

AUCTION PRICE INDEX MODEL FOR RESIDENTIAL PROPERTIES

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DEDICATION

“To my beloved father and mother, and siblings, thank you for all your support in terms of spiritual and encouragement”

“To all my fellow friends, thank you for all your support.”

To my supervisors who guided and helped me,

Prof. Sr Dr. Hishamuddin Bin Mohd Ali

Dr. Muhammad Najib Bin Mohamed Razali

Dr. Janice Lee Yim Mei

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ABSTRACT

The purpose of this study is to develop an auction price index model for residential properties. The model is needed to solve the problem of the unavailability of an auction property price index in Malaysia which is important in monitoring market price movement. The thin nature of auction property market has prompted this study to explore the applicability of rank transformation regression model for the auction property market data instead of using the conventional hedonic price model as employed in the Malaysian House Price Index. Data of high-rise auction property sold from year 2010 to 2014 in Kuala Lumpur was collected from Lelongtips.com. Review of journals, newspapers, legal acts as well as interview with valuers, auctioneers and lawyers were conducted in order to determine the factors to be considered in developing the auction property price model. The rank transformation regression model was analysed, its predictive power and precision performance were validated. This is followed by the application of hedonic Laspeyres Index method to construct the auction property price index. The result shows that rank transformation regression price model is applicable for traded auction property data. The quarterly Auction Price Index built from 2010Q1 to 2014Q4 revealed that the residential auction sale price is on an increasing trend, averaging at 2.4%, with some fluctuations. The construction of auction property price index through the integration of quarterly rank transformation regression and hedonic Laspeyres Index gives the benefit of a more accurate model prediction without the problem of geographical or temporal aggregation.

ABSTRAK

Tujuan kajian ini adalah untuk membangunkan model indeks harga harta kediaman lelong. Model indeks ini diperlukan untuk menyelesaikan masalah ketiadaan indeks harga harta kediaman lelong di Malaysia yang penting untuk memantau pergerakan harga pasaran. Sifat pasaran harta kediaman lelong yang tipis telah mendorong kajian ini untuk meneroka kebolegunaan model regresi transformasi peringkat untuk data pasaran harta kediaman lelong dan bukannya menggunakan model harga hedonik konvensional seperti yang digunakan dalam Indeks Harga Rumah Malaysia. Data harta kediaman lelong jenis bertingkat tinggi yang dijual dari tahun 2010 hingga 2014 di Kuala Lumpur telah dikumpulkan dari Lelongtips.com. Ulasan jurnal, akhbar, tindakan undang-undang serta temu ramah dengan penilai, pelelong dan peguam telah dijalankan untuk menentukan faktor-faktor yang perlu dipertimbangkan dalam membangunkan model harga harta kediaman lelongan. Model regresi transformasi peringkat dianalisis, prestasi ramalan dan ketepatan ramalannya telah disahkan. Ini disusuli dengan penggunaan kaedah Indeks Hedonik Laspeyres untuk membina indeks harga harta kediaman lelong. Hasil kajian menunjukkan bahawa model harga regresi transformasi peringkat boleh digunakan untuk data harta kediaman lelong yang diniagakan. Indeks Harga Lelong setiap suku tahun yang dibina dari tahun 2010 sehingga 2014 menunjukkan bahawa harga jualan harta kediaman lelong berada pada trend yang meningkat dengan purata pada 2.4%, walaupun terdapat beberapa turun naik. Pembinaan indeks harga harta kediaman lelong melalui penyepaduan regresi transformasi peringkat suku tahunan dan index hedonik Laspeyres memberikan manfaat ramalan model yang lebih tepat tanpa masalah pengagregatan geografi atau temporal.

