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Government Regulation Sub-Factors and Housing Supply: A Conceptual Framework

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Abstract

The past studies have used the government regulation factor to examine the influence of regulations imposed by local authorities in the planning process against the housing supply. It is one of the additional factors in the model when the study is to examine the effect of city-specific factors on housing supply elasticity. Although the regulation involved the government controls on housing development at the local level, it is significant to identify the influence of a specific regulation on housing supply. In past studies, some sub-factors were proxied by index values established from the Wharton Residential Land Use Regulation Index (WRLURI) when periodic data was not available. Thus, this paper aims to develop a conceptual framework on the effect of government regulation sub-factors using time series data when the data is made available. This paper reviewed the effect of a few government regulation sub-factors used in past studies and a few other sub-factors that remain understudied. As a result, new studies should apply times series data for sub-factors like the number of restrictions, the number of governing bodies, duration for subdivision approval, and the number of growth management policies although they were the WRLURI components in the past studies. Panel data modeling will be an appropriate method to analyze the cross-sectional time-series data. It is vital to identify the influence of government regulation sub-factors for some cross-sections by using robust tests.

Keywords: *Government, regulation, sub-factors, housing, supply*

1.0 Introduction

In recent years, Malaysia is one of the ASEAN countries that has had the largest house price change (CEIC, 2018) (see Table 1). House prices in Malaysia rose high since 2009 and recorded the highest in 2013 (Chee Yin et al., 2017). Median house price in Kuala Lumpur in 2016 was at RM620,000 which is far above the estimated maximum affordable house price of RM454,000 based on Housing Cost Burden (HCB) approach (Bank Negara Malaysia, 2018). This situation shows that the actual house prices of major cities in Malaysia were beyond the affordability of households. Large increase in house price has caused relative inaccessibility of housing among middle-income earners (Nor Azriyati Wan Abd Aziz & Noor Rosly Hanif, 2009). This was against the aim of the United Nation to make cities and human settlements inclusive, safe, resilient and sustainable as stated in the Sustainable Development Goals (SDG) 11(Mohamad Asroun et al., 2020).

Table 1. House price index of selected ASEAN countries

Country	Nominal Residential Property Price Index		
	Mar 2019	Dec 2018	2010
Indonesia	154	153.24	100
Malaysia	191.73	191.63	100
Philippines	242.89	228.06	100
Singapore	111.83	112.59	100
Thailand	138.57	136.62	100

Source: CEIC

House price dynamics are defined as changes or movements in house price during an economic boom and bust which could affect the household and the economy at large (Granziera & Kozicki, 2015). The great changes of house prices against housing supply changes will contribute to an inelastic supply condition. Otherwise, if changes of house prices are lower than housing supply changes, the city or location could have an elastic housing supply.

The housing supply condition could be influenced by many factors and subfactors. Past studies using different sets of factors had grown substantially in recent years, showing that the studies were carried out for different purposes. However, most of the empirical studies follow the main theoretical framework of DiPasquale and Wheaton (1992) who argue that the model determining the level of housing supply will include housing price level, construction costs, and the interest rate. Government regulation or sometimes called land regulation is one of the additional factors to the model when the study is to examine the effect of city-specific factors towards housing supply. In theory, government regulation can reduce the motivation for firms to start housing construction. There is a strong correlation of land use regulation with higher house prices and lesser housing construction based on the results of past studies. However, similar studies show that government regulation could increase the housing supply.

Price elasticity of housing supply in Malaysia was inelastic because the country has a more restrictive regulatory environment (S. K. Mayo & Malpezzi, 1997; S. Mayo & Sheppard, 1996). The studies concluded that Malaysia practices strict regulation on housing development based on their general view to the regulatory practice of the country without justifying it with any government regulation dataset. Determining the significance of government regulation in general is aimless when there are many forms of government regulation practiced by the local authorities. Although the regulation involves the government controls on housing development at the local level, it is significant to identify the effect of a specific regulation on housing supply. This paper reviews the influence of a few government regulation sub-factors used in past studies and a few other sub-factors that remain understudied. Some sub-factors were established as index value based on the Wharton Residential Land Use Regulation Index (WRLURI) when periodic data was not available. Thus, this paper aims to develop a conceptual framework on the influence of government regulation sub-factors on housing supply by using time series data when the data is made available.

2.0 Effect of Government Regulation on Housing Supply

Most of the past studies stated either government regulation or land use regulation to refer to the rules and regulations imposed by local authorities in the planning process. Theoretically, the government rules and regulations can reduce the motivation of firms to start housing construction. Regulatory practices restrict new housing supply including green belts or urban growth boundaries, height and lot restrictions, development moratoria and zoning restrictions, and historical preservation rules (Kim et al., 2012). Data on government regulation sub-factors including the number of regulation policies, the number of governing bodies, duration for subdivision approval, and the number of growth management policies by a local authority or a development fee were used to create a measure of the local regulatory environment stringency in each community named as the Wharton Residential Land Use Regulation Index (WRLURI) (Gyourko et al., 2008).

