovenia", *Management*, 9, no.4, (2014), 323-348.

[42] Lu Xu and Bo Tang, "On the Determinants of UK House Prices." *International Journal Of Economics and Research*, 5, no.2, (2014), 57-64;

[43] Jinhai Yan, Lei Feng and Helen X. H Bao, "House Price Dynamics: Evidence from Beijing." *Front. Econ. China*, 5, no.1, (2010), 52-68; Eloisa T. Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking,* (2011), 163-204; R. Sean Craig and Changchun Hua, "Determinants of Property Prices in Hong Kong SAR: Implications for Policy", Working Paper, *International Monetary Fund,* no.11/277, (2011),

land supply has significant impacts on house prices. This result is further echoed by Albert Mutonga (2015)[44] which found that house prices have been increasing as a result of lack of serviced land. The scarcity of serviced land exerts an upward pressure on prices of plots and consequently leading to the increase in house prices. Similarly, the institutional factor (housing loan) tested in this study is also found to be positively significant in determining the HPI. To test for the long run stability of both models, the CUSUM and CUSUMQ tests are applied on the model. The results in Figure 2 propose that there is no proof of any significant structural instability.

Figure 3: CUSUM and CUSUMSQ Tests for HPI
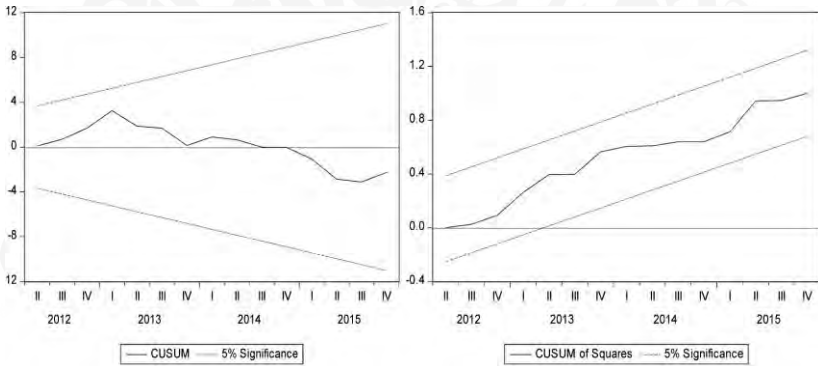
6.0 Conclusion

This study aims to propose an enhanced house price index in Malaysia. A credible and accurate house price index is important in order to accurately measure the changes in house prices. The house price index is driven by the interaction between demand and supply factors. By using ARDL analysis technique, the selected variables (employment, OPR, CPI, construction cost, land supply and housing loan) from year 2008 until 2015 were   tested. Based on the analysis,

1-15.

[44] Albert Mutonga Matongela, "A Quantitative Investigation into Determinants of House Prices in Namibia", *Journal of Economics and Sustainable Development*, 6, no.4, (2015), 1-7.

the Malaysian House Price Index (MHPI) was found to have a long run significant relationship with employment, OPR, CPI, land supply and housing loan while construction cost is not significant with the MHPI. This indicates that the construction cost factor does not influence the increasing of MHPI. Besides that, the study also provides evidences that supply factors are also significant in determining HPI in Malaysia. It implies that the inclusion of the supply variables to be incorporated in determining the HPI in Malaysia is necessary as it would be more accurate to be used as a benchmark of housing market in the country. This enhanced model of HPI captured the price from both the demand and supply factors.

Acknowledgement

AL-SHAJARAH
Special Issue

Contents

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