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CHAPTER 1

INTRODUCTION

1.1 Background

In the real estate market, residential market is the most active market as compared with industrial and commercial property markets since residential property is actively transacted as a necessity for living as well as an investment asset. The trend of investing in property is getting eminent and can be evidenced by The Wealth Report 2014 of Knight Frank which had recorded an average of 47% of Ultra High-Net-Worth Individuals around the world is planning to increase property investments in 2014 (Shirley, Bailey, Gilmore, & James Roberts, 2014). On the other hand, the residential market is closely related to the country economic. From providing job opportunities to revenue generating for the nations and government, the enormous amount of transaction involved causing the impact of residential market can be as great as being capable for lifting or plunging the economy of a country. This can be best illustrated by the chain reaction caused by the collapse of housing bubble and credit market in the United States in year 2008 which had eventually resulted a global recession. Therefore, price movement of the residential market is always the interest for all walks of life and needed to be monitored closely.

In the residential markets, auction is one of the important selling mechanisms to sell residential properties. It is an ancient selling mechanism dates back to 500 BC and had been used by the ancient Rome civilization (8 BC) to liquidate property and estate goods (Cassady, 1967). Today, auction has grown to become an indispensable selling mechanism for treasury bills, foreign exchange, mineral right, broadband spectrum licenses and relevant to this study, real estate. Auctions are regarded as the best avenue to find the true value for an asset that is high and difficult to value (Cassady, 1967; Hungria-Gunnellin, 2013; Lusht, 1996; Stevenson & Young, 2015). The

competitive setting of an auction process often results in higher sales price for the auctioned items (Milgrom, 1989). Real estate as an asset class fit well into these criteria due to its heterogeneous attributes (location, types and building) that make it always a challenge to determine its intrinsic value. High value real estate also tends to be infrequently traded.

A glance at the current worldwide auction market, property auctions in Australia, New Zealand and Ireland best illustrate the description of auction market where expensive and specialized properties that are difficult to value are sold through auction market. In Dublin, Ireland for instance, over 60% of the properties in the highest value decile during the 1997-2004 period were sold through auction (Stevenson et al. 2010). The total residential property sales that were transacted through the auction markets in Ireland, Australia, New Zealand the U.K, United States and Singapore are 85%, (Stevenson & Young, 2004), 35% (Hurst & Reed, 2010), 19% (REINZ, 2013), 1.3% (Corder and Reinold, 2010), 1% (RealtyTrac, 2014) and 0.06 % (Colliers International, 2012) respectively.

Australia, New Zealand and Ireland are the markets that with no negative stigma attached while United States (Allen and Swisher, 2000), Japan (Idee, Iwata and Taguchi, 2011) and Singapore (Ong et al., 2005) auction markets characterized oppositely. Looking into the auction market of Malaysia, it shares the same characteristic like United States and Singapore which attached with negative stigma since these markets are predominant by distress sales initiated by financial institutions to recoup loan losses. The practice of disposing distress property via auction sales can be partly attributed by the liquidation procedure adopted by the Malaysian government through its fully owned Prokhas Sdn Bhd (previously known as Danaharta Bhd), in their efforts to dispose of real estate held by insolvent companies during the 1997 financial crisis. Most of these assets were sold by auction through auctioneers appointed by Prokhas. Although auction market in Malaysia only comprises 0.03% market share of total housing market but it is still an important market as it involves the huge transaction amount which reported at around RM2 billion in year 2017 (The Star, 2017).

Moving forward, the role of auction sale to financial institutions is becoming more important when Malaysia is currently facing the problem of sky-rocketing house price which lead to increasing trend of household debt. Malaysia household debt to GDP ratio that has been reported to be the highest in Asia at end 2013 (86.8%) is mainly driven by loans for properties and motor vehicles (MGI, 2015). Housing loan form 44.2% or equivalent to RM 377.7 billion of the total household debt as at year 2013 (Bank Negara Malaysia, 2014). Malaysia was rated as country which is vulnerable against debt by an international research firm- McKinsey Global Institute (McKinsey Global Institute, 2015). Loan default which eventually results in increasing auction sales is an alarming sign as over-leveraging can cause household to be more vulnerable to adverse shocks and pose risk to the banking system (Yahya, 2008). The best incidence that can be taken as an example is the subprime crisis which happened in United States in year 2008. Adding on that, according to data extracted from Lelongtips.com, the total value of properties being put up for auction from year 2009-2013 was as much as RM 3.2 billion (refer **Table 2.4**). The high value of auction properties coupled with high household debt to GDP ratio reflects the importance of this market.

