

Equilibrium Price Modelling of an Affordable Housing in Malaysia

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Abstract— The main purpose of this study is to propose the equilibrium price modelling for affordable housing in Malaysia. This paper examines whether the equilibrium price of affordable housing is strongly related with any affordable housing demand factors (house price, housing physical state, monetary status, population changes, location, and infrastructure amenities provided) and affordable housing supply factors (house price, cost of construction, land availability, population changes, location, and government interventions). The empirical data of housing prices are collected from Valuation and Property Services Department of the Ministry of Finance Malaysia from 1995 to 2015. Regression analysis is conducted to see the strength of relationship between the affordable housing demand and supply factors with the affordable housing equilibrium price. The paper is useful for buyer and private developers to know which factors lead to equilibrium price of affordable housing. This paper can serve as a guide for the government in controlling and stabilizing the affordable housing price.

Keywords— *affordable housing demand and supply, affordable housing prices, monetary status, population changes, land availability, cost of construction, government intervention*

1. Introduction

In recent decades, the affordable housing market has steadily increased all over the world until today. The increasing global population is not on par with the development of affordable housing especially in the city [14], [29]. The imbalance between demand (DD) and supply (SS) in the affordable housing market has caused the housing market price become imbalanced. Therefore, starting the year 2014, developers must build at least 20 percent low-cost houses and 20 per cent medium-cost houses in a housing project. The houses are open to first-time buyers with a monthly household income of RM3,000 for low-cost houses and a maximum of RM6,000 for medium-cost houses [3]

In addition, Malaysia has introduced some schemes to overcome this problem, the supply for affordable housing units still do not match the demand side. This happened because the developers more prefer to develop luxury properties instead of affordable housing projects [26]. Besides that, most of the private housing developers used the cost-based pricing method to determine the price of residential properties [1]. The cost-based pricing method is

referring to the total up from the land cost, construction cost, and soft cost. Even though the local authorities had set the price ceilings for certain housing category but the developers still disobeyed the regulations [26]. This is happen because the developers are forced to pay high amounts of constructions premium to the state government besides the soft cost, which act as a hidden cost in the housing development projects [1]. Therefore, developers will include the addition costs when pricing the house [22].

As a result, our housing market will face surplus in high cost housing [17]. The impact is, the buyer cannot afford to buy the house and the speculators will control the housing situation until the house price boomed like nowadays. Furthermore, effects from the uncontrolled housing prices nowadays bring a huge total number of squatters by each state across our country. Squatters will continue to be widespread among the low and lower middle-income households in urban areas as long as the issue of inadequate supply of affordable housing is still unresolved [26].

Therefore, in such situations that already discussed by NAPIC, EPU, *Sinar Harian* and Ministry of Finance the implementation of an equilibrium price modelling for affordable housing in Malaysia should be proposed in order to make sure they set an equilibrium price on par with household income. As a result, this study aims to construct the equilibrium price for affordable housing for the middle class-income in Malaysia.

The objectives of the present study are:

- To identify the equilibrium price for affordable housing for the middle class income
- To construct the equilibrium price model for affordable housing for the middle class income
- To analyses the relationship between macroeconomic factors with equilibrium house price

2. Literature Review

Affordable housing does not mean only the best price of a house, but also interests in achieving amenities and facilities in low cost areas, so that a wider socioeconomic range of households will choose to locate [4]. National Research Venture (NRV) is important as it seeks to view

affordability in terms of economic criteria, in addition to a wider range of quantitative and qualitative criteria that affect a household's quality of life. It also offered a criteria system representing sustainable affordable housing includes; housing, jobs, shops, services, transport and green spaces are important factors for forming successful communities [6],[20].

Therefore, econometric methodologies could be employed to construct a model that the relative significance of various characteristics are defined and their influence on price levels from one time to another, or between one region and another, are allowed for simultaneously [27]. This is the concept used in the hedonic pricing model. Once the exact mathematical relationship between the house price and the house attributes is determined, it should be possible to derive the market price of a house [27].

Nevertheless, Malaysia also has its own concept on the definition of affordable housing. Based on the several definitions and general statements of affordable housing outlined in documents such as the National Urban Policy, National Physical Plan-2, National Housing Policy, the 10th Malaysia Plan, a concept paper 'My First Home Scheme', concept papers 'Malaysia Housing (PR1MA)' and the paper 'affordable housing in Asia', it can be summarized that the definition of affordable housing, include houses built for low-income households, low-medium households and medium households. It is also related to the ability of the households to pay at least 1/3 of the total household income for the purpose of payment (own ownership or lease) [28].

