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Living next to poor housing:

A Regression Analysis of House Prices in Greater Kuala Lumpur

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Khazanah Research Institute

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Summary

- Over the years, the increased agglomeration of economic activities in major cities and the higher rate of migration of people to these economic centres have catalysed the formation of urban slums in developing countries worldwide.

- As each country faced the challenge to house their growing number of residents in rapidly growing cities, Malaysia has adopted a 'Zero-Squatter Policy' in the year 2000, whose goals was to be achieved via the provision and facilitation of low-cost housing in the 1970s as well as resettlement programs in the 1990s and 2000s.

- As a result, Malaysia has done reasonably well in providing shelter and curbing the formation of slums. Nevertheless, various problems emerged over the years concerning the management (or mismanagement) of low-cost housing.

- As a diagnostic tool to detect the magnitude and extend of these problems, we seek to quantify the "Not-in-my-back-yard" (NIMBY) effects of living in close proximity to low-cost housing. This is done by geolocating transacted residential data for the entire Greater Kuala Lumpur (GKL) region over the 5-year period of 2015 to 2019.

- We were able to quantify the statistical association that living in close proximity to low-cost housing is correlated with lower house prices. This suggests the existence of a NIMBY effect, which remains persistent even under different model specifications of the Hedonic Price Model (HPM).

- Our findings point to different statistical regularities in the NIMBY effect for Landed housing vs Non-Landed housing, representing different aspects of NIMBY that is conditioned by the those who live in Landed properties vis-à-vis their Non-Landed counterparts.

- Our findings rekindled the need to reconsider several policy recommendations which we have formerly presented in the Rethinking Housing report[1], to ensure that GKL continues to be an inclusive city, that facilitates its citizens social mobility and aspirations.

[1] *Suraya Ismail et al. (2019)*

Common Abbreviations

CBD	:	Central Business District
DOSM	:	Department of Statistics Malaysia
ETP	:	Economic Transformation Programme
GKL	:	Greater Kuala Lumpur
HPM	:	Hedonic Price Model
JMB	:	Joint Management Body
JPPH	:	Valuation and Property Services Department
KLCC	:	Kuala Lumpur City Centre
KPKT	:	Kementerian Perumahan dan Kerajaan Tempatan (Ministry of Housing and Local Development)
LCH	:	Low Cost Housing
LTV	:	Loan to Value
MQA	:	Malaysian Qualifications Agency
NAPIC	:	National Property Information Centre
NIMBY	:	Not in my back yard
NL	:	Non-Landed
PPR	:	Program Perumahan Rakyat
PR1MA	:	Perumahan Rakyat 1Malaysia (1 Malaysia Housing Program)
RTO	:	Rent to Own
SDG	:	Sustainable Developmental Goals
SPAD	:	Land Public Transport Commission
WTP	:	Willingness to Pay

1. Introduction

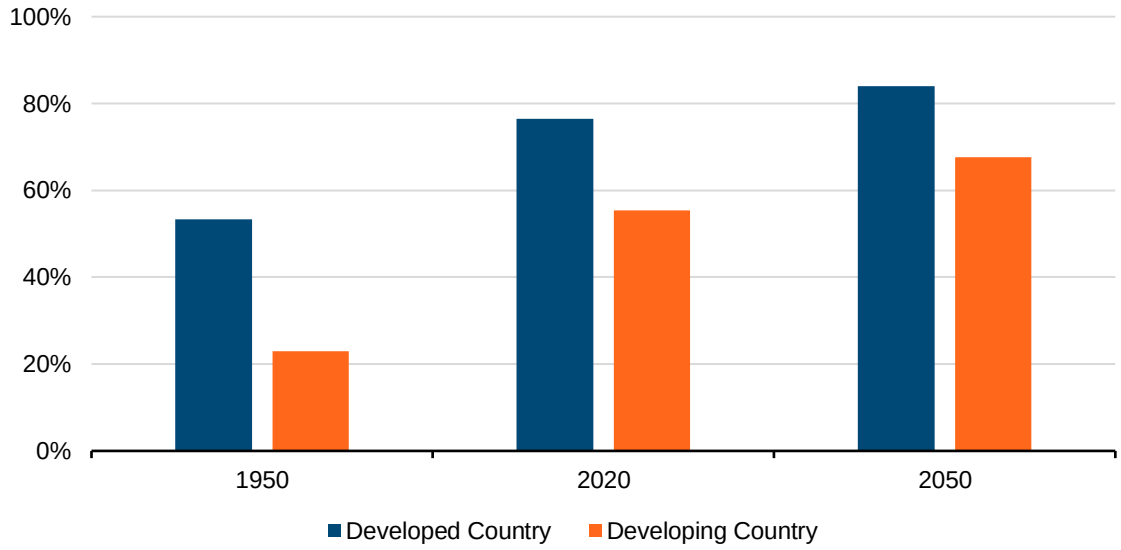
It has been long argued that there exists a hierarchy of needs that human must first satisfy[2]. Typically, these refer to food, shelter and clothing, commonly thought of as basic human needs. As countries progress through different phases of economic development, societies form normative values that over time, influences how society approaches issues of deprivations with regard to its residents. One example would be whether it is conceivable for any resident (or person) to be without food or without a home in the 21st century.

The United Nations' Sustainable Developmental Goals (SDG) outlines 17 interlinked aspirational goals that serve as "*a plan of action for people, planet and prosperity… and that eradicating poverty in all its forms and dimensions, including extreme poverty is the greatest global challenge and an indispensable requirement for sustainable development.*"[3]

The 11th SDG on *Sustainable Cities and Communities* is to "Make cities inclusive, safe, resilient and sustainable". Goal 11.1 on *Safe and Affordable Housing* is focused on "ensuring access for all to adequate, safe and affordable housing and basic services and upgrade slums by 2030".

For context, as countries develop economically, they undergo the process of urbanisation. In 1950, 30% of the world's population was urban, and by 2050, 68% of the world's population is projected to be urban[4].

Figure 1: Percentage of population in Urban Areas (Average)



Source: Author's own calculation, Ritchie and Roser (2018) and DESA (2020)

[2] *Maslow (1943). Maslow's hierarchy of needs posits that humans must first fulfil basic physical needs such as food, shelter, and security, before pursuing higher-order needs such as class, esteem and self-actualisation.*
[3] *UN General (2015)*
[4] *Ritchie and Roser (2018)*

This trend is further reinforced by the agglomeration of economic activities in major cities and greater migration of people to these economic centres from the more rural areas. As a result, most developing countries faced challenges in housing the growing number of residents of their rapidly growing cities.

Consequently, when left to the market, the inward migration of the proletariat coupled with the depersonalisation of both people and space led to the formation of slums all over the world[5]. It was estimated that as of 2001, 31.6% of the world's urban population lived in slums, the majority of which were in developing countries[6].

Different developing countries resolved to manage the socio-economic and political issues surrounding the formation of slums in different ways, as there were country specific heterogeneities that influenced both the thinking as well as the operating environment in managing slums. Malaysia's approach to managing this global phenomenon was that of the 'Zero Squatter Policy'[7], and this was to be achieved via the provision and facilitation of low-cost housing back in the 1970s as well as resettlement programs in the 1990s and 2000s[8].

Despite this, the surge of low-cost housing over the years raises the following question: to what degree does the placement of nearby low-cost housing affect nearby residents? While the desire to provide homes for a growing populous is certainly a noble one, could there be unintended negative externalities which impact surrounding residents? And if these negative externalities exist, could it be because there are intrinsic problems in the provision and management of low-cost housing? Could there be potential improvements to perhaps mitigate these effects?

In an affluent neighbourhood today, resistance to the construction of housing for 'poorer' people would be expected. This is known as the "Not-in-my-backyard" syndrome (NIMBY), which is described as the "*protectionist attitude of and oppositional tactics adopted by community groups facing an unwelcomed development in their neighbourhood … including … low-income housing"*[9].

While the scope of the NIMBY phenomena can often be used in relation to a variety of different context, such as the construction of a nuclear power plant, a new railway station, or even hospitals and shopping centres, this paper focuses specifically on the NIMBY phenomenon in relation to low-income housing. Our goal is to quantify these NIMBY effects on surrounding properties using house prices as a proxy. However, it is noteworthy that these statistical effects can be the outcomes of various other factors and underlying problems that exist in the low-cost housing system.

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[5] *Mumford (1961)*
[6] *Ibid*
[7] *Abdullah et al. (2017)*
[8] *Refer to Appendix 1: Key plans and policies implemented for low-cost housing for more information*
[9] *Dear (1992)*

2. Low-cost housing in Malaysia

2.1. What is a low-cost house in Malaysia?

Beginning from 1964, low-cost housing in Malaysia was primarily built as multi-story flats to economise the use of land[10]. Hence, while there are landed low-cost properties in Malaysia, most low-cost housing that can be observed today, at the time of this writing were built as non-landed housing complexes, and as such they mostly took the form of flats and apartments.

Low-cost housing in Malaysia is defined based on the property's selling price. Before June 1998, properties sold for RM25,000 and below are classified as low-cost, and catered for families with a monthly household income of less than RM750. The classification was amended in June 1998 due to rising land, infrastructure, and development costs[11]. Hence, beginning in June 1998 till present, properties sold for RM42,000 and below are classified as low-cost, and caters for families with a monthly household income of less than RM1,500.

Table 1: Low-Cost House Price Structure and its Target Groups

	Category	Property Price/ Unit	Target group/ Monthly Income
Before June 1998	Low-Cost	RM25,000 and below	RM750 and below
	Medium Low-Cost	RM25,001 – RM80,000	RM751 – RM1,500
	Medium Cost	RM60,001 – RM100,000	RM1,501 – RM2,500
	High-Cost	Above RM100,000	Above RM2,500
From June 1998 – 29 August 2000	Low-Cost	RM42,000 and below (depending on land worth and location)	RM1,500 and below
	Medium Low-Cost	RM42,001 – RM60,000	RM1,501 – RM2,500
	Medium Cost	RM60,001 – RM150,000	RM2,501 – RM3,000
	High-Cost	Above RM150,000	Above RM3,000
From 30 August 2000	Low-Cost	RM42,000 and below (depending on land worth and location)	RM1,500 and below
	Medium Low-Cost	RM48,000 – RM70,000	RM1,501 – RM2,600
	Medium Cost	RM70,001 – RM150,000	RM2,501 – RM3,000
	High-Cost	Above RM150,000	Above RM3,000

Source: Ministry of Housing and Local Government (KPKT) (2018)

2.2. Low-cost housing strategies and policies in Malaysia

The provision of low-cost housing has always been a priority for the Malaysian government, as part of Malaysia's social development plans. Malaysia's approach to the provision of low-cost housing is recorded in its 5-year Malaysia Plans (*Rancangan Malaysia*). In fact, housing is a core

[10] *Prime Minister's Office of Malaysia (1966)*
[11] *Sulaiman, Baldry, and Ruddock (2005)*

issue that surfaces in all plans from the *First Malaysia Plan (1964 - 1970)* to the *Twelfth Malaysia Plan (2021 - 2025)*[12].

In the *First Malaysia Plan (1964 – 1970*) and *Second Malaysia Plan (1971 – 1975)*, the provision of low-cost housing was placed under the government as such ventures did not appeal to private developers. Low-cost housing was to be built in the Federal Capital and urban areas to relieve congestion and combat the formation of squatters. To economize on the use of valuable land and reduce construction cost, multi-story flats were built. Whereas in smaller urban and rural areas, the building of timber and terrace houses was continued.

Beginning in the *Third Malaysia Plan (1976 – 1980)*, there were increased involvement of the private sector to provide and accelerate the pace of low-cost housing construction. Financing was made available in 1977 for state governments to construct low-cost housing at 4% per annum with a repayment period of 20 years. Financing was also available for homebuyers to purchase low-cost houses at a rate not exceeding 5.5% per annum with a repayment period of 25 years. For context, this was at a time where interest rates were higher at between 10% to 12%, with shorter repayment periods, and an 80% LTV ratio under a conventional loan.

In the *Forth Malaysia Plan (1981 – 1985)*, low-cost housing schemes were implemented based on the condominium (high-rise/multi-story) concept to optimize the use of land and enhance the quality of life. Under this concept, a number of three storey walk-up flats will be clustered together to be linked by walkways and provided with amenities such as shops, playgrounds and community centres. In high density areas such as the Federal Territory, high rise flats will continue to be constructed but on the concept of condominium. Under this new concept, low-cost houses will be rented out to beneficiaries for a period of 25 years. The tenants will be given the option to purchase the houses subject to the condition, among others, that they have stayed in these houses continuously over a period of ten years. Additionally, various measures were introduced to increase stock of low-cost houses, which includes requirements for the private sector to reserve between 30-50% of its housing development for the condominium concept of low-cost housing.

Beginning in the *Fifth Malaysia Plan (1986 – 1990)* until present, both the government and private sector will continue providing low-cost housing. The focus however, shifted to constructing affordable homes for all income groups. Nevertheless, various loan plans were introduced for low-cost homebuyers and programs to increase the supply of low-cost housing. Beginning in the *Ninth Malaysia Plan (2006 – 2010)*, emphasis was placed in the maintenance and cleanliness of low-cost housing. The Housing Maintenance Fund was established for major repair and maintenance work.

In the *Eleventh Malaysia Plan (2016 – 2020)* and *Twelfth Malaysia Plan (2021 – 2025)*, the government focused on housing needs for targeted groups in urban and rural areas as well as to make financing more accessible. This was mainly driven via various programs such as the PBR for the poor, and programs for low- and middle-income households such as the RMR1M, PPR,

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[12] *A more detailed summary of low-cost housing policies in relation to the various Malaysia Plans is summarized in Appendix 1: Key plans and policies implemented for low-cost housing*

PRIMA, and PPA1M, as well as programs for second-generation FELDA and FELCRA settlers. There were many financing schemes aimed at making financing more accessible to different target groups such as the My First Home Scheme, Youth Housing Scheme, Rent-to-Own (RTO) and MyHome for low- and middle-income households as well as prospective young individuals. Clearly, strategies and policies for the provision of low-cost housing has evolved over the decades. To summarise, Table 2: Low-Cost Housing Programs in Malaysia provides an overview of the public housing programs introduced in Malaysia over the years.