From the demand side, auction market is gaining its popularity in Malaysia due to the steep hike in house price that had inducing more buyers to enter auction market for discounted properties. The increasing popularity and acceptance of auction market in Malaysia is also reflected from market reaction in which the auction data service providers are mushrooming as well as added classified section for auction property by renowned international online property advertising websites such as Iproperty and Propertyguru. The buyers of auction property are varying from low to high income group. Under the current hot housing market, low incomer looks for property that is under his affordability. Meanwhile, the latter looks for higher return by buying property which is below market price via auction market. Even if the auction property is in bad condition, it is common to see the successful bidder will renovate it and sell for higher return then.

The main indicators used to measure the market movement of auction market are auction price index, clearance rate and success rate. In United Kingdom, Fathom-

Zoopla auction index was co-developed by the renowned financial consultancy-Fathom Consulting and Zoopla Property Group is a time series estimate of the relative price of auctioned property (Fathom, 2015). In United States, WWM Auction Index was developed by Williams, Williams & McKissick Companies by calculated the auction performance ratio using a three-month exponential moving average. Both indices share the same similarity in which both are able to track closely on the movement of house prices. Auction price index provide a more timely indication of current conditions in the housing market since auction sales capture the prices at an early stage in the house purchasing process. (Corder and Reinold, 2010; WWM, 2015)

Clearance rate and success rate are volume-based indicators. Clearance rate was broadly used in Australia (APM, 2014; Corelogic RP Data, 2015; REIV 2015; REINSW, 2015) and New Zealand (Hurst & Reed, 2010); ANZ, 2015; Barfoot & Thompson, 2013; REINZ, 2015) to monitor the auction market. Meanwhile success rate are commonly reported in auction market of Singapore (JLL, 2015 and Knight Frank, 2012), Ireland (Allsop Space, 2014) and United Kingdom (Allsop, 2015). Methodology of auction clearance rate and success rate are mainly derived from the percentage of sold auction to unsold auction. However, calculation of clearance rate is more detailed and varies with different institutions (see Section 2.2.1). Similar to auction price index, clearance rate is also playing a role to predict the future trend of residential market (Eve, 2005). Meanwhile, success rates are only playing a role as market indicator. Although auction market in different countries are measured by different indicators, yet, it can be seen that, the volatility of auction market was functioning as a leading indicator to predict the coming trend of the overall property market besides being an alternative barometer.

1.2 Problem Statement

In Malaysia, there is only Malaysia House Price Index available to monitor the residential market. The House Price Index which captures only the non-auction residential sales data is not able to provide insight for the market trend of residential auction property. The increase of popularity and importance of auction market in

Malaysia had urge for the need and interest of all parties to monitor closely on the price movement. However, Malaysia auction market still does not have any tool of measurement for price movement of auction market. Thus, it is causing the auction market trend has never been able to be observed by market players and also contribute to the problem of low market transparency and information flow. This situation can be evidenced by literature search on the real estate journal and professional reports, magazines and newspapers in which news or information on residential auction market is hardly reported. In contrast, property services companies, government portal and newspaper frequently reported auction market information for its clearance rates, price index, transaction volume and etc. in countries (e.g., Australia and New Zealand) where auction markets are developed and transparent. Comparing the Malaysia auction market with countries, it can be seen that how the unavailability auction market movement measurement tool is factoring the underdevelopment of Malaysia residential auction market. Therefore, it is important to develop an auction price index for the context of Malaysia.

In fact, given the heterogeneity nature of property, it is challenging to develop a reliable market measurement tool that will accurately reflect the market movement especially for auction market. As the pioneer research in developing the auction market movement measurement tool for Malaysia, there is no previous empirical works which relevant to Malaysia can be taken for reference.