Specifically, the affordable housing is included [17]:

- i. Various types of low-cost houses priced at RM42,000 and below (low-cost private, Public Housing Program - PPR / National Housing Department and the Housing Program *Mesra Rakyat* / Affordable Housing Program - NHC);
- ii. Various types of low-medium cost houses priced between RM42,000 - RM80,000 (medium low cost private and public); and
- iii. Various types of medium-cost houses priced not exceeding RM300,000 (i.e. the ceiling price set at the national level refers to the maximum price PR1MA house.

Therefore, this research set the price for affordable housing market for middle class income is RM300,000 by considering into the MURNInets house price definitions.

Like any other market, determinations of equilibrium prices are determined through the interaction of supply and demand or sellers and buyers in the marketplace. Graphically the market price is determined as the intersection of the demand and the supply curves at which $QD = QS$. This intersection point represents the price at which the number of willing buyers equals the number of supply provided by seller (see Figure 2.1). Shifting demand and supply curve affect the market equilibrium point [13].

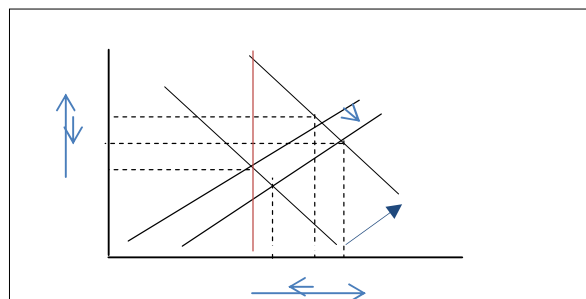


Figure 2.1: Demand and supply curve [13]

As affordable housing prices issues is highlighted around the world, there are some models developed by past researcher in order to solve the affordable housing prices issues that burden the household [18]. Lancaster and Rosen proposed the hedonic price model based on the theoretical microeconomic framework. However, this model only stressed on the sphere of macroeconomics factors such as location and accessibility of neighbourhoods [19].

The theory seems can only propose the macroeconomic factors theoretically and not empirically as it cannot design the method on how to set the appropriate price for affordable housing to low and middle-income group of households [21]. Ideally, the implicit prices should represent the 'ceteris paribus' effect on house prices. If the assumption of exogenous independent variables does not hold, we get biased estimates on the implicit prices, and they cannot be interpreted as partial effects [21].

Recently, an increasing number of hedonic studies use quasi-experimental methods to obtain unbiased estimates on implicit prices in particular when a time-dimension is important [24]. The idea of using panel data in hedonic house price analysis is not new, however. Traditionally, the method is used in order to obtain information on the pure price change of house prices. This implies accounting for a range of observed quality differences and unobserved time constant characteristics, so that the pure price change can be estimated [7],[11].

Even there are some models and theories related to the achieving EP affordable housing model reviewed, the inherent differences between affordable housing prices and the low-cost housing prices may result in the

ineffectiveness of these models [11]. Therefore, the hedonic price model seems suitable to be applied in this research since it involved the macroeconomic determinants on the achieving real equilibrium price for housing.

2.1 Theoretical Background

2.1.1 House Price

In general, if the price elasticity is less than one demand it is considered as an inelastic. An inelastic demand schedule implies that demand is insensitive to price increase or, that a large price increase induces relatively small decrease in the quantity demanded [5]. In reality, developers and investors would always prefer to face inelastic project demands because if the prices increase, revenue will increase as well, as demand/absorption does not decrease enough to eliminate the gains from rent increase [18]. So even if the actual cost of the new houses is far lower than the market price, they will be sold at a higher market price. As the current medium-cost housing keep increasing every year, the 'sandwich group' are more preferred to buy an affordable housing [18], [26].

Moreover, the medium-cost house price offered by developers seem not compatible and on par with monthly income of household. In addition, even the house is the medium-cost house category, they still offered the price by not looking with the current state of property location [18]. Even most of the affordable housing areas located at the sub urban areas, the location are still strategic with all the amenities and facilities provided nearby [26].