Table 2: Low-Cost Housing Programs in Malaysia

Public Housing Program	Description
Perbadanan Kemajuan Negeri Selangor (PKNS)	Economic development agency to develop low and medium cost housing in Selangor.
Perumahan Awam Kos Rendah (PAKR)	The Federal Government provides funding in the form of loan to the state governments to build low-cost houses. Detached or semidetached houses (mostly made from wood) outside the city or two-storeys terraced houses, and flats in urban areas.
Perumahan Awam Kos Rendah Bersepadu (PAKRB)	Low-cost flats for rental to overcome the problem of squatters in Kuala Lumpur.
Site and Services Scheme	For lowest-income households who cannot afford homes under PAKR. • Site preparation and foundation for a house that is designed or constructed that allows the owner to upgrade the house later • Develop vacant sites including basic facilities
Program Perumahan Rakyat (PPR)	To provide comfortable houses with adequate infrastructure and basic amenities in suitable locations. Implemented to address the increasing demand for affordable housing among the low- income households, particularly in urban areas
Housing Loan Scheme – scheme for low-income groups who cannot get financing from other sources	• Squatters needing finance to build a new house on the land allocated to them. • Housing for settlers provided by the Ministry of Rural and Regional Development and regional development agencies such as the Federal Land Development Authority (FELDA), The Federal Land Consolidation and Rehabilitation Authority (FELCRA), South Johor Development Authority, Central Terengganu Development Authority (KETENGAH), South Kelantan Development Authority (KESEDAR). • Quarters for civil servants. • Employee housing estates and industrial (Akta Standard Minimum Perumahan dan Kemudahan Pekerja 1990) where the owner of the estate provides free housing
Syarikat Perumahan Negara Berhad (SPNB)	• Affordable housing for low- and middle-income groups. • SPNB is the implementing agency for the rehabilitation of abandoned housing projects in order to monitor and rehabilitate abandoned projects and build homes for the disadvantaged.
Perumahan Rakyat 1 Malaysia (PRIMA)	• Develop and maintain quality affordable housing for middle income group. • House price between RM 100,000 to RM 400,000 in major cities.
Perumahan Penjawat Awam 1 Malaysia (PPA1M)	Housing for low- and middle-income civil servants (household income of RM 8,000 and below). Built on government land and priced between 20% to 30% lower than the market price

Source: Abdullah et al. (2017) and KPKT (2018)
Note: As Table 2 outlines Public Housing Programmes that were incepted some decades back, some of the programmes may have been replaced or are no longer in existence today. Table is not exhaustive

3. Literature Review

3.1. The Hedonic Price Model (HPM)

While we acknowledge that there is a variety of qualitative dimensions to the NIMBY phenomenon, in this paper, NIMBY effects are primarily quantified via transacted house prices and its relationship to other variables of interest. This is done via the Hedonic Price Model.

Etymologically, the term "hedonics" is derived from the Greek word "ηδονισμός", which is the root word for 'pleasure' or 'sensuality'. Hedonistic price theory is rooted in the principle that observed prices were determined based on the relationship between differentiated products and the underlying attributes that were associated with these products[13].

In the context of the housing market, the hedonic price model is frequently used to investigate variations in house prices based on the house's inherent attributes[14]. In this view, the price of a house is determined by inherent attributes such as structural attributes (e.g., lot size, built area, age of building, design, etc.), neighborhood attributes (e.g., income of residents, proximity to hospitals, shopping centers, environment quality, etc.) and locational attributes (e.g., distance from Central Business District (CBD), land lease, accessibility to public transport, etc.).

Prices between different houses will differ based on the different attributes that each individual house can offer as well as the *"willingness to pay (WTP) for the attributes"*[15]. For example, homebuyers might value lot size over the location of the house. By utilizing the hedonic estimation technique, the degree to which home buyers value the lot size over the location of the house can be estimated. If house prices are indeed affected by nearby low-cost housing, the hedonic estimation technique will be able to quantify these monetary effects, while controlling for other variables (i.e., housing attributes)[16]. Table 3 outlines some commonly used housing attributes.

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[13] Traditionally, the approach is attributed to Lancaster's consumer theory and Rosen's model. Lancaster (1966), Rosen (1974)

[14] Ridker and Henning (1967) were credited to be the pioneers who applied the approach to model residential properties.

[15] Preez and Sale (2013); Epple (2011); Haab and Mcconnell (2002); Sirmans, Macpherson, and Zietz (2005)

[16] Nguyen (2005)

Table 3: List of common housing attributes in Hedonic Price Models.

Attribute Class	Attribute	Expected Effect on house prices
Structural	Number of rooms	+
	Built-up area	+
	Building Services	+
	Floor level (for high rises)	+
	structural quality	+
	Age of building	-
	Facilities (swimming pool, gym, etc.)	+
Neighbourhood	Income of residents	+
	Proximity to hospitals	?
	Proximity to good schools	+
	Proximity to shopping centres	?
	Proximity to parks	?
	Crime Rate	-
	Noise (from traffic, airports, hospitals)	-
	Environmental Quality (landscape, playgrounds)	+
Locational	Distance from CBD	-
	View of ocean, lakes, etc.	+
	View of Golf Course	+
	Land lease	+

Source: Adapted from Chin and Chau (2003)

Most of these results are inclined towards western housing markets in America or Europe. There are several studies that were conducted in the east which explored attributes specific to eastern cultures such as *feng shui*, *lucky unit numbers, or living next to graveyards*[17].

In the context of the Malaysian housing market, there are several studies which employed the Hedonic Price Method to study house price variation in relation to these various attributes, albeit in different geographical localities.

In terms of structural attributes, various authors agree that in Malaysia, built-up area and holding type typically fetches a higher premium[18]. This is to be expected as properties with a bigger living area corresponds to a higher degree of flexibility in terms of functional-space on the part of the house-buyer. Similarly, freehold properties would naturally fetch a higher premium because house-buyers who purchase a leasehold property would have to go through the trouble of renewing the leasehold agreement, which would also be a hassle should they sell the house in the future.

Locational attributes reflect spatial fixities – fixed attributes that inhabitants enjoy from being located in a particular area. For example, certain locations provide house-buyers with improved access to central business districts. Accessibility, in its various forms all provide value to the

[17] *Bourassa and Peng (1999), Chau, Ma, and Ho (2001)*
[18] *Mar Iman, Hamidi, and Liew (2009) , Ooi, Le, and Lee (2014), Kam et al. (2016)*

inhabitant through shorter travelling time, lower costs of travel, higher convenience or even having a flexibility of transport modes[19].

On the other hand, neighborhood attributes reflect both the characteristics that are specific to the neighborhood at hand. These attributes correspond to socio-economic variables such as social class and occupations of its inhabitants, the quality of service of local governments – schools, hospitals, markets, places of worship, and exposure to negative externalities such as crime rates, noise or congestion from traffic, airports, hospitals, shopping centers, etc. It has been recognized that neighborhood attributes are slightly more difficult to quantify and value in the marketplace.

The empirical research on neighborhood attributes exhibits mixed results. For example, certain houses seem to fetch a higher price because they are located closer to shopping centers and forests while houses situated closer to schools and highways seem to have a negative effect on sales prices[20].

3.2. Empirical Findings on the NIMBY effect

There have been various studies that analyses the effects of affordable/ subsidized/ low-cost/ social housing on nearby property houses using the hedonic price method. Table 4 provides a summary of literature on the empirical findings of the NIMBY effect in relation to low-income housing.

Table 4: Review of studies using the hedonic price methodology

Author(s)	Year	Study Area	Program	Relationship between distance from LCH and property value
Cummings and Landis	1993	San Mateo County, California	42-unit condominium project for families and seniors	None
		San Francisco County, California	96-unit condominium project for families	Mixed: Not California for families significant if located within 1/8 or 1/4 mile but (–) effect at 1/2 mile
Lyons and Loveridge	1993	Ramsey County, Minnesota	Section 8 EV, Section 236, below-market interest rate (BMIR)	None
			Section 221(d)(3)	(+)
			Public housing	(+)
			Section 8 NC&R	Mixed

[19] *Dziauddin, Alvanides, and Powe (2013)*
[20] *Kam et al. (2016)*

Geotz, Lam and Heitlinger	1996	Minneapolis, Minnesota	Community Development Corporations (CDC)-developed subsidized housing Privately managed and publicly subsidized housing, public housing	(+) (+)
Briggs, Darden, and Aidala	1999	Yonkers, New York	Scattered-site public housing	None
Galster, Tatian, and Smith	1999	Baltimore County, Maryland	Section 8 certificate and voucher	Aggregate Data: (+) 6+ sites within 500 feet: (-)
Lee, Culhane and Wachter	1999	Philadelphia, Pennsylvania	Public housing, scattered-site public housing, Section 8 certificate and voucher, Low-Income Housing Tax Credit (LIHTC) program FHA housing, PHA home ownership programs, Section 8 NC&R	(-) (+)
Santiago, Galster and Tatian	2001	Denver, Colorado	Dispersed rehabilitated public housing	(+)

Source: Nguyen (2005)

Based on the review, most research suggest that locating near low-cost housing can have negative impacts on property prices. However, the magnitude of impact appears to be relatively small. While in recent years there have been several studies conducted in other countries such as South Africa[21], we see that most studies seem to be conducted in the United States of America.

[21] *Ludick, Dyason, and Fourie (2021); Preez and Sale (2013)*

4. Data Collection & Methods

For this analysis, our main dataset is constructed based on each individual sub-sale residential transactions which occurred between 2015 and 2020. The raw data is extracted from Brickz[22]. Brickz publishes transacted real estate data that is compiled by the National Property Information Centre (NAPIC) of the Valuation and Property Services Department (JPPH). Each record contains the following information:

Table 5: Description of the residential transactions' dataset

No.	Dimension	Description
1.	SPA Date	The date where the Sales Purchase Agreement (SPA) is legally stamped.
2.	Address	Shortened Address. Normally recorded in the following format: *<Unit No., Road Name>*

3.	Building Type	Building categorization.
		• Landed
		  ○ Bungalow, Cluster House, Semi-D, Terrace House, Townhouse
		• Non-Landed
		  ○ Apartment, Condominium, Flat, Service Residence

4.	Tenure	Freehold/Leasehold
5.	Floors	…
6.	Rooms	…
7.	Land Area	Land area (normally in sq feet)
8.	Built Up	Land area (normally in sq feet)
9.	Price	transacted price as recorded in SPA
10.	Price psf	transacted price per unit of land area (or per unit of built-up area for Non-Landed)

4.1. Feature Generation

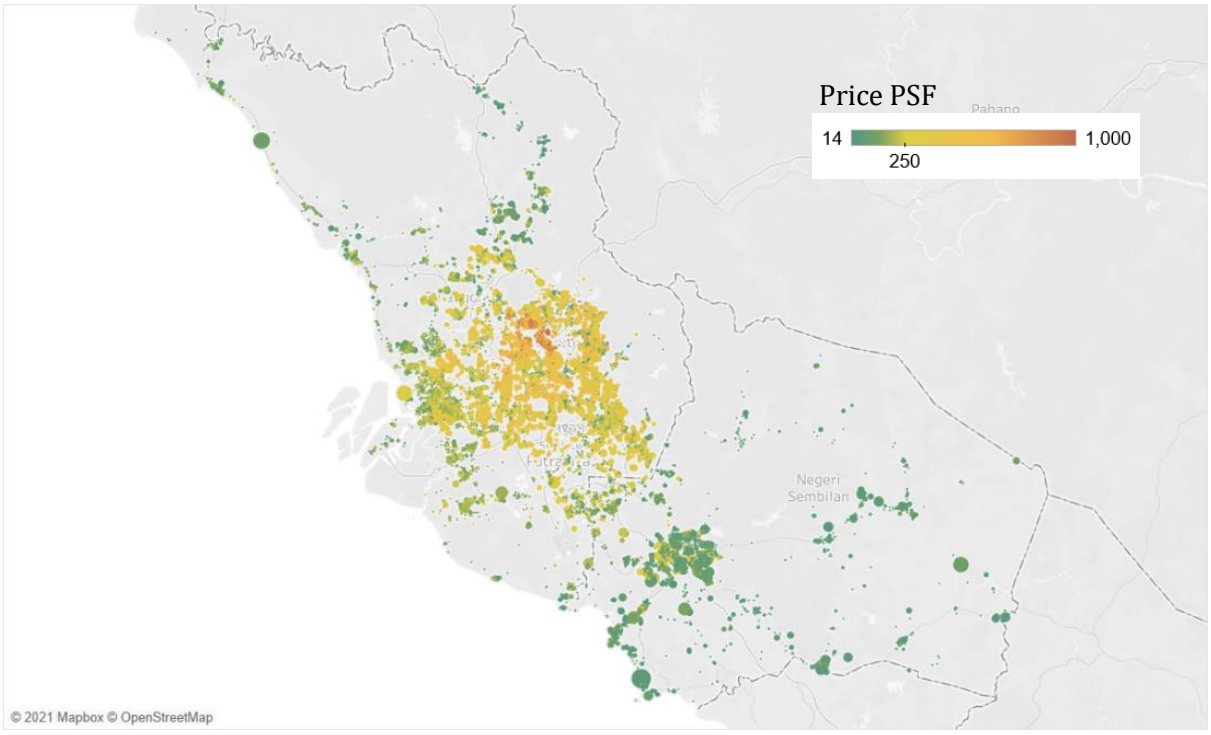
In the context of Data Science, features refer to dimensions or characteristics of a certain datapoint. Feature generation is the process of expanding the feature space with new features based on existing information[23]. As described in Table 5 above, the raw dataset already contains structural attributes of a residential transaction.

To obtain neighborhood attributes, each transaction was then geocoded and mapped by calling upon Google's Geolocation API. We extracted the street name for every address as recorded in the residential transactions dataset and requested for the latitude and longitude of each unique street name. The mapping of our residential dataset is described in Figure 2 and Figure 3 below.