If looking into the United Kingdom and Unites States markets, Fathom-Zoopla price index and WWF Auction Index are the relevant references for developing auction price index for Malaysia. However, the methodology for Fathom-Zoopla price index is not publicly available. Although knowing that WWF Auction Index is calculated from the auction performance ratio using a three-month exponential moving average but the method to construct the auction performance ratio is not made public. Under this circumstance, methodology of constructing house price index will be the best reference to be reviewed since both markets are selling the same product – property. Generally, three main models which commonly used for house price index construction are repeat sales, hybrid model and hedonic model (Hana, 2011 and Berg, 2005). Among these three models, hedonic model is frequently used to develop house

price index (Atkinson and Crocker, 1992; Berg, 2005; Clapham et al., 2004; Gatzlaff and Haurin, 1997; Gatzlaff and Ling, 1994; Goodman, 1978; Hoesli and MacGregor, 2000; Meese and Wallace, 1997). Given that auction market of Malaysia is mainly used to dispose distressed properties which will only be transacted once in auction market, using repeat sale and hybrid model is not applicable. This leaving hedonic model as a suitable methodology to be adopted. In Malaysia, hedonic regression model is being used to develop Malaysia House Price Index. However, the differences between the auction and private treaty residential market urge the need of developing a different price model for residential auction property. Auction property market is characterized with different market structures and players involved if compared with housing market and thus, selection of elements or pricing attributes for pricing attributes for properties in these markets are also different. Location, market condition, size and condition of the property are the factors that would affect the house price no matter the properties are disposed in residential or auction market. However, there are additional factors that uniquely associated with auction market such as bidders, auctioneer, and so on (Anglin, 2003; De Boer et al, 1992; Johnson et al, 2007; Mayer, 1998; Ong et al, 2005; Stevenson and Young, 2015). These factors will affect the sale price of property sold in auction but does not exist in residential market. Thus, analysis on the auction property price influencer will need to counter in more factors (independent variable) if compared with housing market. This also making proper selection of pricing attributes that are uniquely associated with auction market is another issue that needs to be addressed in constructing the price index model.

In addition, auction market is thinly traded as compared with housing market in which only occupying 0.03% of the total market share of housing market. This causing the transaction data of auction market is scarcely available. In contrast, the construction of house price index often relies on large volume of database with extensive set of time-indexed regressors and dummy variables (Taher Buyong, 2008; Lusht, 2001). Despite, when zooming into local or neighbourhood housing markets, the availability of transaction data is limited and therefore considered as thin market (Shwann, 1998) In general, thin market refers to market with low transaction volume in respective of the market (Kohls and Uhl, 1990; Nelson and Turner, 1995). In fact, Malaysia auction market characterized with thin transaction is not a unique case but

same goes to the countries such as United Kingdom (Corder and Reinold, 2010), Singapore (Coliers International, 2012), United States (Realty Trac, 2014) and so on. The limitation of auction data has causing the reliable auction price index which cause the data to be volatile. Consequently, it will hinder property players in reviewing auction market.

As lower transactions is causing high transaction price noise on price estimation (Francke, 2010), innovative methodologies have been proposed to solve the problem. Modification made on hedonic model including structural time series approach (Shwann, 1998), hierarchical trend model (HTM) (Francke & Vos, 2004) and geographical aggregation using cluster analysis (Ericson, et al., 2013). Meanwhile, modification made on repeat sale model including principal component analysis factor repeat sale index (Baroni, Barthemy, & Mahdi, 2007), two-step procedures (Cleveland & Cleveland, 1979; Wand & Jones, 1994), replace dummy variables by a smooth deterministic trend function (McMillen & Dombrow, 2001; Mcmillen & Mcdonald, 2004), signal extraction approach (Goetzmann, 1992; Lindley & Smith, 1972) and structural time series approach (Goetzmann, 1992). For hybrid method, latest study on thin market house price index construction had made modification on repeat sales procedure by including pricing information from comparable houses in nearest distance that only transacted once which enable significant percentage of discarded (non-repeat sale) observations been utilized and adding calculation of pairwise distances (Guntermann, Liu, & Nowak, 2014). All these methods are innovated to increase the number of observations by geographical or temporal aggregations in order to curb the problem of price noise due to thin market.