Past empirical studies show mixed results between supporting or contradicting the theory as the result of different regulatory practice between countries (see Table 2). There is a strong correlation of land use regulation with higher house prices and lesser housing construction (Hwang & Quigley, 2006; Ihlanfeldt & Mayock, 2014; Quigley & Raphael, 2005; Saks, 2008; Wang et al., 2012). It is proven by the negative coefficient of government regulation factors or sub-factors. However, government regulation can also reduce both housing supply and house prices (Green et al., 2005), increase the supply and reduce the price (Oikarinen et al., 2015), and increase both supply and price (Saiz, 2010).

Table 2. Significance effect of government regulation on housing supply of recent empirical studies.

Variables	Government regulation coefficient	Price coefficient	Country & Period	Source
Zoning	0.196* (std deviation 0.095)	-0.805 (std deviation 0.574)	Finland 1987 – 2011	Oikarinen, Peltola, and Valtonen (2015)
Planning expenditures	-1.52e-07*** (std error 5.61e-08)	2.07 (std deviation 2.02)	United States 1990 – 2010	Ihlanfeldt and Mayock (2014)
Minimum lot size	-0.876*** (std error 0.321)			
Green ratio	- 30.78* (t-stats 1.90)	0.30 (t-stats 0.07)	China 1998 – 2009	Wang, Chan, and Xu (2012)
Government regulation	0.268*** (std error 0.068)	1.54	United States 1970 – 2000	Saiz (2010)
Government regulation	-0.027* (std error 0.016)	0.120 (std error 0.099)	United States 1980 – 2002	(Saks, 2008)
Government regulation	-0.015 (t-ratio 1.63)	0.094 (t-ratio 13.57)	United States 1987 – 1999	Hwang and Quigley (2006)
Government regulation	-0.08 (std error 0.04)	-0.904 (std error 0.5)	United States 1979 – 1996	(Green et al., 2005)
Number of restrictions	-0.0031 (std error 0.0017)	0.106 (std error 0.003)	United States 1990 – 2000	(J. M. Quigley & Raphael, 2005)
Duration for subdivision approval	-0.127 (std error 0.017)	3.42 (std error 0.48)	United States 1985 – 1996	(Mayer & Somerville, 2000)
Number of growth management policies by the local authority	-0.062 (std error 0.031)			
Development fees	-0.131 (std error 0.094)	3.42 (std error 0.31)		

In some studies, the government regulation factor is proxied by sub-factors. In a study by Ihlanfeldt and Mayock (2014) on housing supply in 63 Florida counties in the US from 1990 to 2010, government regulation was represented by planning expenditures and minimum lot size sub-factors. Both sub-factors are negative and statistically significant based on regression results. Another sub-factor used is the green ratio which is the average ratio of greenbelt to urban built-up areas. As such, when the green ratio increases, less land will be available for housing development, hence, housing supply drops (Wang et al., 2012). The number of restrictions is negatively correlated with growth in the aggregate housing stock and single-family units with marginally increased results when the change in the relevant price index is added to the specification (J. M. Quigley & Raphael, 2005). In a study on 44 metro areas in the US between 1985 and 1996 by (Mayer & Somerville, 2000), the development fees have little effect on new construction but the duration for subdivision approval and number of growth management policies significantly reduce the volume of new supply.

3.0 Conceptual Framework

3.1 Government Regulation Sub-Factors in Past Studies

Studies on the housing supply elasticity are dynamic when the recent empirical studies improved the models, method of data analysis, and type of data used. The model determining the level of housing supply includes the housing price level, construction costs and the interest rate (DiPasquale & Wheaton, 1992). Government regulation is one of the additional factors in the model when the studies are to examine the effect of city-specific factors to housing supply elasticity.

As mentioned, the results of past studies show the significant effect of a few government regulation sub-factors on housing supply including zoning, planning expenditures, minimum lot size, green ratio, number of restrictions, duration for subdivision approval, number of growth management policies and development fees (see Table 2). The similar sub-factors were also available in other studies; green belts or urban growth boundaries, height and lot restrictions, development moratoria and zoning restrictions, historical preservation rules, number of regulation policies and number of governing bodies. Upon comparison between the past studies, the sub-factors are grouped into few sub-factors and their status is determined whether they have been studied empirically or remain under study (see Table 3).

Table 3. Status of government regulation sub-factors in past studies.