[22] *Brickz: https://www.brickz.my/*

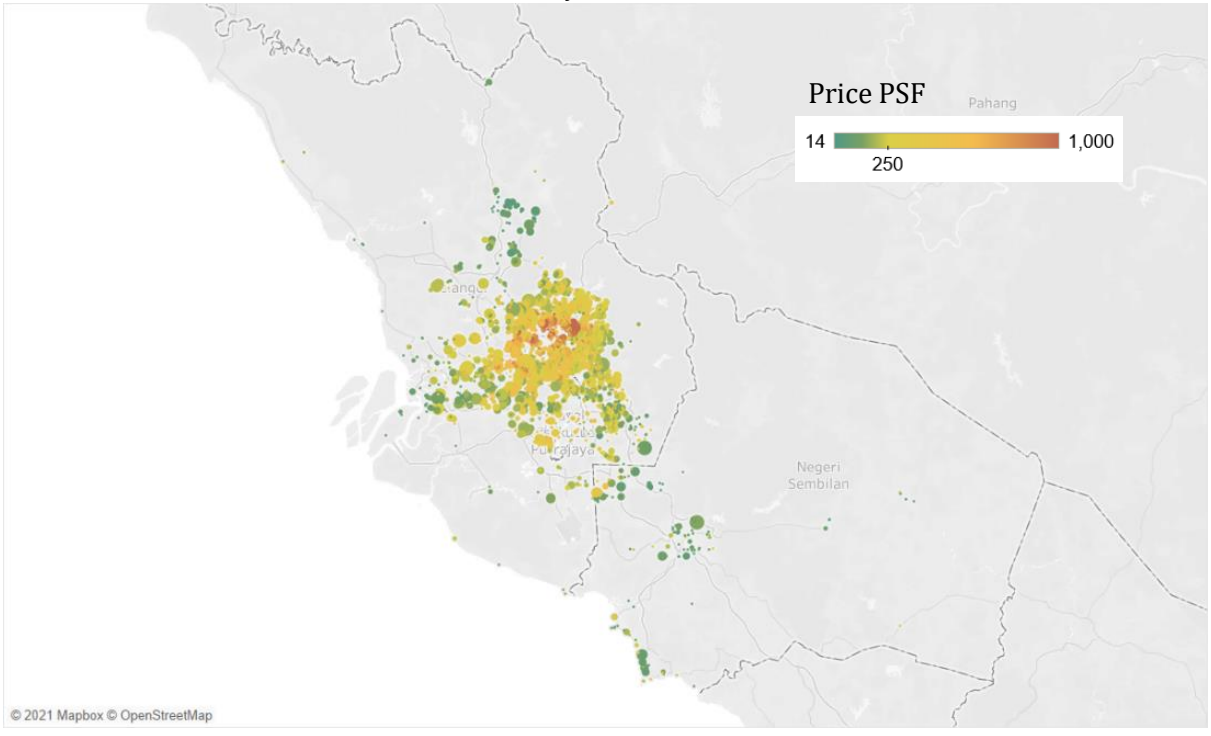
[23] *Author's edit to manuscript – The footnote contained in a previous version of this paper was incorrect*

Figure 2: Map of Landed Residential Transactions



Source: JPPH Transactions, extracted from Brickz.my

Figure 3: Map of Non-Landed Residential Transactions
Source: JPPH Transactions, extracted from Brickz.my



Additionally, to relate these features to the other external features that represent neighborhood attributes, we compiled and geocoded several lists as described in Table 6 below:

Table 6: Neighborhood feature generation

No.	Feature	Description
1.	Government Managed Low-Cost Housing (Distance and Count)	The presence of government managed housing. These refer to PPR, PPA and PKNS non-landed complexes. Source: KPKT, Authors own compilation
2.	Privately Managed Low-Cost Housing (Distance and Count)	The presence of low-cost non-landed complexes. NL Complexes are categorized as LCH if they are mostly transacted at RM 42,000 or below (*Refer to Table 1)* Source: Authors own calculation
3.	Distance to KL City Centre	Accessibility of the neighborhood in relation to KL City Centre Source: Google Geolocation API
4.	Distance to Nearest Train Station	Accessibility of the neighborhood to rail public transport (LRT, MRT, KTM and Monorail) Source: Google Geolocation API
5.	Distance to Nearest Hospital	Accessibility of the neighborhood to hospitals. Source: Ministry of Health (MOH)[24] and Google Geolocation API
6.	Distance to Nearest University	Accessibility of the neighborhood to universities. Only universities with accreditation from the Malaysian Qualification Agency (MQA) are included. Source: Malaysian Qualification Agency (MQA)[25] and Google Geolocation API

Source: Authors own compilation

[24] *MOH (2019a); (2019b)*
[25] *MQA (2021)*

4.2. Hedonic Model Construction

There are three categories of attributes used in our study:

i. structural attributes (S);
ii. neighborhood attributes (N); and
iii. locational attributes (L).

The variables selected for this study are shown in Table 7.

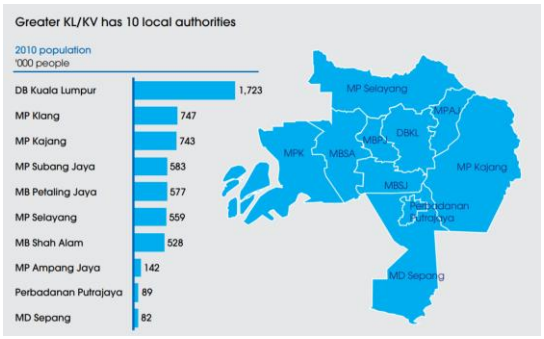
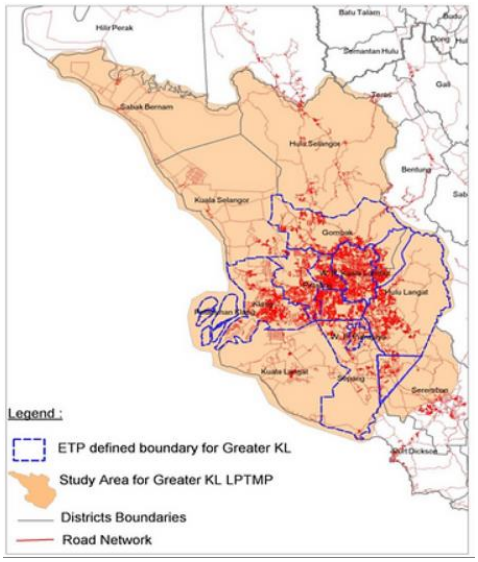
Table 7: Hedonic Price Model Variables

Category	Variables	Description
Dependent Variable	PRICE	Property sales price
Variables of interest	DLOWCOST	Distance from the nearest low-cost property
	DPRIVATE	Distance from the nearest private low-cost property
	DGOVERNMENT	Distance from the nearest government managed low-cost housing
	CLOWCOST	Count (number) of low-cost housing surrounding a property
	CPRIVATE	Count (number) of private low-cost housing surrounding a property
	CGOVERNMENT	Count (number) of government low-cost housing surrounding a property
Structural Attributes	ROOMS	Number of rooms
	TENURE	Dummy variable for tenure (1 indicates freehold, 0 indicates leasehold)
	LANDAREA*	Land area of landed property
	BUILTUP*	Built-up of landed property
	FLOORS*	Number of floors of landed property
	LOTSIZE**	Lot-size of non-landed property
Neighbourhood Attributes	DUNIVERSITY	Distance to the nearest university
	DHOSPITAL	Distance to the nearest hospital
Locational Attributes	DCITYCENTER	Distance from Kuala Lumpur (KL) City Center
	DTRAIN	Distance from the nearest train station

*Landed properties only; **Non-landed properties only

There is some ambiguity in defining the Greater Kuala Lumpur region. Figure 4 outlines several definitions employed in the past decade:

Figure 4: The Definition(s) of Greater Kuala Lumpur

GKL outlined in the Economic Transformation Programme	GKL outlined in SPAD's Land Public Transport Masterplan
	

Source: PEMANDU (2010), SPAD (2011)

The initial inception of the GKL region was made in the Economic Transformation Programme (ETP), however the Land Public Transport Commission (SPAD) has employed a larger area of study for their GKL Land Public Transportation Masterplan that is based on functional mobilities. In the latter definition, Seremban may be considered part of the GKL region possibly because there are residents who live in Seremban but travel daily to work in Kuala Lumpur. In the absence of a comprehensive Origin-Destination study, we have made the decision to include the whole of 4 states (KL, Selangor, Putrajaya, Negeri Sembilan) as our definition of GKL.

In analyzing Greater Kuala Lumpur, KL City Centre (KLCC) is often described as a main focal point representing the concentration of workspaces[26]. While the Land Public Transport Masterplan also identified employment destinations aside from KLCC, KLCC ranks highest in the corridor hierarchy of GKL mobilities. A potential caveat in the analysis moving forward would be how the development of future mega townships (such as the TRX) might influence existing trends in mobilities.

In the Greater Kuala Lumpur region, it is an established fact that the use of Land Public Transport (LPT) remains relatively low at below 20%[27], especially when compared to other international

[26] *SPAD (2016). The Land Public Transport Masterplan identifies KL City Centre as the primary economic centre and key employment area.*
[27] *World Bank (2015)*

cities such as Hong Kong (90%), Singapore (63%) or London (55%)[28]. There are many reasons why Malaysians heavily rely on private vehicles. It is argued that Malaysia's policies are more inclined towards car ownership, with the government emphasis on developing a Malaysian automotive manufacturing industry[29]. Moreover, it is frequently argued that the Public Transportation System has longstanding issues ranging from poor last-mile connectivity to the unreliability of feeder busses and KTM services that disincentivizes public transport[30].

With reference to previous research on hedonic pricing models in housing, we included the standard structural, locational and neighborhood variables (refer to Table 7). However, with respect to neighborhood attributes which contain some subjective and qualitative element by nature, we did not extract data on schools and shopping centers[31].

However, universities which are accredited under the Malaysian Qualifications Agency (MQA) and hospitals registered under the ACT 586 under the Ministry of Health were included. Universities were included as a neighborhood attribute, as they represent the inflow of students that drives the demand for a rental market which in turn drives prices of surrounding houses upwards. Hospitals were included to represent the benefit of being able to access healthcare in the event of an emergency, as well as to represent the negative externality of noise and congestions resulting thereof.

In this paper, we explore the hedonic aspects of living next to poor people. Similar to the various literature on the topic, we employ the following hedonic price function[32]:

$$P = f(S, N, L)$$

whereby:
P : sales price of a property,
S : structural attributes of the property,
N : neighborhood attributes of the property
L : locational attributes of the property

As described in Table 7, our first research question is as follows:

RQ1: Does low-cost housing impact nearby property prices?

We attempt to answer this by regressing variation in sales price against the presence of low-cost housing as proxied by both the distance and count, whilst controlling for the hedonic properties of housing attributes. Our regression equation is as follows:

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[28] SPAD (2016)
[29] Azuddin and Omar (n.d.)
[30] Ibid.
[31] In general, schools and shopping centres proliferate GKL. However, these typically have inherent scale hierarchies (for example, One Utama vs. Aeon Big). The ordering of such hierarchies is outside the scope of this paper.
[32] There are numerous variations in the specifications of the hedonic price functions. A large number of studies log-transform house prices or employs the Box-Cox transformation to overcome their study specific circumstances.

Equation 1: Estimating the impact of all low-cost housing

$$P = \alpha + \beta_1 DLOWCOST + \beta_2 CLOWCOST + \gamma_i S_i + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 D\text{CITYCENTER} + \lambda_2 DTRAIN + e$$

where S_i represents a matrix of structural attributes and e is the standard error term. Positive coefficient is expected for β_1 which would imply that greater distance away from low-cost housings would result in higher property prices. Whereas a negative coefficient is expected for β_2 which would imply that higher number of low-cost housings surrounding a property is correlated with a decline in property prices.

However, given the nature of Malaysian low-cost housing policy in the various Malaysia Plans, we also attempt to explore if there is a difference in impact if the said low-cost homes are privately managed, or if they are government managed low-cost homes (normally rented out at sub-market prices). This difference might be expected as homeowners might have a vested interest to maintain their properties, while renters might not. Furthermore, maintenance works of privately managed units are typically managed by a joint management body (JMB), but government managed housings (such as PPRs) are maintained by local councils.

To explore the differences in impact, our second research question is as follows:

RQ2: Is the impact different for privately managed low-cost housing and government managed low-cost housing?

To examine if the impact is different, we compiled a list of privately managed low-cost housing and government managed low-cost housing. Next, we ran the following equations to examine the difference in impact:

Equation 2: Estimating the impact for privately managed low-cost housing

$$P = \alpha + \beta_1 DPRIVATE + \beta_2 CPRIVATE + \gamma_i Si + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 D\text{CITYCENTER} + \lambda_2 DTRAIN + e$$

Equation 3: Estimating the impact for government managed low-cost housing

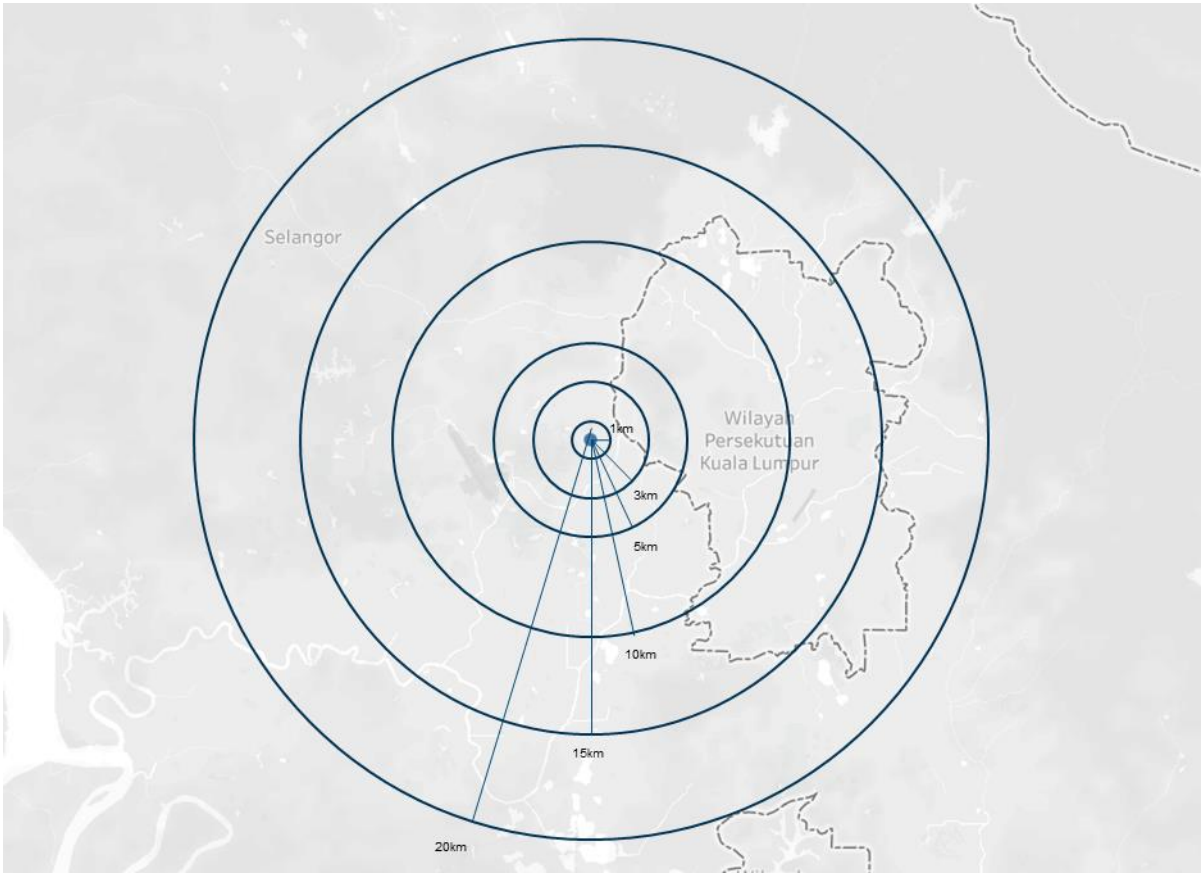
$$P = \alpha + \beta_1 DGOVERNMENT + \beta_2 CGOVERNMENT + \gamma_i Si + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 D\text{CITYCENTER} + \lambda_2 DTRAIN + e$$

Similarly, Si represents a matrix of structural attributes and e is the standard error term. The β_1 and β_2 coefficients in Equation 2 and Equation 3 are compared to examine the difference in effects between privately managed and government managed low-cost housing respectively.