Repeat sale method is not suitable for the nature of auction property market, especially Malaysia, which mainly for disposal of distressed property. This causing the data of same property being transacted twice and above is hardly available. Applicability of hybrid method shares the same reason since repeat sale procedure forms part of the hybrid method. Although Guntermnn et al., (2014) has shown the capability of hybrid method in price estimation for thin market even repeat sale procedure modified by including comparable property which transacted once but still this approach is not applicable to auction market of Malaysia due to limited

availability of comparable auction property. Thus, hedonic methods which modified for the purpose of thin market application (Shwann, 1998; Francke & Vos, 2004 ; Ericson, et al., 2013) still appear to be the more appropriate method to be applied in auction property market of Malaysia which is thinly traded. Even though these hedonic methods were empirically proved to be a plausible alternative, however, they are with certain level of flaws. Temporal aggregation applied in the studies of Schwann (1998) and Francke & Vos (2004) are always linked with the problem of timely situation reflection while geographical aggregation associated with potent modifiable areal unit problem.

In comparison to all these methods, the rank transformation regression appears to be more suitable in developing price index for residential auction properties. Rank transformation regression is a non-parametric method which involves the process of replacing data with ranks, in which the values of observation will be ranked in ascending order which then to be analyzed with ordinary least squares (OLS) regression. In another word, the application of rank transformation regression requires neither temporal nor geographical aggregation and thus providing an alternative thin market price index construction methodology which exempted from bias caused by these aggregations. In fact, for housing market, rank transformation regression have been long applied in property valuation of thin market (Cronan, Epley & Perry, 1986; Perry, Cronan, & Epley, 1986). Theoretically, the strength and nature of rank transformation regression fits well to the characteristic of auction property market data in price estimation as part of the process for price index development. Especially in Malaysia, the reserve price of auction property was determined through valuation by a registered appraisal. However, there is no empirical evidence as yet to prove the applicability of rank transformation regression in auction property data.

Therefore, this study suggests developing an auction price index using rank transformation regression model to address the problem of unavailability of measurement tool for the monitoring of auction market price movement in Malaysia residential auction market. Selecting the appropriate method in developing the auction market price index and further validates for its reliability are important issues to be

addressed which then contributing an empirical reference for thin market or auction price index construction methodology for future research.

1.3 Research Question

The research questions that need to be addressed are:

1. What are the attributes in developing auction price model?
2. How to evaluate the appropriate method in developing auction price model?
3. What is the suitable model to develop auction price model for residential property in Malaysia?

1.4 Research Objective

This research aims to develop a model to construct an auction price index for Malaysia auction market by exploring the applicability of rank transformation regression. Therefore, the objectives of the research are:

1. To determine the attributes for auction price index model.
2. To evaluate the model in developing auction price model.
3. To develop auction price model for residential auction sector in Malaysia.

1.5 Scope and Limitation of Study

This study is solely based on the auction market for high rise properties (condominium, apartment and flat) of Kuala Lumpur Malaysia which transacted within the year of 2010 to 2014.

The timeframe of study starts from year 2010 is to align with the base year of 2010 which adopted by the Malaysia House Price Index. At the same time, the Malaysia housing market is maintaining an uptrend during this period before the global economy hit by the downtrend of oil price with average Brent Crude Oil recorded at during this period. Given the same market trend during this period, macro economy factors are not considered in this study.

The aggregation of these three types of properties were to observe the price movement of high-rise residential auction properties of Kuala Lumpur. The property types are dummy coded to study the impact of each property type on the sale price. High rise property is chosen instead due to low transaction volume of landed properties.

The result of this study does not represent the residential auction market for Malaysia as the area of study and data used are considered small scale. This is not a case study base research. Instead, this study is aims to develop a model of auction price index using rank transformation regression. Therefore, this model will give auctioneer and the field players a great benefit in terms of an insight into the pricing of auction residential properties.

1.6 Significant of Study

This study will add knowledge to the residential auction market which is similar to Malaysia and paving way for future research in residential auction index construction.

In the long run, it will benefit the property market players. Bank and owner can utilize this index to do necessary analysis in order to increase the auction sale success rate as well as reserve price setting. From the market movement trend of residential auction market, auctioneer and real estate agent will also be better informed about the market movement and therefore advice their clients accordingly like what had been practised by agents in Melbourne (Hurst & Reed, 2010). For buyers, an informed decision can be made when buying auction properties.