Sub-factor	Source	Examined in empirical studies	Data used for empirical analysis	Method of data analysis
Zoning/development moratoria and zoning restrictions	(Kim et al., 2012; Oikarinen et al., 2015)	Yes	Index value	Structural approach, Vector Error – Correction Model (VECM), Cross-section analysis using OLS.
Planning expenditures/ development fees	(Gyourko et al., 2008; Ihlanfeldt & Mayock, 2014; Mayer & Somerville, 2000)	Yes	County's expenditures on comprehensive planning reported annually to the Florida Department of Financial Services (Ihlanfeldt & Mayock, 2014), Index value (Mayer & Somerville, 2000)	Stock adjustment model, OLS (Ihlanfeldt & Mayock, 2014), OLS, GLS, PCSE, IV (Mayer & Somerville, 2000)
Minimum lot size/height and lot restrictions	(Ihlanfeldt & Mayock, 2014; Kim et al., 2012)	Yes	The minimum lot size is equal to the total acreage of undeveloped residential land by Florida Department of Revenue in the 2011 tax roll divided by the total number of housing units allowed under future land use map.	Stock adjustment model, OLS
Green ratio/green belt or urban growth boundaries	(Kim et al., 2012; Wang et al., 2012)	Yes	The average ratio of green belt to urban built-up areas between 1998 and 2009 extracted from various issues of the China City Statistical Yearbook.	Stock adjustment model
Number of restrictions/ numbers of regulation policies	(Gyourko et al., 2008; J. M. Quigley & Raphael, 2005)	Yes	Growth-control regulation index based on a survey of California land-use officials.	Bivariate regression, OLS
Historical preservation rules	(Kim et al., 2012)	No	N/A	N/A
Number of governing bodies	(Gyourko et al., 2008)	No	N/A	N/A
Duration for subdivision approval	(Gyourko et al., 2008; Mayer & Somerville, 2000; J. Quigley & Rosenthal, 2005)	Yes	Index value	OLS, GLS, PCSE, IV
Number of growth management policies by the local authority	(Gyourko et al., 2008; Mayer & Somerville, 2000; J. Quigley & Rosenthal, 2005)	Yes	Index value	OLS, GLS, PCSE, IV

Few sub-factors of different sources are grouped when they are similarly defined. Green ratio is referred to as the green belt in the past studies. The green ratio is part of the urban development policy (Wang et al., 2012) while green belt is a policy and land use zone designated to retain areas of largely undeveloped land, wildland, or agricultural land surrounding urban areas. The main goal of the green belt is to keep the land from urban sprawl and to maintain the designated area for forestry, agriculture and to provide a home to wildlife (Ramesh & Nijagunappa, 2014). The average green ratio and its difference show the evenness of green space distribution (Li et al., 2011).

The duration of subdivision approval is the period ranging from submission of the subdivision application until the issuance of an approval letter from the land office. All applications about land development will be received by the land office and forwarded to the state authority for approval purposes.

Growth management is defined as government policies, plans, investments, incentives, and regulations to guide type, amount, location, timing, and cost of development to meet a responsible balance between the protection of the natural environment and the development to support growth (Randolph, 2004). The number of growth management policies by the local authority is a dynamic of public policies in the local authority comprehensive plan. The comprehensive plan which includes land-use regulations represents the community policy for future growth. The plan supports the management of the city or county by providing policies to guide decision-making (Yukubousky, 2017).

From the table above, a few government regulation sub-factors remain understudied such as historical preservation rules and number of governing bodies. Historical preservation rule is usually used to protect heritage sites by the preservation of the original building façade, prohibition building demolition, and limitation of new construction within the area zoned as the heritage site. The standardized number of land preservation and conservation-related initiatives put on the ballot by communities are used to form the local political pressure index (Gyourko et al., 2008).

The number of governing bodies refers to the local authority and other relevant authorities involved in the planning process to ensure that housing development provides a comfortable and safe living environment. The authorities will verify and comment on the submitted plans and other documents, check the amended plans and documents, issue permits and verify the progress of a project until a certificate of completion and compliance is issued. The requirements for authorities to review and approve a new project which does not need rezoning such as local planning commission, local councils, managers and commissioners, a county board of commissioners, environmental review board, public health office, and design review board are requested in the survey on residential land use regulation (Gyourko et al., 2008).

3.2 Sources of Data

The government regulation data used in the past empirical studies comes from either WRLURI surveys or periodicals. However, most of the studies gained the regulation data through surveys (see Table 3). Index value in WRLURI is formed by data collected from the surveys sent to municipalities targeted for planning directors or chief administrative officers of the municipalities. The respondents were required to inform and to give their view on the current land regulatory process, rules of residential land use regulation and specific characteristics of land use regulation. In the studies by (Ihlanfeldt & Mayock, 2014; Wang et al., 2012), the regulation data is taken from periodicals that provide time-series data. Few variables were used as the proxy for government stringency on land use when the regulation index was not constructed (Wang et al., 2012).