We run all equations at different distance intervals (1km, 3km, 5km, 10km, 15km, 20km and beyond 20km) to form concentric "distance rings". The impact of low-cost housing is expected to

intensify the closer one is located to LCHs[33]. Figure 5 provides a visual description of our methodology:

Figure 5: Concentric Distance Restrictions



These hedonic variables serve as our regression controls to ensure robustness of results. For context, Table 8 to Table 11 provides a descriptive summary of the hedonic parameters in our study[34]:

Table 8: Descriptive Parameters (Landed Properties)

		mean	s.e.	min	25%	50%	75%	max
Dependent Variable	Price	512,872	730,633	5,000	240,000	400,000	668,000	4,664,310
Variables of Interest	Distance from low-cost (km)	4.1622	6.699	0.001	0.5181	0.9705	1.8749	52.0833
	Distance from private low-cost (km)	4.1596	6.696	0.001	0.5274	0.9873	1.8864	52.0833
	Distance from government low-cost (km)	9.0145	8.8393	0.0130	3.0873	6.1385	11.8678	64.2667
Structural Attributes	Built Up (sq feet)	1366	693	400	816	1221	1694	5514
	Land Area (sq feet)	1,940	1,295	253	1,300	1,496	1,970	11,194
	Rooms	3.4	0.7	0	3	3	4	5
	Floors	1.7	0.6	0	1	2	2	3.5
Neighbourhood Attributes	Distance from hospital (km)	4.847	4.369	0	1.647	3.350	6.628	26.898
	Distance from university (km)	10.109	9.209	0	2.904	6.570	15.836	46.627
Locational Attributes	Distance from KL City Centre (km)	30.448	19.288	0.007	15.515	27.518	37.289	104.606
	Distance from train station (km)	5.626	6.216	0	1.751	3.722	6.711	61.809

Note: Number of Observations = 111,125

[33] The literature that we have covered does not provide a systematic way to determine appropriate distance thresholds. Most researchers also examine such effects along varying distance intervals

[34] We've removed outliers by trimming our datasets whose normalized values exceeded the 99.5th percentile.

Table 9: Descriptive Parameters (Non-Landed Properties)

		mean	s.e.	min	25%	50%	75%	max
Dependent Variable	Price	446,016	358,641	30,000	230,000	350,000	525,000	2,970,000
Variable of Interest	Distance from low-cost (km)	0.8406	0.895	0.001	0.303	0.565	1.052	16.492
	Distance from private low-cost (km)	0.870	0.892	0.001	0.320	0.610	1.100	16.492
	Distance from government low-cost (km)	3.761	3.600	0.005	1.260	2.844	5.065	29.316
Structural Attributes	Lot Size (sq feet)	1,026	397	151	797	926	1152	3552
	Rooms	2.9	0.6	0	3	3	3	4
Neighbourhood	Distance from hospital (km)	2.256	2.019	0.008	0.919	1.714	2.856	15.742
Attributes	Distance from university (km)	3.379	3.521	0.039	1.441	2.401	4.185	38.948
Locational Attributes	Distance from KL City Centre (km)	8.262	5.718	0.353	4.328	6.958	10.822	47.610
	Distance from train station (km)	2.321	2.552	0.043	0.812	1.586	2.903	26.515

Note: Number of Observations = 110,893

Table 10: Descriptive Parameters (Privately Managed Low-Cost Housing)

		mean	s.e.	min	25%	50%	75%	max
Dependent Variable	Price	135,420	85,336	4,000	80,650	120,000	168,000	2,150,000
Structural Attributes	Lot Size (sq feet)	693	143	135	635	657	740	3,466
	Rooms	2.8	0.4	0	3	3	3	4
Neighbourhood	Distance from hospital (km)	3.256	2.949	0.086	1.123	2.264	4.386	15.537
Attributes	Distance from university (km)	5.400	5.202	0.111	1.963	3.503	7.112	39.110
Locational Attributes	Distance from KL City Centre (km)	11.528	7.267	0.727	5.827	9.860	15.614	47.706
	Distance from train station (km)	2.757	2.584	0.073	0.895	1.940	3.829	25.886

Note: Number of Observations = 30,839

Table 11: Descriptive Parameters (Government Managed Low-Cost Housing)

		mean	s.e.	min	25%	50%	75%	max
Dependent Variable	Price	143,352	55,886	6075	100,000	140,000	185,000	330,000
Structural Attributes	Lot Size (sq feet)	650	91	398	592	651	750	861
	Rooms	2.5	0.6	1	2	3	3	4
Neighbourhood	Distance from hospital (km)	1.495	0.921	0.332	0.767	1.250	2.227	4.987
Attributes	Distance from university (km)	2.198	1.582	0.550	1.695	2.108	2.247	11.748
Locational Attributes	Distance from KL City Centre (km)	12.246	4.813	1.256	8.780	14.478	15.504	21.346
	Distance from train station (km)	2.065	1.153	0.120	1.541	2.144	2.412	4.620

Note: Number of Observations = 847

5. Results

5.1. RQ1: Does low-cost housing impact nearby property prices?

This section describes the results of our regression analysis of Equation 1, where we examine the effects of all low-cost housing (both privately-managed and government-managed). Table 12 and Table 13 outlines the results for landed properties and non-landed properties respectively.

Table 12: Regression Results, All Low-Cost Housing (Equation 1a – Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	9,006.874***	9,448.121***	13,053.030***	23,406.880***	22,928.670***	17,673.400***	33,930.490***
	(248.7)	(417.671)	(533.621)	(714.954)	(1057.531)	(1517.527)	(4867.404)
CLOWCOST		936.537***	1,108.088***	1,199.157***	-441.815***	-3,502.703***	-13,726.740***
		(10.89)	(13.912)	(23.347)	(63.433)	(136.324)	(635.923)
TENURE	67,307.900***	78,245.740***	72,303.080***	69,523.340***	71,277.800***	68,577.840***	66,753.170***
	(1868.865)	(1832.389)	(1849.22)	(1896.223)	(1977.551)	(2026.842)	(2353.217)
ROOMS	-10,515.11***	-3,155.941**	-1298.56	-4,262.521***	-9,922.111***	-10,744.620***	-2478.39
	(1600.37)	(1567.33)	(1583.703)	(1622.072)	(1681.44)	(1718.837)	(1987.19)
FLOORS	-4,833.675**	-5,767.755***	-3217.87	149.606	4,979.185**	2785.086	22,375.920***
	(2174.045)	(2130.969)	(2151.348)	(2203.577)	(2276.926)	(2325.502)	(2679.6)
LANDAREA	93.204***	92.971***	92.765***	95.598***	101.010***	101.571***	99.105***
	(0.843)	(0.828)	(0.836)	(0.858)	(0.894)	(0.919)	(1.159)
BUILTUP	419.841***	410.795***	413.077***	414.499***	411.512***	414.661***	386.004***
	(2.162)	(2.115)	(2.134)	(2.185)	(2.259)	(2.306)	(2.817)
DUNIVERSITY	1,732.882***	2,164.894***	967.882***	1,289.333***	3,281.620***	3,808.918***	719.019***
	(182.399)	(178.206)	(179.99)	(186.944)	(203.775)	(209.795)	(263.404)
DHOSPITAL	-7,143.325***	-1,357.782***	-3,010.249***	-7,162.008***	-12,826.860***	-13,448.760***	-10,871.020***
	(233.079)	(260.202)	(294.768)	(306.111)	(312.298)	(327.55)	(392.858)
DCITYCENTER	-8,466.658***	-2,207.994***	-3,166.299***	-6,043.552***	-10,207.860***	-10,867.310***	-8,198.112***
	(92.169)	(119.826)	(118.761)	(114.78)	(115.383)	(115.002)	(134.848)
DTRAIN	-1,769.005***	210.502	762.586***	1,922.759***	2,377.308***	2,410.065***	3,608.707***
	(182.388)	(204.216)	(223.757)	(234.299)	(246.351)	(256.435)	(323.77)
Constant	58,167.750***	-405,249.500***	-322,210.000***	-169,005.700***	66,108.550***	116,580.900***	19,268.790**
	(5500.062)	(7580.172)	(7160.448)	(6969.594)	(6854.112)	(6942.342)	(7947.295)
Observations	110,900	108,786	107,919	106,423	102,664	95,443	56,699
R^2	0.698	0.718	0.716	0.707	0.701	0.707	0.703
Adjusted R^2	0.697	0.718	0.716	0.707	0.701	0.707	0.703
Residual Std. Error	282,089.200 (df = 110889)	273,567.800 (df = 108774)	275,007.100 (df = 107907)	280,074.100 (df = 106411)	285,300.800 (df = 102652)	282,223.700 (df = 95431)	258,573.500 (df = 56687)
F Statistic	25,569.630*** (df = 10; 110889)	25,181.510*** (df = 11; 108774)	24,755.290*** (df = 11; 107907)	23,372.570*** (df = 11; 106411)	21,911.010*** (df = 11; 102652)	20,944.800*** (df = 11; 95431)	12,225.060*** (df = 11; 56687)
Note:							*p<0.1; **p<0.05; ***p<0.01
							S.E. stated in parenthesis

Table 13: Regression Results, All Low-Cost Housing (Equation 1b - Non-Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	42,184.310***	45,042.140***	53,222.880***	53,036.390***	49,282.000***	55,039.480***	66,714.980***
	(702.189)	(901.396)	(961.255)	(983.878)	(1134.095)	(1471.364)	(3509.148)
CLOWCOST		14.952	451.050***	387.434***	-376.153***	-2,143.358***	-7,944.467***
		(12.793)	(15.588)	(19.749)	(41.297)	(85.507)	(400.798)
TENURE	64,512.080***	71,968.940***	66,198.400***	64,364.790***	70,669.730***	68,684.120***	59,229.110***
	(1170.542)	(1531.909)	(1532.195)	(1563.664)	(1531.998)	(1540.854)	(1713.03)
ROOMS	-78,208.760***	-84,510.350***	-79,524.510***	-81,304.060***	-85,998.730***	-84,619.290***	-97,471.320***
	(981.054)	(1205.289)	(1210.345)	(1212.206)	(1215.104)	(1214.587)	(1438.203)
LOTSIZE	(652.426***)	(639.452***)	(631.564***)	(634.821***)	(639.605***)	(634.300***)	(614.927***)
	(1.665)	(2.023)	(2.028)	(2.029)	(2.028)	(2.054)	(2.543)
DUNIVERSITY	1,781.489***	2,851.850***	2,900.405***	2,792.120***	2,986.605***	2,702.984***	-102.288
	(186.908)	(288.385)	(285.402)	(286.729)	(287.658)	(294.246)	(362.2)
DHOSPITAL	-7,973.113***	-12,767.890***	-11,377.430***	-11,843.350***	-13,161.180***	-13,389.100***	-15,464.010***
	(290.182)	(446)	(444.194)	(444.906)	(446.448)	(455.323)	(566.388)
DCITYCENTER	-10,952.240***	-14,315.390***	-7,949.833***	-11,040.900***	-15,377.950***	-15,911.870***	-13,646.750***
	(135.96)	(264.605)	(301.525)	(269.078)	(217.04)	(208.978)	(237.695)
DTRAIN	-2,634.063***	-1,482.982***	-3,077.265***	-2,542.215***	-2,056.613***	-1,720.726***	-8,676.041***
	(297.391)	(409.349)	(410.24)	(411.961)	(412.1)	(421.335)	(529.977)
Constant	33,327.770***	87,935.930***	-92,981.280***	3879.26	122,976.000***	148,736.600***	198,840.700***
	(2906.507)	(8111.997)	(7489.272)	(5939.814)	(4995.729)	(4730.548)	(5295.773)
Observations	110,087	80,868	80,840	80,828	80,401	77,974	59,139
R^2	0.711	0.673	0.676	0.675	0.675	0.677	0.634
Adjusted R^2	0.711	0.673	0.676	0.675	0.675	0.677	0.634
Residual Std. Error	182,974.900 (df = 110078)	205,146.300 (df = 80858)	204,006.700 (df = 80830)	204,532.300 (df = 80818)	204,920.800 (df = 80391)	204,795.300 (df = 77964)	198,494.900 (df = 59129)
F Statistic	33,787.830*** (df = 8; 110078)	18,477.050*** (df = 9; 80858)	18,779.700*** (df = 9; 80830)	18,634.470*** (df = 9; 80818)	18,539.780*** (df = 9; 80391)	18,186.370*** (df = 9; 77964)	11,383.160*** (df = 9; 59129)

Note: *p<0.1; **p<0.05; ***p<0.01

S.E. stated in parenthesis

Based on our literature review, we expect a positive coefficient for the number of rooms (ROOMS). However, we observe a negative coefficient for number of rooms in the case for both landed and non-landed properties. Ludick, Dyason, and Fourie (2021) listed a possible reason for this contradiction which could be due to changing market trends where young couples prefer smaller houses. However, we believe that the negative coefficient here could be an emergent phenomenon arising from a confluence of household and housing typologies. As of 2019, DOSM reports that the average household size in urban areas is 3.8[35]. On the other hand, both landed properties and non-landed properties normally have a median of 3 rooms (refer to Table 8 and Table 9). With modal households being composed of either 3 or 4 persons per home, building homes with more than 3 rooms without an accompanying increase in unit size results in less functional space for the house buyer. This would be a natural consequence of the increased proliferation of smaller homes or the lack of building different unit typologies for different household compositions.