2.1.2 Consumer preferences

The occurrence of distortions in the housing market burdens are more prone to the middle income and low-income group. However, only the state of Melaka stood out as under affordable for housing affordability [15], [17]. The housing affordability for Terengganu, Kuala Lumpur, Pulau Pinang, and Sabah are stood out as severely unaffordable compared to other states in Malaysia. According to the Utusan Online social developments nowadays give a high impact to housing development [12]. Even the affordable housing area usually located at sub urban, the buyer still can find the facilities and amenities nearby the housing area [12]. Moreover, the affordable housing physical state also filled the buyer requirements and satisfaction in choosing houses because it always provided minimum three bedrooms with two bathroom inside it [10], [14].

2.1.3 Monetary status

Very few can buy a house with cash. For the vast majority, buying a house requires credit and so the availability and cost of credit are important factors in the demand for housing. Moderate of financial availability with high monthly rental cost with moderate household income contribute to the high-pressure debt burden of middle income of households [15].

Having credit however does not make a house cheaper, even if government policy and interventions can make the monthly instalment payments lower [22]. While measures to make credit more available and less costly may seem to make housing affordable, our position is that affordable housing means lowering the price of housing and not increasing the debt burden of households [15], [22].

2.1.4 Changes of Population Structure

As the population in Malaysia is continuing to increase, people need more houses to live in but the production of housing is slow due to the many laws, regulations and procedures related to the building of houses [3]. Moreover, the changing of total population placement happen due to many factors. Migration of youth from rural to urban to seek the employment opportunities occur most heavily as the development of urban areas are growing faster [22]. In fact, the occurrence of housing market distortions created by the developers especially in the urban area forced the youth and middle-income group to switch to the affordable housing [22], [26], [29].

2.1.5 Interest Rate

The cost of borrowing are decreases as mortgage interest rates decline. While lower retail interest rates may directly reduce ongoing mortgage repayments, they also increase demand in the buyers' market, which pushes up the price of residential housing if the supply of dwellings is insufficient [1]. Nevertheless, the interest rate for the affordable housing loan still same with other loan houses. This is because the interest rate imposed to the cost of borrowing is based on the amount of borrowing. The more loan borrowed, the low interest rate will be imposed [19].

However, the existing scheme introduced by government can increase the tendency of loan house borrowing among the middle-class income especially for youth. 50% stamp duty exemption on transfer documents and loan agreement, 10% of loan guarantee for affordable housing and offering incentives of up to RM30,000 per unit by government can benefit the home buyer [15].

2.1.6 Land Availability

Land availability and the land release process also affect the supply of affordable housing [15]. The government will release land for affordable housing development as the demand for the affordable housing increase [10]. Competition between other types of construction and infrastructure cost forces the developers to build the affordable housing at other locations [10]. Therefore, the developer will develop the affordable housing at the sub urban area to reduce the land cost of exclusionary zoning for middle-class income [9].

2.1.7 Construction Cost

The main cause of surging prices of properties in Malaysia is the high amount of premiums that developers need to pay to the federal and state government for every housing project [29]. In addition, supplying the affordable housing unit stocks is not contributing high anticipation of capital gain [29]. Developing the affordable housing is more to give an adequate supply of affordable housing towards middle-class income instead of gaining margin. Therefore, government need to cut down premiums payable by the developers so that their construction costs are lower which allow them to build more affordable homes [22].

However, the most of the construction cost expensed include labour, raw material, equipment, financing from a bank and the services involved in building the house [12]. The labour force is the total number of the people who are employed or seeking a job in Malaysia. The population means the whole number of people in a country. The price of housing is determined by housing supply and demand, with equilibrium occurring when the demand for housing equals the supply of housing [10].

Figure 2.2 shows the theoretical framework from the summary of the theoretical background for the supply and demand factors, which have influenced the cost of affordable housing. It is important to distinguish between the supply of existing and new dwellings when considering the factors that impact on affordable housing supply.