Since the data sample used to generate Malaysia House Price Index does not include auction properties transactions. This residential auction index and clearance rate complement to the residential market since it will be functioning as an alternative barometer as well as measuring the market sentiment. Therefore, it will help the policy maker to capture a more in-depth of the residential market movement and make policy decision.

The output from this research is believe able to construct an auction property index to provide industry performance measurement which eventually increase the market transparency as well as become the industry benchmark. This results in a clearer picture of the industry growth, prospect, pricing and planning. For Malaysia, it is high time that such methodology to be introduced for the betterment of the auction property industry amid the high household debt to GDP ratio recorded for consecutive years.

1.7 Methodology of Study

The research process of this study will be divided into 2 stages: -

Stage 1 – Theoretical Stage

This stage starts with identification on the research problem and the need of this research. And this followed by developing research framework in solving the problem.

In addressing the first objective, literature review will be conducted to review and evaluate the factors that should be considered in developing residential auction price index. Literature review will also be conducting on available methods to develop residential auction index and house price index in order to choose a property index construction methodology which is most appropriate for residential auction market of Malaysia.

The source of literatures is mainly obtained from secondary data such as magazines, journals, newspapers, article, books and financial report and electronic resources. As for primary data such as local market issues and views will be obtained by interviewing with experts

Stage 2 – Empirical Stage

This stage which aims to address the objectives 2 and 3 will involve data collection and preparation, model specification and evaluation, residential property auction price index construction and clearance rate construction.

Auction transaction data will be collected from Lelongtips.com. The collected data will then go through the process of data cleaning, quantification and validation.

After reviewing on available clearance rates in the market and auction procedure and legislation of Malaysia, clearance rate will be developed in order to address the Objective 2.

After the procedures of model specification, hedonic regression will be performed to address Objective 2. This followed by model evaluation through statistical test, diagnostic test and predictive performance to address Objective 3. Then, a residential auction index will be constructed by using 2010 as base year.

Lastly, the market movement of residential auction market will be reviewed by trend analysis using clearance rate and residential auction price index.

1.8 Research Framework

Figure 1.1 shows the research framework of this study.

RESEARCH PROBLEM	
The price movement of auction market in Malaysia has not been monitored.	
PURPOSE OF STUDY	
To keep track on the price movement of auction market by developing clearance rate and auction property price index using hedonic regression model.	
OBJECTIVE OF STUDY	RESEARCH METHODOLOGY
1. To determine the attributes for auction price index model.	Literature review on: magazines, journals, newspapers, article, books and financial report and electronic resources. As for primary data such as local market issues and views will be obtained by interviewing with experts
2. To evaluate the model in developing auction price model.	Reviewing auction indicators in the market, auction procedure and legislation of Malaysia so as to develop clearance rate that is suitable for the context of Malaysia.
3. To develop auction price model for residential auction sector in Malaysia.	Perform model specification and rank transformation regression. Conduct model evaluation through statistical test. Construct auction price index by Hedonic Laspeyres Index

Figure 1.1 Research Framework

1.9 Organization of Study

This study will be carried out and presented in 7 chapters:

I. Chapter 1

This chapter will introduce the background of property auction. Also, it will present the problem statement, objective, scope, significance, methodology, data collection and organization of the study.

II. Chapter 2

This chapter will review on the current market condition of Malaysia residential and auction property market to see the role of auction market towards the residential market. In addition, a detail review on the auction market theory, structure, regulation and process will be covered in order to establish an in-depth understanding towards the auction market.

III. Chapter 3

This chapter will develop the theoretical framework through review on the current property auction market indicators and methods for construction of thin market house price index. Throughout the review on method and factors for construction of property auction market indicators, a thorough understanding on the relevant factors in clearance rate construction will be established. This followed by construction of the clearance rate for the context of Malaysia. On the other hand, the review on the methods of construction of thin market house price index will provide justifications for selection of testing the applicability of rank transformation regression in thin auction market.

IV. Chapter 4

Methodology of study such as analysis technique and time frame of study will be discussed detail in this chapter.

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