[35] *DOS (2020)*

Apart from rooms, the remainder of our hedonic attributes are consistent with empirical findings from other studies in this matter[36]. All hedonic variables are statistically significant at a tolerance threshold of 1% and all models exhibit an adjusted-R^2 value of between 0.63 and 0.72.

In general, freehold properties seem to fetch a higher price of between RM60k to RM80k compared to leasehold properties. In terms of accessibility, the further away a property is from KL City Centre, the cheaper its price. Also, the further away a house is from train stations[37], the cheaper the house price.

While controlling for the broad hedonic variables, we now explore the attributes of our variables of interest – distance from low-cost housing (DLOWCOST) and count of low-cost housing (CLOWOST). Most models exhibit statistical significance at a 1% tolerance threshold. Both landed and non-landed properties exhibit a similar trend.

As shown in Figure 5, the regression is run at different concentric distance restrictions, creating 7 separate models with varying distance ranges. Firstly, we will look at the effects of distance from low-cost housing (DLOWCOST) on nearby property prices. The unrestricted model exhibits the presence of a NIMBY effect (of about RM9,000 for landed properties). Next, we progressively restrict distances to examine the set of properties that are situated at proximities that are closer to LCHs. We found that in doing so, the NIMBY effects intensify for properties which are located closer to LCH. At a 1km radius, the NIMBY effects seem to be significantly higher relative to most of the other hedonic variables (between RM29k to RM39k for landed properties and between RM63k to RM71k for non-landed properties).

In computing the regression diagnostics (as described in *Appendix 2: Regression Diagnostics*), we have detected the presence of Heteroskedasticity, whose treatment is summarized in *Appendix 4: Addressing Heteroskedasticity – Quantile Regression*. For more robust results, we employed median regression (or regression based on percentiles)[38]. It is observed that the NIMBY effects for distance were persistent, albeit at a consistently lower level for landed properties (at RM30k to RM40k within a 1km radius for example), while non-landed properties exhibited greater variation over price quintiles. A similar trend is also observed over the distance thresholds. This indicates that residents who stay in landed properties more consistently exhibited or experience the NIMBY effect as compared to residents who were in non-landed properties, whose experience were more varied.

Moreover, we have also found that the count of low-cost properties (CLOWCOST) within the distance thresholds are statistically significant. At 0 to 1km, the presence of a low-cost non-landed complex decreases house prices by around RM14k for landed properties and around RM8k for non-landed properties. At 0 to 3km, the effects for each low-cost housing in the vicinity converged to a decrease of RM3k for landed properties and RM2k for non-landed properties. Above the 3km threshold, the effects even become positive, suggesting that the NIMBY effects have fizzled out.

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[36] *Mar Iman, Hamidi, and Liew (2009) , Ooi, Le, and Lee (2014), Kam et al. (2016)*

[37] *MRT, LRT, KTM*

[38] *Refer to Appendix 4: Addressing Heteroskedasticity – Quantile Regression*

5.2. RQ2: Is the impact different for privately managed LCH vs government managed LCH?

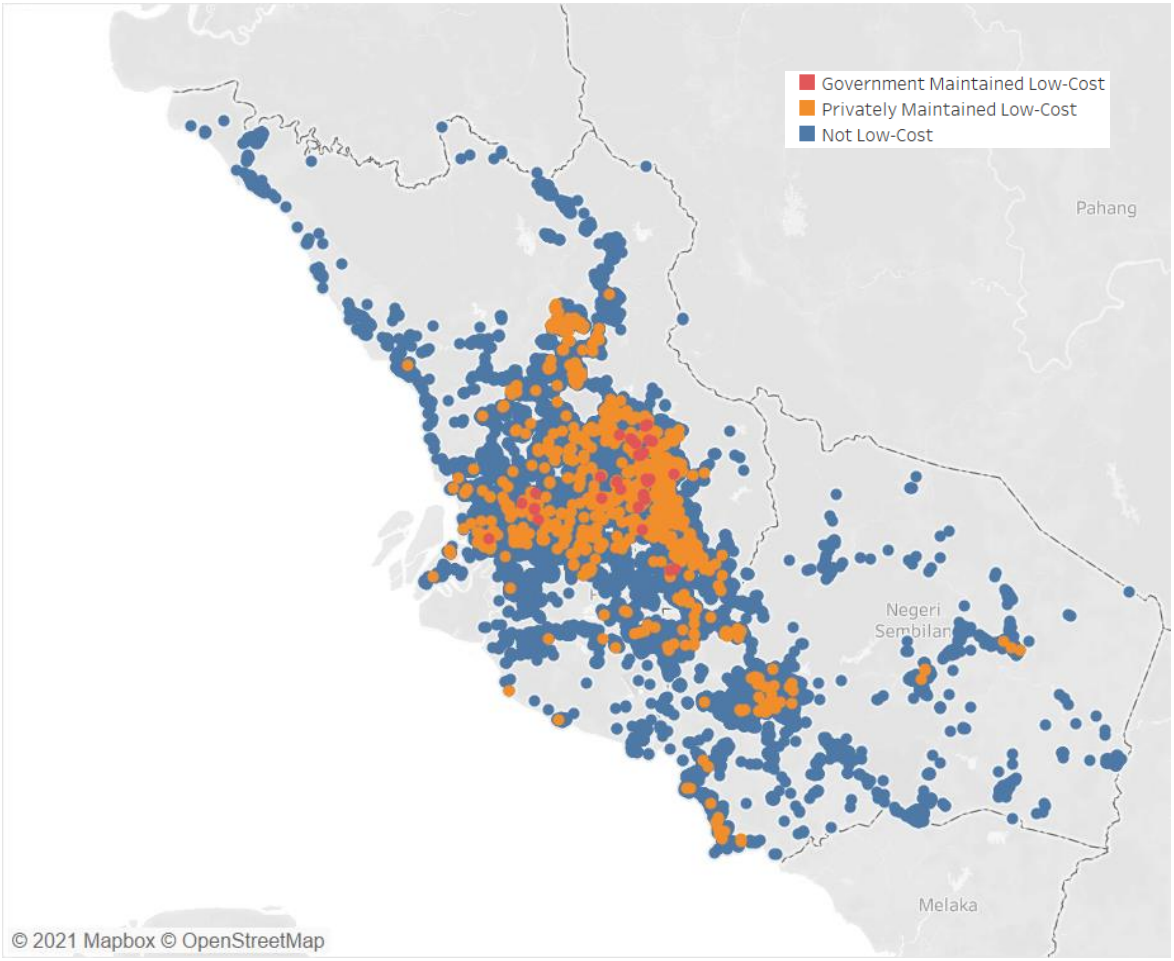
For context, Table 14 outlines the count and composition of LCH types in GKL, while Figure 6: Distribution of LCH types over GKL describes its geographical distribution across the GKL region. For context, there are 3561 unique NL complexes in our dataset. Out of this amount, 728 are privately managed LCH, while an additional 86 government managed LCH were mostly compiled outside our dataset.

Table 14: Frequency count of LCH categories

Type of low cost	Number of properties
Privately managed	728
Government managed (PPR + PA +PKNS)	86
Total	814

Source: Author's own compilation (Refer to Table 6)

Figure 6: Distribution of LCH types over GKL



Note: The 'Not Low-Cost' category encompasses both landed and non-landed properties.

It is observed that privately managed low-cost homes are distributed fairly uniformly across the various states and districts in GKL. However, government managed housing (non-landed) seems

to be fairly concentrated at the central districts of Kuala Lumpur and a few other places here and there.

Next, to explore if there are significant differences when the low-cost homes are privately managed or if they are government driven social housing, we outline the regression results for Equation 2 and Equation 3. Table 15 and Table 16 outlines the regression results for privately managed low-cost homes, while Table 17 and Table 18 outlines regression results for government managed low-cost homes.

Table 15: Regression Results, Privately managed LCH (Equation 2a – Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DPRIVATE	8,955.056***	10,149.140***	14,163.690***	23,785.940***	19,582.510***	13,500.920***	32,162.210***
	(248.54)	(417.669)	(535.144)	(718.103)	(1065.348)	(1522.216)	(4855.615)
CPRIVATE		1,147.635***	1,263.767***	1,257.414***	-1,056.082***	-4,428.975***	-15,593.230***
		(13.908)	(18.005)	(30.398)	(76.542)	(151.54)	(667.459)
TENURE	67,409.950***	76,984.910***	70,274.960***	68,124.430***	71,254.850***	69,821.380***	67,071.980***
	(1869.202)	(1836.567)	(1860.421)	(1904.663)	(1974.06)	(2022.474)	(2374.061)
ROOMS	-10,519.730***	-4,758.513***	-3,280.925**	-5,901.076***	-10,015.400***	-10,501.720***	-2586.75
	(1600.477)	(1570.68)	(1592.958)	(1628.356)	(1680.022)	(1717.325)	(1999.266)
FLOORS	-4,829.666**	-5,521.530***	-3,627.798*	287.269	5,181.608**	3806.224	21,088.510***
	(2174.176)	(2136.537)	(2165.404)	(2213.571)	(2276.054)	(2324.365)	(2693.792)
LANDAREA	93.208***	93.455***	93.431***	96.324***	101.142***	101.603***	98.552***
	(0.843)	(0.83)	(0.842)	(0.862)	(0.894)	(0.918)	(1.166)
BUILTUP	419.859***	410.606***	413.145***	414.044***	411.123***	413.899***	387.598***
	(2.162)	(2.121)	(2.147)	(2.195)	(2.259)	(2.306)	(2.839)
DUNIVERSITY	1,727.795***	2,974.155***	1,795.916***	1,889.159***	3,273.834***	3,527.042***	488.766*
	(182.409)	(179.054)	(180.659)	(187.055)	(202.475)	(209.043)	(265.269)
DHOSPITAL	-7,136.721***	-1,587.548***	-3,824.946***	-7,824.448***	-13,317.690***	-13,545.120***	-10,631.560***
	(233.088)	(260.951)	(296.796)	(309.155)	(312.274)	(326.001)	(391.887)
DCITYCENTER	-8,458.483***	-2,532.266***	-4,010.261***	-6,793.748***	-10,398.770***	-10,727.780***	-8,074.159***
	(92.148)	(119.479)	(117.804)	(113.235)	(112.344)	(112.701)	(135.341)
DTRAIN	-1,753.275***	238.61	919.722***	1,997.608***	2,360.671***	2,508.199***	3,686.242***
	(182.352)	(204.684)	(225.131)	(235.317)	(246.177)	(256.162)	(323.977)
Constant	57,783.290***	-413,441.900***	-294,725.600***	-137,665.400***	89,978.980***	122,402.200***	21,854.890***
	(5500.074)	(7817.845)	(7337.317)	(7134.869)	(6831.357)	(6841.574)	(7896.674)
Observations	110,900	108,786	107,919	106,423	102,664	95,419	55,880
R^2	0.697	0.717	0.713	0.705	0.702	0.708	0.704
Adjusted R^2	0.697	0.717	0.713	0.705	0.702	0.708	0.704
Residual Std. Error	282,106.000 (df = 110889)	274,284.500 (df = 108774)	276,763.600 (df = 107907)	281,318.000 (df = 106411)	285,158.000 (df = 102652)	282,015.300 (df = 95407)	258,173.400 (df = 55868)
F Statistic	25,565.260*** (df = 10; 110889)	24,998.460*** (df = 11; 108774)	24,317.950*** (df = 11; 107907)	23,080.980*** (df = 11; 106411)	21,942.310*** (df = 11; 102652)	20,983.710*** (df = 11; 95407)	12,071.610*** (df = 11; 55868)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 16: Regression Results, Privately managed LCH (Equation 2b - Non-Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	42,219.540***	44,370.210***	50,944.510***	49,480.720***	39,635.360***	46,271.240***	64,445.270***
	(695.633)	(889.42)	(950.167)	(992.93)	(1130.805)	(1433.782)	(3394.406)
CLOWCOST		34.455**	397.058***	187.981***	-1,412.200***	-3,766.548***	-9,353.545***
		(14.7)	(17.265)	(24.922)	(54.521)	(105.163)	(457.651)
TENURE	64,970.460***	71,950.890***	66,792.850***	68,689.960***	70,100.730***	67,583.260***	61,883.170***
	(1168.611)	(1513.173)	(1521.628)	(1544.214)	(1508.909)	(1518.502)	(1708.281)
ROOMS	-77,760.310***	-83,470.590***	-80,056.560***	-82,625.470***	-85,692.780***	-82,793.030***	-96,035.470***
	(-980.972)	(-1194.706)	(-1199.168)	(-1198.385)	(-1196.829)	(-1199.052)	(-1444.865)
LOTSIZE	652.281***	640.021***	635.364***	638.847***	639.567***	633.943***	615.648***
	(1.664)	(2.012)	(2.014)	(2.016)	(2.01)	(2.034)	(2.535)
DUNIVERSITY	1,753.632***	2,524.502***	3,307.997***	2,853.800***	1,926.345***	1,203.861***	118.099
	(186.733)	(288.394)	(283.389)	(284.176)	(282.779)	(289.537)	(358.92)
DHOSPITAL	-7,971.123***	-13,044.400***	-12,384.260***	-12,679.900***	-13,840.860***	-13,862.590***	-13,412.920***
	(290.087)	(441.942)	(440.285)	(441.873)	(440.983)	(447.801)	(558.956)
DCITYCENTER	-10,914.020***	-13,778.050***	-10,333.340***	-13,253.590***	-15,685.410***	-14,979.140***	-13,136.070***
	(135.873)	(238.69)	(253.829)	(234.941)	(198.571)	(195.36)	(231.904)
DTRAIN	-2,462.520***	-1,107.864***	-2,114.625***	-1,490.866***	-1,670.373***	-989.348**	-8,500.678***
	(296.532)	(406.132)	(406.292)	(409.259)	(406.884)	(415.737)	(528.428)
Constant	30,179.550***	74,496.170***	-41,755.190***	55,016.740***	168,239.600***	161,451.700***	182,934.500***
	(2906.186)	(7697.622)	(6777.521)	(5759.224)	(4874.987)	(4542.244)	(5176.122)
Observations	110,087	81,659	81,631	81,619	81,192	78,765	58,210
R^2	0.711	0.674	0.677	0.675	0.679	0.681	0.64
Adjusted R^2	0.711	0.674	0.677	0.675	0.679	0.681	0.639
Residual Std. Error	182,915.000 (df = 110078)	204,405.600 (df = 81649)	203,673.900 (df = 81621)	204,221.500 (df = 81609)	203,465.000 (df = 81182)	203,256.500 (df = 78755)	196,774.600 (df = 58200)
F Statistic	33,818.990*** (df = 8; 110078)	18,784.790*** (df = 9; 81649)	18,980.170*** (df = 9; 81621)	18,827.280*** (df = 9; 81609)	19,045.160*** (df = 9; 81182)	18,708.650*** (df = 9; 78755)	11,473.260*** (df = 9; 58200)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 17: Regression Results, Government Managed LCH (Equation 3a - Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DGOVT	6,788.659***	694.897**	3,997.110***	2,258.335***	6,325.573***	11,278.350***	17001.68
	(188.622)	(289.426)	(347.699)	(568.794)	(1483.485)	(2869.637)	(17645.61)
CGOVT		3,472.123***	3,879.607***	2,214.464***	-9,103.609***	-9,795.284***	-21,666.370***
		(53.149)	(60.586)	(104.014)	(298.629)	(614.365)	(3471.82)
TENURE	69,099.730***	88,211.850***	94,899.250***	122,436.80***	150,107.900***	136,478.200***	184,846.000***
	(1872.948)	(1969.079)	(2083.884)	(2504.892)	(3451.562)	(4074.595)	(8683.957)
ROOMS	-12,302.810***	767.688	1597.055	4,437.171**	8,731.819***	22,073.590***	30,428.850***
	(1599.002)	(1664.588)	(1743.407)	(1989.989)	(2799.476)	(3382.357)	(6771.45)
FLOORS	-6,318.282***	-501.86	5,816.931**	18,721.890***	60,358.440***	75,113.130***	122,011.700***
	(2174.203)	(2253.663)	(2366.779)	(2712.022)	(3691.79)	(4255.941)	(8146.388)
LANDAREA	93.251***	100.657***	105.901***	117.716***	134.871***	146.913***	145.641***
	(0.843)	(0.893)	(0.947)	(1.101)	(1.528)	(1.841)	(3.759)
BUILTUP	422.423***	415.313***	416.574***	414.464***	409.133***	364.121***	317.428***
	(2.16)	(2.228)	(2.326)	(2.644)	(3.608)	(4.425)	(8.749)
DUNIVERSITY	4,134.990***	-681.130***	-958.610***	5,644.901***	23,617.300***	8,185.623***	107.142
	(194.939)	(236.614)	(265.846)	(388.173)	(586.611)	(699.354)	(1386.231)
DHOSPITAL	-9,142.669***	-1,227.969***	-3,261.468***	-13,584.76***	-38,311.120***	-23,040.430***	-10,932.690***
	(241.454)	(367.844)	(406.591)	(517.248)	(884.907)	(1242.799)	(2458.21)
DCITYCENTER	-10,050.15***	-3,296.047***	-4,189.766***	-10,648.20***	-22,110.910***	-11,996.040***	-4,720.283***
	(109.879)	(162.16)	(169.52)	(227.734)	(311.227)	(354.73)	(703.33)
DTRAIN	-4,464.487***	-705.491*	-4,034.290***	-9,990.747***	-14,303.640***	-34,843.030***	-17,252.070***
	(217.377)	(388.939)	(448.221)	(629.443)	(1138.407)	(1840.664)	(5535.261)
Constant	68,765.080***	-269,872.***	-243,954.9***	-76,979.58***	75,851.250***	-92,396.940***	-298,656.600***
	(5518.198)	(7564.215)	(7559.316)	(8454.525)	(11000.53)	(12685.65)	(27888.78)
Observations	110,900	99,884	92,895	76,649	45,276	27,038	5,977
R^2	0.697	0.715	0.718	0.716	0.722	0.718	0.722
Adjusted R^2	0.697	0.715	0.718	0.716	0.722	0.718	0.721
Residual Std. Error	282,109.600 (df = 110889)	280,637.300 (df = 99872)	285,615.100 (df = 92883)	302,319.000 (df = 76637)	331,424.800 (df = 45264)	315,209.200 (df = 27026)	305,974.700 (df = 5965)
F Statistic	25,564.330*** (df = 10; 110889)	22,816.670*** (df = 11; 99872)	21,518.860*** (df = 11; 92883)	17,544.010*** (df = 11; 76637)	10,672.950*** (df = 11; 45264)	6,257.531*** (df = 11; 27026)	1,408.433*** (df = 11; 5965)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 18: Regression Results, Government managed LCH (Equation 3b - Non-Landed Residential Properties)