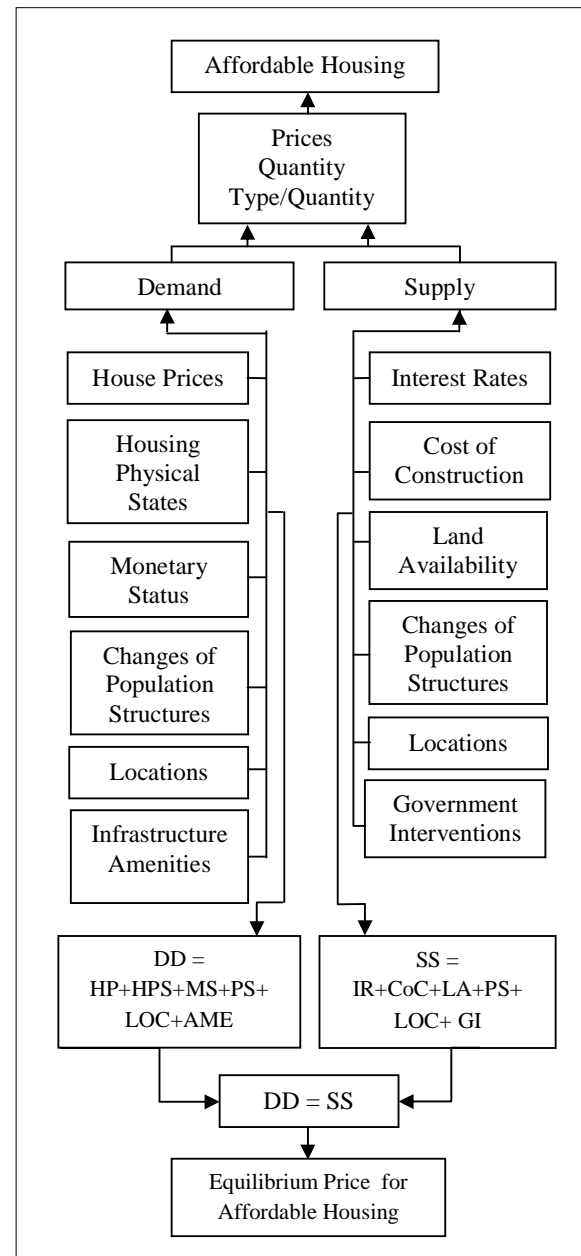


Figure 2.2: Theoretical Framework

Hypothesis developed:

Demand side

- H1 : There is a significant impact between house prices towards the equilibrium price of affordable housing.
- H2 : There is a significant impact between housing physical states towards the equilibrium price of affordable housing.
- H3 : There is a significant impact between monetary statuses towards the equilibrium price of affordable housing.
- H4 : There is a significant impact between changes of population structure towards the equilibrium

- price of affordable housing.
- H5 : There is a significant impact between locations towards the equilibrium price of affordable housing.
 - H6 : There is a significant impact between infrastructure amenities towards the equilibrium price of affordable housing.

Supply side

- H1 : There is a significant impact between interest rates towards the equilibrium price of affordable housing.
- H2 : There is a significant impact between costs of construction towards the equilibrium price of affordable housing.
- H3 : There is a significant impact between land availability towards the equilibrium price of affordable housing.
- H4 : There is a significant impact between changes of population structure towards the equilibrium price of affordable housing.
- H5 : There is a significant impact between locations towards the equilibrium price of affordable housing.
- H6 : There is a significant impact between government interventions towards the equilibrium price of affordable housing.

3. Methodology

To achieve research aim and target, data collection method used in this research are document analysis and survey method. Both instruments used the Statistical Package for Social Sciences (SPSS) software. Results obtained will be presented in the appropriate way followed the research objectives targeted. All the objectives need to be answered in order to develop an EP model for affordable housing market in Malaysia.

A benchmark for housing data series set for objective one set at a price range below RM300,000 since the year 1995 until 2015 from DD side and SS side respectively. Total DD and SS produced will be compared for each year before being regressed using SPSS software to obtain a regression value of DD and SS. Later, DD and SS curve will be developed to get the EP for affordable housing market in Malaysia. Later the data will be analyzed by using regression method using SPSS software to get the DD value from the following equations form:

$$Q_D = \alpha - \beta P \quad (1)$$

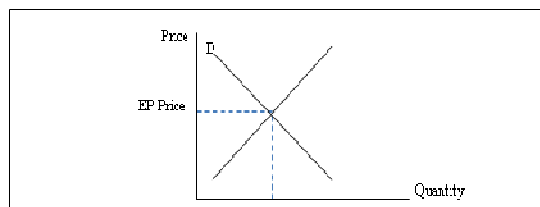
$$Q_S = \alpha + \beta P \quad (2)$$

The raw data about the housing sales performance beginning year 1995 until 2015 for housing price below