Each index with a low value indicates a less restrictive or more laissez faire approach in regulating the housing market (Gyourko et al., 2008). In the study by (Gyourko et al., 2008), light regulated areas are those in the bottom quartile of the distribution of WRLURI values (WRLURI<-0.55), modest regulated areas are those in the interquartile range (-0.55<WRLURI <0.74); and high regulated areas are defined with WRLURI index values (WRLURI>0.74) in the top quartile. (Ihlanfeldt & Mayock, 2014) used periodicals to measure the stringency of land use regulation in time series data. They adopted county expenditures on comprehensive planning to know annual spending for land use

planning and enforcement of the regulation while future land use maps were to determine the minimum lot size for each county.

3.3 Use of Time Series Data for New Studies

Determining the significance of government regulation in general is not realistic to mitigate the house price dynamic issue. Although the regulation involves the government controls on housing development at the local level, it is important to identify the effect of a specific regulation on housing supply elasticity. The effect of a specific regulation may or may not influence housing supply as well as the house price.

Index value contributes to a comprehensive land use regulation data when the periodical data is not available. Index value is based on the viewpoint of respondents at a specific time when a survey is implemented. However, the data is limited to a specific year and not distributed on a short term or long-term basis. Therefore, it is necessary to conduct new studies to measure the short term and long-term effects of understudied and ever studied government regulation sub-factors using the time series data in a housing supply model (see Figure 1).
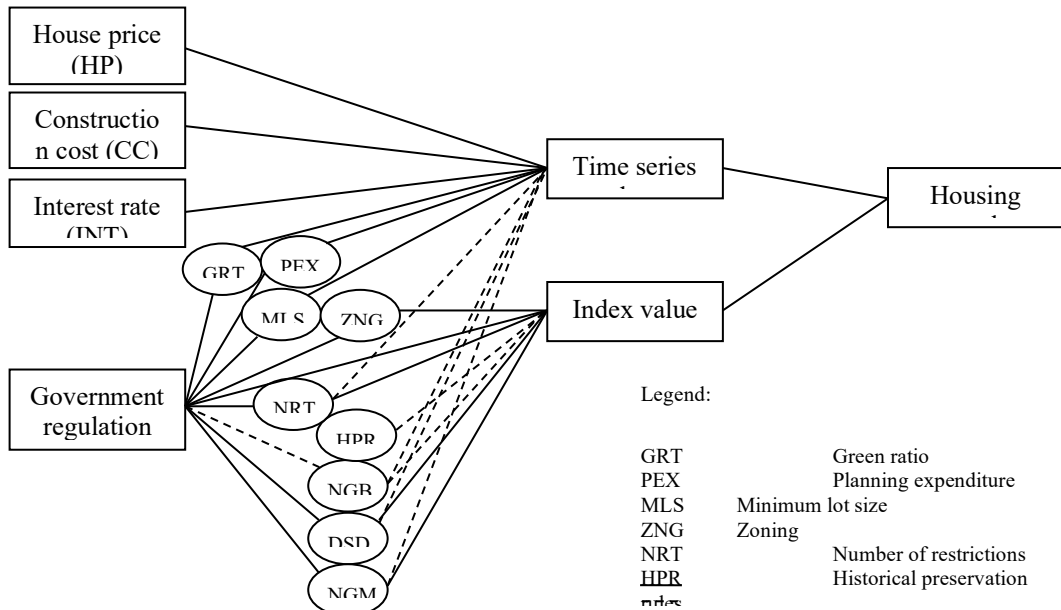

Figure 1. Conceptual framework

Figure 1 shows there is a potential use of time series data for the number of restrictions, number of governing bodies, duration for subdivision approval, and the number of growth management policies sub-factors although they are part of WRLURI components. It can happen when the World Bank starts to publish annual reports that comprise land use regulation measures between countries.

Panel data modelling will be an appropriate method for the new studies to analyse cross-sectional time-series data. A panel data set has multiple entities, each of which has repeated measurements at different time periods that may give individual (group) effect or time effect, or both (Park, 2011). It is vital to prove the effect of a specific regulation on housing supply for different major cities or locations in future studies by using robustness tests.

4.0 Conclusion

Government regulation is one of the additional factors in the housing supply model when the study is to examine the effect of city-specific factors on housing supply elasticity. Thus, it is important to

identify the effect of a specific regulation on housing supply elasticity. Most of the past studies gained the regulation data through surveys to establish index value when periodic data was not available. However, index value is limited to a specific year and not distributed on a short term or long-term basis. After a few analyses, this paper found a gap for new studies to use times series data for number of restrictions, number of governing bodies, duration for subdivision approval, and number of growth management policies sub-factors to show the effect of a specific regulation. Panel data modelling will be an appropriate method for the new studies to analyse cross-sectional time-series data.

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