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	5,836.013***	5,285.675***	6,283.807***	8,111.070***	10,078.510***	-5,914.254***	-5925.97
	(230.523)	(237.554)	(255.393)	(352.441)	(733.409)	(1334.334)	(6282.581)
CLOWCOST		-961.347***	1,424.485***	1,708.953***	-586.543***	-1,549.924***	-10,630.970***
		(48.875)	(49.508)	(54.223)	(108.117)	(210.275)	(1155.629)
TENURE	76,713.180***	78,169.500***	84,364.460***	81,362.680***	91,187.880***	96,061.970***	89,471.260***
	(1169.555)	(1194.51)	(1198.564)	(1280.549)	(1541.736)	(1795.448)	(3071.042)
ROOMS	-79,292.070***	-75,216.080***	-72,403.920***	-69,426.100***	-77,668.450***	-86,333.500***	-84,390.960***
	(994.039)	(1011.389)	(1018.637)	(1057.225)	(1192.663)	(1382.272)	(1906.43)
LOTSIZE	668.365***	665.909***	656.711***	661.711***	696.510***	692.776***	665.513***
	(1.661)	(1.67)	(1.694)	(1.739)	(2.048)	(2.513)	(4.258)
DUNIVERSITY	926.006***	385.826*	-2,077.466***	-1,470.683***	-593.447*	-7,825.195***	-7,171.908***
	(190.367)	(202.826)	(218.151)	(264.693)	(327.384)	(407.822)	(713.959)
DHOSPITAL	-10,088.790***	-7,614.384***	-8,537.514***	-11,800.680***	-20,440.180***	-19,734.480***	-22,589.260***
	(303.459)	(329.218)	(350.429)	(392.733)	(536.028)	(668.911)	(1125.525)
DCITYCENTER	-12,225.810***	-16,567.020***	-5,194.582***	-6,525.876***	-14,068.450***	-8,438.062***	-6,556.313***
	(154.473)	(266.957)	(279.046)	(268.429)	(253.655)	(300.556)	(498.997)
DTRAIN	-1,827.951***	-7,141.593***	-8,317.860***	-10,510.170***	-12,790.500***	-12,696.330***	-26,310.170***
	(319.726)	(359.087)	(366.966)	(397.184)	(729.282)	(1057.996)	(2523.12)
Constant	36,379.250***	135,318.500***	-86,805.310***	-62,089.710***	57,621.850***	87,854.970***	124,101.400***
	(2946.822)	(5808.605)	(5322.808)	(4592.371)	(4716.56)	(4872.631)	(8189.165)
Observations	110,087	108,757	107,113	100,975	77,113	55,817	21,783
R^2	0.703	0.705	0.708	0.711	0.716	0.689	0.66
Adjusted R^2	0.703	0.705	0.708	0.711	0.716	0.689	0.66
Residual Std. Error	185,411.300 (df = 110078)	185,244.900 (df = 108747)	185,118.000 (df = 107103)	187,036.500 (df = 100965)	200,027.100 (df = 77103)	198,599.800 (df = 55807)	199,669.700 (df = 21773)
F Statistic	32,546.460*** (df = 8; 110078)	28,918.410*** (df = 9; 108747)	28,827.400*** (df = 9; 107103)	27,557.810*** (df = 9; 100965)	21,627.990*** (df = 9; 77103)	13,718.250*** (df = 9; 55807)	4,693.240*** (df = 9; 21773)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Proximity to privately managed LCH

We have found that for privately managed LCH, the NIMBY effects seem to be similar to that of the regression for RQ1 (Table 12 and Table 13). This is to be expected as it is a natural consequence of how 90% of LCH are composed of privately managed LCH.

Proximity to government managed LCH

However, for government managed LCH, we have found the NIMBY effects for distance to be statistically insignificant at a distance threshold of less than 1km, but statistically significant at 1% tolerance at a 3km (model 2) and beyond. For landed properties that experience the NIMBY effect, the trend appears to be similar in relation to RQ1[39] - in general, houses situated closer to LCHs are associated with a negative effect on house prices, while the greater the count of LCHs nearby also impacts house prices negatively. Jointly, both these NIMBY effects intensify the closer a particular house is to LCH, which signifies higher intensity of presence and permeance of being situated closer to government managed LCH.

[39] *For ease of reference, RQ1 – Does low-cost housing impact nearby property prices?*

On the other hand, non-landed properties seem to exhibit a different trend. Within a 3km distance range, non-landed properties that were situated closer from a government managed LCH seemed to experience an increase in their house price, which suggests the presence of an "In my back yard" IMBY effect. However, like RQ1, these effects were less pronounced at longer distances.

As the current specification of the model is heteroskedastic, a deeper inspection based on quantile regression yields several revelations. Firstly, while β remains statistically insignificant at a 1km radius (according to Table 17), a quantile regression indicates that β is statistically significant and positive for the bottom 30% of landed transacted prices[40], while quantiles above 30% were statistically insignificant. On the other hand, β is statistically significant and positive for the bottom 50% of non-landed transacted prices, but negative for the top 40% of quintiles.

While we observe that both the NIMBY and IMBY effects do intensify the closer a property is to LCHs, the difference in statistical relationship as faced by the bottom quintiles vs the higher ones seem to persist below a 3km radius. This suggests that the houses that were priced at the lower quantiles face a different reality of being in close proximity to government managed LCH, as compared to the higher price quantiles, that may be able to insulate themselves from NIMBY effects.

Count of privately managed LCH

As for count of private LCH, the results were significant for at all distances for landed properties. At a 1km, 3km and 5km radius, the effects are negative which indicates that property prices decreases when there is a stronger presence of LCH. Above 5km, the presence of LCH seem to have a positive effect on landed properties, though the positive effects are smaller than the negative effects.

The results of non-landed property were mixed. At 1km and 3km, the effects are negative and significant. Interestingly, the effects at 5km become non-significant. At 10km and 15km, the effects are positive and significant, but becomes negative at 20km. We also observe that beyond a 1km radius, the effects of presence of LCH are larger for landed properties comparative to non-landed properties.

Count of government managed LCH

The NIMBY Effects for the count of government managed LCH exhibits a similar trend to that of the count of private LCH. The results were significant for at all distances for landed properties. However, the effects of the presence of LCH seem to be more intense at a 1km and 3km distance threshold.

[40] *Refer to Table 34 and Table 36*

6. Discussion

6.1. GKL – An Inclusive City. But with varying degrees

The provision of low-cost housing seemed to be quite uniformly distributed across the GKL region. This is in part because governments require private developers to construct a certain quota of LCH in line with the country's social objectives of creating affordable housing for all (refer to Appendix 1). In this sense, this is perhaps reflective of how Malaysia has been in principle inclusive of having the poor in their neighborhood. Where the distribution of low-cost housing is fairly uniform over geography, we infer that 'the poor' have access to shelter regardless of where they are situated in GKL. On the other hand, we also observe that government managed social housing is mostly situated in fairly accessible areas, indicating that the poor have access to public transportation infrastructure and central business districts in general (refer to Table 10 and Table 11).

When measured against the set policy objectives of the various Malaysia plans and state provisions for housing matters, the social provision of housing seemed to have worked well both in providing for shelter as a core housing need and culling the formation of slums. Various studies have also found negative effects to be stronger when there are many LCH clustered/ concentrated together[41]. In Figure 6: Distribution of LCH types over GKL, we see that private LCH in Malaysia is generally distributed all over GKL and is not concentrated only in certain areas. As for government LCH, we see that it's distributed around Kuala Lumpur.

This would mean that most neighborhoods generally will have LCH within their proximity. This is a possible explanation as to why the effects of count/ presence of LCH is weaker comparative to the effects of distance from LCH. Interestingly, the study done by Goetz (1996) suggest that non-profit developed subsidized housing does not depress property values, it does not increase crime and it does not concentrate poverty by attracting more poor families to the central city. Thus, the dispersal of subsidized housing is not necessary for the sake of inner-city neighbourhoods.

Since LCH in Malaysia is generally well distributed and not clustered together, the issue of dispersal of affordable housing, therefore, needs to be reframed. Housing for the poor should be undertaken to enhance aspects of city living that inculcate social mobility even among poorer communities, by ensuring educational and employment opportunities are accessible in close proximity to the lower-income group, as well as adopting these considerations to provide families with a wider range of communities to choose from when they make their housing decisions[42].

6.2. Many low-cost housing have not been maintained well

Studies have found that the deteriorating physical conditions of LCH can be a reason for the decline in nearby property prices[43]. In Malaysia, private non-landed properties are typically managed by the building's joint management body (JMB) that are elected by the residents.

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[41] *Santiago, Galster, and Tatian (2001)*
[42] *Goetz, Lam, and Heidinger (1996)*
[43] *Santiago, Galster, and Tatian (2001); Goetz, Lam, and Heidinger (1996)*

Tenants will then have to pay a monthly maintenance fee to the JMB and contribute to a sinking fund. The former is used for contractual and non-contractual operating expenses, utilities and contingencies[44], while the latter is used for capital expenditure in respect of repainting, upgrading and refurbishment of the common property. Maintenance fees of low and medium-cost units cost an average between RM30 and RM200 a month and the sinking fund is typically 10% of the maintenance fee[45].