RM300,000 will be analysed by using SPSS software regression method to find the α and β value. Later, α and β value will be substituted into their equations respectively. Therefore, the DD and SS value regressed by SPSS software can develop an EP model application. Graphically the EP market price is determined at the intersection of the demand and the supply curves while in the mathematical terms this is the price at which:

$$Q_D = Q_S \quad (3)$$

All the steps bring to the application of the EP model as the following:



Objective three is to analyse the relationship between macroeconomic factors with equilibrium house price. Two types of group respondents were chosen to answer a set of questionnaires. The first set of questionnaire from side SS will be deliver to households group and the second set of questionnaire from DD side will be delivered to the developers group. The data collected hence will be analysed by using SPSS software to get the regression value for each factors identified from DD and SS side respectively. All the results will be used to support the development of EP model from objective one and two.

However, before performing regression analysis, tolerance and variation inflation factor (VIF) tests, none of these tests detected multi-collinearity among the variables. The regression model can be built as below:

$$DD = HP + HPS + MS + PS + LOC + AME \quad (4)$$

Where,

- HP : House Price
- HPS: Housing Physical State
- MS : Monetary Status
- PS : Changes in Population Structure
- LOC: Locations
- AME: Amenities

$$SS = IR + CoC + LA + PS + LOC + GI \quad (5)$$

Where,

- IR : House Price
- CoC : Housing Physical State
- LA : Monetary Status
- PS : Changes in Population Structure
- LOC: Locations
- GI : Government Interventions

4. Discussion

From the previous literature review, it is clear that there is a need to study the equilibrium price for affordable housing in Malaysia presently, coinciding with current policy and socioeconomic condition. Literature on affordable housing that cover uncontrolled construction costs for affordable housing are like Glaeser et. al [8], Sadi et al [25], Alghabari et. al [2] and Labin et al [16]. Many studies have agreed that finding equilibrium price for affordable housing is quite complex due to the macroeconomic and microeconomic changes Tan [27], Akhirudi [1], Osmadi [22], Osland [21] and NAPIC [18], [19]. The paper has found many literature covering the shortage of affordable housing supply, performance indicators for affordable housing and effect of construction cost towards affordable housing price.

This research is used quantitative in character. This research is based on the primary and secondary data. First, pilot articles will be done by doing intensive reading from leading journals. Research gap, research theory, research methodology, and research scope identified based on the previous studies carried out. The majority of the articles were obtained from established leading journals such as Science Direct, Emerald, and other resources related to studies. The research gap is obtained from the articles and current studies discussed by past researchers. All the proposed issues and proposed future research will be considered in finding a gap for the research.

Besides that, other primary data from various materials and media that discuss equilibrium house price issues will also be a part of completing the research process. Apart from that, research problem and objectives will be develop in order to fill the gap identified. To achieve research aim and target, data collection method used in this research are document analysis and survey method. Both instruments will later be analysed by using the Statistical Package for Social Sciences (SPSS) software. Results obtained will be presented in the appropriate way followed the research objectives targeted. In fact, this research shows the sequential relation between objectives as the first objective is related to the second objective and the second objective is related to the third objective. Hence, all the objectives need to be answered in order to develop an EP model for affordable housing market in Malaysia.

A benchmark for housing data series set for objective one is set at a price range below RM300,000 since the year 1995 until 2015 from DD side and SS side respectively. Total DD and SS produced will be compared for each year before being regressed using SPSS software to obtain a regression value of DD and SS. Later, DD and SS curve will be developed to get the EP for affordable housing market in Malaysia. The data collection for objective three is collected by using questionnaires. The data will then be analysed using SPSS software to get the

regression value for each factor identified from DD and SS side respectively. All the results will be used to support the development of EP model from objective two.

5. Conclusion

The main fundamentals in obtaining the equilibrium price (EP) for affordable housing market are demand and supply variables. The two variables are driven effects from many aspects and they are different according to countries based on previous studies. The suitability of equilibrium price model approach to get the real equilibrium price house seems to have been approved as current studies use it to promote new design of house prices.

Thus, this study aims to identify the research gap as mentioned earlier in the beginning of this chapter. The factors identified as a contributor to the equilibrium price of affordable housing will be carried out. Hence, in order to get appropriate and nearly equilibrium house price, consumers, government, and developers should cooperate to ensure that the market works efficiently.

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