However, JMBs face a common problem of facing residents who do not pay their maintenance fees, particularly in low and medium-cost buildings. Housing and Local Government Ministry (KPKT) Housing and Strata Management Tribunal deputy chairman Mohammad Khalid Ab Karim said that: "*Based on complaints received in 2019, of the 5,675 cases registered with the Strata Management Tribunal (TPS), 5,291 or 93% involved failure to pay maintenance fees*"[46].

The problem of high maintenance fees arrears restricts JMB in conducting comprehensive maintenance works. The lack of maintenance naturally leads to building dilapidation, malfunctioning facilities (e.g., lifts) and poor cleanliness. Additionally, an insufficient sinking fund will also limit the JMB's ability to upkeep the building, causing LCH buildings to suffer from deteriorating physical conditions. For example, many buildings have exterior walls that are not regularly repainted nor maintained, causing the paint to look dirty.

On the other hand, government LCH is not managed by an individual building management team, but rather by a general government body that manages all the government LCH. In recent years, the government has begun to place emphasis on maintenance through the allocation of funds (as explained in Section 2.2), however efforts for maintenance of government LCH still seems to be insufficient.

A study conducted by KPKT[47] had looked at various aspects of PPR livelihoods, including the physical built environment. While the study found that there were no critical damages that adversely affect the safety of the building, there were multiple recorded problems relating to the physical built environment. The study identified problems such as 'concrete spalling', cracks on pathways (resulting from shoddy work), formation of stalactites and stalagmites, cracks, soil deposition, collection of stagnant water, growing moss from water leakage, paint peeling off and all sorts of problems, which was traced to shoddy work and a lack of scheduled maintenance, among other things.

Recently, it is even suggested[48] that some privately managed low-cost complexes may not even have a JMB to collect maintenance fees and manage general upkeep to begin with. Against this

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[44] Contractual operating expenses refer to a fixed monthly amount for service providers that include cleaning, security, firefighting, lift maintenance, landscaping, swimming pool, management staff cost, property management fees, pest control, and rubbish collection and disposal. Non-contractual operating expenses cover CCTVs, carparks, firefighting systems, air-conditioning repairs, barriers gate and waterproofing. Utilities mean electricity charges, water charges, telephone and internet. (Lee, 2020)

[45] Lee (2020)

[46] "'Over 90% of Tribunal Cases Involve Maintenance Fee Arrears' | The Star" (n.d.)

[47] KPKT (n.d.)

[48] Daim (2021)

backdrop, it wouldn't be surprising to find these privately managed low-cost complexes suffer from varying states of dilapidation.

6.3. Low-cost housing may be sub-standard in a variety of ways

We argue that the presence of a NIMBY effect can also be an outcome which indicates inherent problems in the way provision of shelter is managed in the housing market.

Although not specifically studied in our paper, one of such problems is whether low-cost housing is provisioned in a way where 'the poor' may have no choice but to live in a sub-standard environment. A sub-standard housing experience can manifest itself in a variety of ways. For example, a 700 sq ft unit can be too small for a family of 6 people, resulting in overcrowding. The unit might be designed in a way that is not conducive for our culture or social aspirations. For example, when there are insufficient car parks, residents who own motor vehicles encroach upon surrounding neighborhoods.

In our analysis, we provide evidence for the existence of a NIMBY effect in Greater Kuala Lumpur. In general, people's preferences suggest that the negative externalities of having close proximity to poor people may be more apparent if one resides in a landed property as compared to non-landed properties. Future studies can further unravel this phenomenon by studying the living experiences of people living in close proximity to low-cost flats.

Could the NIMBY effect be the result of a misplaced negative perception of 'poor people', or if there are legitimate concerns surrounding low-income housing? For example, would the introduction of a new low-cost housing complex lead to a surge in the number of cars and cause communities to face both increased traffic and be inconvenienced every time a resident shop for groceries? Would it result in the surge in illegally parked motorcycles occupying pedestrian pathways?

It is also claimed that low-income housing leads to an upsurge in crime rates[49]. However, elsewhere it is found that the conversion of the properties from private ownership into non-profit subsidized housing was associated with a reduction in the average level of criminal activity[50]. There are multiple perspectives to consider, and the devil often lies in the details.

On the other hand, various studies have shown that LCH can be a vehicle for generating positive externalities[51]. While not specifically studied in our paper, we recognize that understanding and addressing these socio-behavioral perspectives could go a long way in mitigating NIMBY effects and making our GKL city more inclusive.

[49] *Santiago, Galster, and Tatian (2001); Preez and Sale (2013)*
[50] *Goetz, Lam, and Heidinger (1996)*
[51] *Santiago, Galster, and Tatian (2001)*

6.4. The National Housing Survey & The Housing Conditions Survey

In order to better understand and address the different aspects of housing, we argue from previous work on housing[52], that a National Housing Survey accompanied by a Housing Conditions Survey ought to be conducted. The National Housing Survey can be undertaken to better quantify existing issues in physical design and functional space in relation to our social expectations.

On the other hand, a housing conditions survey can be undertaken to quantify problems with the built condition of housing complexes and the cost associated with addressing building dilapidation. Generally, a housing conditions survey would be unfavorable to homeowners because these have the potential to reveal critical information on the building dilapidation that might make their houses hard to sell in the sub-sale market. However, we believe that when done right, inherent problems may be addressed, and these would naturally lead to improvements in the housing condition for both present and future homeowners.

7. Conclusion

Our study finds that property prices are indeed negatively affected by being in close proximity to a LCH. We also observe that the NIMBY effects for private LCH seems to be larger as compared to government LCH.

The findings reflect the behavior of properties in states surrounding Greater Kuala Lumpur (Kuala Lumpur, Selangor, Negeri Sembilan and Putrajaya), where more than 20% of the Malaysian population resides in. We conclude that more attention is required in (1) raising the living standards of LCH and (2) ensuring proper maintenance of buildings.

Studies have recommended for policy makers to disperse LCH and ensure that LCH are placed in "compatible neighborhoods" to reduce the effects of LCH. We observe that LCH is relatively well dispersed around Greater Kuala Lumpur already, hence ensuring compatibility will be challenging considering that every neighborhood will generally have a LCH situated near them.

Future studies can consider the socio-economic status of neighborhoods, and compare the effects of LCH in "rich" and "poor" neighborhoods. While our study takes on a quantitative methodology, future study can also take on qualitative or mixed method approaches, to further understand homeowners' perception on LCH and other qualitative consequences of NIMBY.

One of such examples would be in the computation of distances. our computation of distance was based on the 'Haversine' method, producing a distance method "as the crow flies" from one point to another. While there exist other computational approaches such as the use of travel isochrones based on road networks, there are qualitative considerations as well on the actual travel experience that individuals face. An individual's mobility may be multi-modal, it may be influenced by other factors such as security, convenience, etc. which we do not account for in this paper.

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[52] *Suraya Ismail et al. (2019)*

Finally, there are still various questions that are remains to be addressed. Does LCH correlate with higher crime rates? Does LCH catalyzes a vicious cycle of poverty? While LCH may be a good policy in ensuring that the poor have access to the basic necessity of shelter, policymakers should explore ways to integrate LCH into neighborhoods in a way where both poor people benefit from; and contribute to help the local neighborhood grow economically.

8. Appendix

8.1. Appendix 1: Key plans and policies implemented for low-cost housing

In this section, we reviewed each of the Malaysia plans and summarized key highlights of housing in general, but with a focus on the policies and thinking with regards to low-cost housing[53].

Table 19: Low-Cost Housing Policies Based on the Malaysia 5 Year Plan (Rancangan Malaysia)

Plan Period	Key Plans and Policies Implemented
First Malaysia Plan (1964 – 1970)	Low-cost housing is one of the major efforts of the government to promote the welfare of the lower income group. This is because private developers are not attracted to enter the field of low-cost housing development. Although housing is a state matter, the federal government will provide financial assistance to state governments through "loan funds on generous terms" to undertake low-cost housing projects. Additionally, the services of the Housing Trust are made available to provide technical aid. Low-cost housing will be built in the Federal Capital and in the larger urban areas to relieve congestion and combat the squatter problem. To economize on the use of valuable land and reduce construction cost, multi-story flats will be built. In smaller urban areas and in the rural areas timber and terrace houses will continue to be built.
Second Malaysia Plan (1971 – 1975)	The government will continue to place emphasis on housing for the low-income groups, as such ventures do not appeal to private developers. Various federal and state agencies also supplemented the public housing programs. The Housing Trust was dissolved in 1972 and was replaced by the National Housing Development in delivering low-cost housing (Endan (1984).
Third Malaysia Plan (1976 – 1980)	There will be increased joint ventures between the public and private sector to accelerate the pace of low-cost housing construction. A Private Sector Consultative Committee on Housing and Construction, comprising representatives from both public and private sectors, has been formed to assist the government in the formulation of appropriate programs to particularly deal with housing problems for the low-income group. Additionally, the Housing Developers' Association has formed a housing company, HDA Perumahan Bhd, with the sole objective of undertaking private low-cost housing as well as in joint venture with public housing agencies. For the lowest income group, such as squatter families in urban areas, will be rehoused through the Sites and Services projects. The inhabitants will accordingly complete the construction of their homes with government loan facilities for the procurement of materials. Public low-cost housing will continue to be undertaken by the state governments under the supervision and coordination of the Ministry of Housing and Village Development. The ministry will provide direct financial assistance, technical expertise and guidelines on implementation. Additionally, financing at reasonable terms was made available, through the provision of funds to ministries, agencies and the Malaysia Building Society Berhad (MBSB), mainly for low-cost housing. In 1977, the rate of interest on loans provided to the state governments for low-cost housing was fixed at 4% per annum with a repayment period of 20 years. The state governments were directed to relend to house buyers at a rate not exceeding 5.5% per annum. In 1978, the repayment period was extended to 25 years.
Fourth Malaysia Plan	Government will implement low-cost housing schemes based on the condominium concept to optimize the use of land and enhance the quality of life. Under this concept, a number of three storey walk-up flats will be clustered together to be linked by walk-ways and provided with

[53] *We referred to and benefitted from a forthcoming KRI publication on Social Housing.*

(1981 – 1985)	amenities such as shops, playgrounds and community centres. In high density areas such as the Federal Territory, high rise flats will continue to be constructed but on the concept of condominium. Under the new concept, houses will be rented out to the beneficiaries for a period of 25 years. The tenants will be given the option to purchase the houses subject to the condition, among others, that they have stayed in these houses continuously over a period of ten years. In addition, the government will introduce measures directed towards increasing stock of houses. Measures specifically for low-cost housing include: (i) setting up a State Liaison Committee in each state which will be responsible for the implementation of the low-cost housing scheme; (ii) requiring for the private sector to reserve between 30-50% of its housing development for the condominium concept of low-cost housing. (iii) introducing some form of prefabrication or industrialised system of construction in the low-cost housing schemes to save time and cut cost
Fifth Malaysia Plan (1986 – 1990)	Focus to be given on constructing affordable homes for all income groups. Houses for rent will be made available primarily in cities. Properties under this scheme will be rented for a period of no less than 10 years, and tenants will be given the option to purchase the houses at the end of the period. The government will continue the plans from the Forth Malaysia Plan (1981 – 1985) in increasing the stock of houses. Additionally, the government will continue working with the private sector for the provision of low-cost housing. The government will consider bearing the costs of constructing low-cost housing from private developers. The government and credit institutions such as the Syarikat Perumahan Malaysia Berhad (MBSB), Sabah Credit Corporation and Bank Rakyat will provide loans, with as estimate of $2000 million for low-cost housing. The Central Bank of Malaysia will revise guidelines and requirements for eligibility of the loans. Launch of Program Khas Perumahan Kos Rendah (PKPKR) in 1986 to increase supply of low-cost housing primarily during the recession period. Various services were provided, for example: establishing local agencies to approve applications, relaxing certain regulations and standards, as well as additional facilities to receive financing from banks. These services were introduced in order to reduce the costs of constructions.
Sixth Malaysia Plan (1991 – 1995)	Various programs were introduced during this period to speed up the process of building low-cost housing. The Tabung Perumahan Kos Rendah was established in 1993 with an allocation of RM500 million. The Tabung Pusingan Perumahan Kos Rendah was established in 1994 with an allocation of RM1 billion. Additionally, Yayasan Perumahan Untuk Rakyat Termiskin was introduced in 1994 for the lowest-income group with an allocation of RM600 million, contributed by both the public and private sector. The program gives grants to state governments, PKEN and local authorities to finance the construction of low-cost flats that are high density and for-rent, particularly in cities where there are shortages of low-cost housing. The lower-income group faces difficulties in applying for loans, as they generally do not receive fixed income. For low-cost transactions without loans, the buyer will sign a separate S&P agreement with the state government. Under this agreement, the buyer will incur a 5.5% interest rate per annum based on the purchase price. The house and land will become the loan collateral with a repayment period of 25 – 30 years. The Tabung Amanah Pinjaman Perumahan was also introduced as a housing loan scheme without interest rates. The scheme aims to assist the low-income group to build houses on their private land. The loan limit was set at RM7,500 with a repayment period of 5 – 20 years. At the end of the period, loans worth up to RM27 millions were issued, primarily to rubber tappers, farmers, fishermen and small business owners.

Seventh Malaysia Plan (1996 – 2000)	Changes to the designs will be made to optimize land use and minimize costs. New designs will be higher density, being from 26 units to 41 units per hectare. Improvements will be made to the designs as well, primarily by ensuring low-cost flats have sufficient washing area. The government will continue to provide financing to state governments, particularly by giving grants to cover low-cost housing construction costs that exceeds RM25,000 per unit. Extension of Tabung Pusingan Perumahan Kos Rendah (TPPKR) for the private sector to launch new low-cost housing projects. Establish the Syarikat Perumahan Negara Malaysia Berhad (SPNB) in 1999 to increase supply of housing that cost not more than RM150,000. Program Perumahan Rakyat (PPRB) was launched in December 1998 for the resettlement of squatters primarily in major cities.
Eighth Malaysia Plan (2001 – 2005)	The main objective during this period was to provide adequate, quality and affordable housing to all Malaysians. To increase the construction of low- and low-medium-cost houses, the SPNB implemented the Program Perumahan Mampu Milik and Program Perumahan Mesra Rakyat. In addition, SPNB undertook the rehabilitation of selected abandoned housing projects including those of the private sector as identified by the Ministry of Housing and Local Government (MHLG). Under the Public Low-cost Housing Program (PLHP) for the low-income group, low-cost housing projects were implemented by state governments through loans provided by the Federal Government and mainly concentrated in small towns and sub-urban areas. These houses were sold to eligible buyers registered under the computerized open registration system administered by the respective state governments. For cities and larger towns, the Program Perumahan Rakyat Bersepadu (PPRB) was implemented for the resettlement of squatters. Various programmes continued to be implemented in the rural areas such as the Program Perumahan Rakyat Miskin Tegar (PPRT) for the hardcore poor and Program Pembangunan Masyarakat Setempat (PPMS). These programmes were part of efforts to eradicate poverty among the rural poor as well as to provide them with decent houses with basic amenities.
Ninth Malaysia Plan (2006 – 2010)	During this period, the development of the housing sector will continue to focus on the provision of adequate, affordable and quality houses for all Malaysians. The government will continue constructing low-cost houses under the Program Perumahan Rakyat (PPR). To complement efforts by the Government, the SPNB will build low- and low-medium-cost houses in the urban and sub-urban areas. Low-cost houses will be built in rural areas under the Program Perumahan Mesra Rakyat. Greater private sector involvement in the construction of low-cost houses will be encouraged to ensure adequate supply of affordable houses to meet the needs of the low-income group. To facilitate this, current housing policies and strategies as well as legislation will be reviewed. These will include the requirement for private housing developers to surrender to the government the land allocated for low-cost houses in their mixed-development project in the event that the project fails. Measures will be undertaken to further improve the registration and distribution system for low-cost houses to ensure proper distribution and prevent genuine target groups from being denied the opportunity to buy these houses. Information in the database will be regularly updated and the criteria for selection of eligible buyers will be revised and standardized for all states. Apart from income level, priority will be given to the less advantaged groups such as single mothers, families with many dependents and those with handicapped members. Measures will be undertaken to ensure that all high-rise apartments, particularly the low- and low-medium-cost categories are properly maintained. In this regard, the National Housing Department, in collaboration with the respective local authorities, will conduct activities aimed at increasing awareness among residents on their responsibility for the cleanliness and maintenance of their

	premises. Efforts will be made to encourage residents to appoint management companies in the provision of maintenance and security services. Tabung Perumahan 1Malaysia, established in February 2010 that provides support for the maintenance and major repairs of low-cost private housing in Kuala Lumpur with contributions from the Government and a number of large private corporations.
Tenth Malaysia Plan (2011 – 2015)	The government will provide housing assistance programs to deserving poor households in rural and urban areas. For rural areas, assistance will continue to be given to build and upgrade rural homes especially for households with larger household size, older persons, single parents or individuals with special needs. Where eligible households own a parcel of land, the government will construct a house on the land. In addition, to complement government efforts, GLCs and the private sector will be encouraged to provide houses through their corporate social responsibility (CSR) programs. For urban and semi-urban areas, affordable housing programs and clusters as well as the provision of low-cost housing will be expanded. These public housing units will be offered to qualified individuals and families with the aim to encourage greater home ownership among the bottom 40% households. The private sector will also be encouraged to develop more affordable medium-cost housing. In addition, efforts will be undertaken to incorporate facilities that will encourage greater community development and better access for older persons and persons with disabilities. Additionally, the government will establish a Housing Maintenance Fund with an initial funding of RM500 million to assist the residents of both public and private low-cost housing units. The fund will be used for major repair and maintenance works such as the replacement of lifts and water tanks. This fund will be based on a matching grant where half of the contribution comes from residents through their joint management body or management corporation. Housing programs for poor and low-income households in urban and rural areas were implemented through Program Bantuan Rumah (PBR), Program Perumahan Rakyat (PPR) and Rumah Mesra Rakyat 1Malaysia (RMR1M), as well as housing for second-generation Federal Land Development Authority (FELDA) and FELCRA Berhad (FELCRA) settlers.
Eleventh Malaysia Plan (2016 – 2020)	The Government will continue to play a major role in meeting the housing needs for targeted groups in urban and rural areas by continuing successful, existing programs. This includes programs under the PBR for the poor, and programs for low- and middle-income households such as the RMR1M, PPR, PRIMA, and PPA1M, as well as programs for second-generation FELDA and FELCRA settlers. In addition, financing schemes such as the My First Home Scheme, Youth Housing Scheme and MyHome will be enhanced to improve access and affordability for low- and middle-income households.
Twelfth Malaysia Plan (2021 – 2025)	The government will continue to focus on providing access to quality and livable affordable housing for the citizens. With emphasis on improving access to affordable housing by enhancing affordable housing governance and ensuring inclusive housing development. There are plans in place to push out a housing redevelopment guideline to rebuild dilapidated public housing. In terms of financing homes, there is an increased focus on the use of RTO schemes to make financing accessible for targeted households or individuals.

8.2. Appendix 2: Regression Diagnostics

This section outlines the regression diagnostics for the models presented in our results above. We subjected our regression analysis to the standards tests of multiple regression. All treatments resulting from these tests are addressed in Appendix 3: Addressing Autocorrelation – Time Dummies onwards.

Model 1: All Low-Cost Housing (Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	1.493415	1.47341	1.524344	1.427839	1.3575	1.307959	1.215413
CLOWCOST		4.779643	3.808939	2.98464	2.151399	1.844816	1.314112
TENURE	1.087711	1.089775	1.087942	1.089536	1.098133	1.096393	1.093161
ROOMS	1.63446	1.635371	1.636188	1.632651	1.629562	1.616479	1.560281
FLOORS	2.059876	2.053664	2.048879	2.032546	2.000208	1.951563	1.874542
LANDAREA	1.662115	1.670806	1.675817	1.680536	1.693627	1.701601	1.717261
BUILTUP	3.134466	3.14094	3.144591	3.144191	3.150658	3.113866	2.973406
DUNIVERSITY	3.932105	3.627327	3.582655	3.542607	3.82593	3.735865	3.90438
DHOSPITAL	1.445047	1.803229	2.226525	2.075311	1.728132	1.469268	1.311506
DCITYCENTER	4.404625	6.938345	6.577289	5.639411	5.038344	4.633886	4.353301
DTRAIN	1.791517	1.902755	1.987993	1.92659	1.811845	1.664934	1.630086

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.606134	0.641819	0.641239	0.629533	0.613445	0.642474	0.738537
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	20661.45	20476.35	21604.02	21962.8	19741.91	18924.84	12206.76
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	153979	164827.4	164136.3	156015	139838.1	124748	78961.97
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Model 1: All Low-Cost Housing (Non-Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	1.17663	1.249641	1.284725	1.306449	1.454458	1.425385	1.169806
CLOWCOST		4.136649	4.668779	3.358921	2.051457	1.712499	1.259218
TENURE	1.125242	1.114721	1.12731	1.167857	1.11199	1.09633	1.100686
ROOMS	1.122859	1.122479	1.144368	1.141939	1.13128	1.124297	1.121662
LOTSIZE	1.309603	1.240893	1.26099	1.255484	1.241939	1.247747	1.222108
DUNIVERSITY	1.999398	1.981089	1.947257	1.951154	1.951615	1.955707	1.749956
DHOSPITAL	1.538641	1.557318	1.538191	1.527645	1.529731	1.447248	1.288056
DCITYCENTER	2.476198	4.398126	5.766678	4.560185	2.928421	2.578969	2.040276
DTRAIN	1.901864	2.097561	2.103389	2.093447	2.084254	1.924132	1.547492

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.293708	0.290108	0.289093	0.289221	0.289926	0.288065	0.29057
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	14426.27	10356.76	9834.688	9970.467	10000.24	9183.284	6608.155
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	109948.4	58911.29	59829.43	59847.62	57714.8	55191.35	50499.83
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Model 2: Privately Maintained Low-Cost Housing Only (Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	1.489438	1.462345	1.509263	1.422215	1.373012	1.311908	1.193417
CLOWCOST		5.103836	3.977902	3.134028	2.095458	1.729359	1.249263
TENURE	1.087974	1.089036	1.087228	1.089557	1.095356	1.093114	1.093819
ROOMS	1.634482	1.633796	1.634422	1.630807	1.628446	1.615726	1.559921
FLOORS	2.05988	2.053634	2.049476	2.032927	2.000678	1.952439	1.870265
LANDAREA	1.662113	1.670172	1.675056	1.679273	1.693052	1.700836	1.717301
BUILTUP	3.134484	3.141738	3.144734	3.14401	3.151157	3.115866	2.967657
DUNIVERSITY	3.932044	3.642839	3.563674	3.515511	3.781029	3.713906	3.946688
DHOSPITAL	1.444987	1.804158	2.228709	2.098115	1.729604	1.457282	1.304511
DCITYCENTER	4.402085	6.862175	6.38984	5.44023	4.78125	4.456665	4.347512
DTRAIN	1.790592	1.901524	1.987018	1.926229	1.811091	1.663834	1.627231

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.60614	0.640618	0.635732	0.624333	0.613508	0.645283	0.740753
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	20660.81	20338.55	21073.97	21017.42	19798.79	18954.19	12010.66
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	154006.1	163761.8	161355.6	153256.3	139616.5	125299.5	77680.21
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Model 2: Privately Maintained Low-Cost Housing Only (Non-Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	1.162943	1.221912	1.255761	1.330904	1.46517	1.39061	1.161599
CLOWCOST		3.463204	3.362143	2.730813	1.784083	1.492537	1.186044
TENURE	1.122268	1.108604	1.128771	1.156103	1.107236	1.093668	1.094648
ROOMS	1.123407	1.12426	1.1406	1.132953	1.126862	1.12597	1.120553
LOTSIZE	1.309407	1.246761	1.257821	1.253666	1.248181	1.25409	1.227097
DUNIVERSITY	1.996953	2.001698	1.932076	1.928306	1.91899	1.928386	1.744905
DHOSPITAL	1.53864	1.545505	1.521449	1.516747	1.519244	1.426092	1.266673
DCITYCENTER	2.474649	3.646999	4.148056	3.528111	2.516171	2.318085	1.994356
DTRAIN	1.892134	2.084264	2.07443	2.076982	2.065606	1.906491	1.55117

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	10km	15km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.29368	0.28969	0.288913	0.288763	0.290617	0.288518	0.293308
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	14442.23	10477.1	9954.447	9964.894	9707.741	9217.723	6573.544
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	110337.1	60332.79	60649.91	60581.5	58892	57257.38	52892.17
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Model 3: Government-Maintained Low-Cost Only (Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	3.873678	2.391533	2.024409	1.800778	1.620408	1.355165	1.179796
CLOWCOST		4.036796	3.22837	2.789134	2.082415	1.589381	1.494606
TENURE	1.092311	1.101452	1.09466	1.151173	1.166714	1.128805	1.101258
ROOMS	1.631431	1.628328	1.62988	1.613335	1.659684	1.712682	1.727264
FLOORS	2.059878	1.957571	1.937828	1.874356	1.785319	1.685593	1.736747
LANDAREA	1.662062	1.699694	1.730885	1.795725	1.839916	1.848091	1.823257
BUILTUP	3.126318	3.112473	3.140881	3.15676	3.115	2.983719	2.939288
DUNIVERSITY	4.490684	4.246566	4.759204	7.176111	8.417123	7.103495	7.019858
DHOSPITAL	1.550525	2.074744	1.620452	1.484035	1.40863	1.09691	1.084251
DCITYCENTER	6.259098	8.088255	7.801956	9.89033	10.05924	8.289259	8.120851
DTRAIN	2.544448	2.184768	1.864646	1.604123	1.423137	1.320558	1.715466

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.61006	0.637205	0.648424	0.652101	0.666652	0.718187	0.859974
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	21054.75	19564.39	20094.83	17860.47	10396.58	6373.497	1548.509
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	156297.8	145471	132307.6	98170.73	49826.77	30397.49	7452.834
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Model 3: Government Maintained Low-Cost Housing Only (Non-Landed Property)

Multicollinearity – Variance Inflation Factor (VIF)

Variable	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	2.581012	2.288524	2.002149	1.968523	1.928357	1.550113	1.336072
CLOWCOST		6.699724	6.495584	4.449714	2.579941	1.848535	1.43567
TENURE	1.094019	1.128649	1.120269	1.181923	1.145109	1.128068	1.244192
ROOMS	1.122683	1.139242	1.152278	1.173165	1.170961	1.191937	1.216344
LOTSIZE	1.269328	1.276935	1.311231	1.303123	1.325775	1.30703	1.360037
DUNIVERSITY	2.019927	1.896036	2.153511	2.536295	1.733341	1.770716	1.858453
DHOSPITAL	1.63873	1.848403	1.577648	1.421303	1.217794	1.180821	1.217303
DCITYCENTER	3.112997	8.155267	8.24297	5.921005	2.641319	2.506468	2.156176
DTRAIN	2.140881	1.95127	1.685407	1.574122	1.534092	1.551354	1.940567

Autocorrelation – Durbin Watson Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Independence of ε							
Durbin-Watson Test	0.294195	0.295092	0.293564	0.299219	0.313671	0.323205	0.308194
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Heteroskedasticity – Breusch & Pagan Test

	Unrestricted Model	20km	15km	10km	5km	3km	1km
Heteroscedasticity							
Breusch and Pagan (1979) Test	14584.62	14747.15	14130	13856.28	9199.654	5960.31	3486.088
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16
Non-Constant Variance Score Test (χ^2)	107800.8	104231.7	105763.8	96423.81	57619.39	48478.99	16037.02
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

8.3. Appendix 3: Addressing Autocorrelation – Time Dummies

In Appendix 3, the presence of Autocorrelation (positive autocorrelation according to the DW test) was detected. Positive autocorrelation refers to the fact that a statistical observation on price is conditioned on past values of itself. This is to be expected as one of the mechanisms of price discovery is the *Sales Comparison Approach* which appraises the price of a housing unit based on other recently sold housing units of a comparable stature. In this way, a general increase in house prices is expected to beget other increases in similar house prices and vice versa.

Table 20 to Table 25 below outlines the same regression results from Equation 1 through Equation 3 as above while controlling for the effects of time.

Table 20: Equation 1 - Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	9,025.036***	9,457.045***	12,968.350***	23,204.040***	22,805.540***	17,437.810***	34,121.250***
	(248.252)	(416.953)	(532.786)	(713.980)	(1,055.805)	(1,514.937)	(4,857.064)
CLOWCOST		933.769***	1,104.754***	1,193.203***	-452.776***	-3,520.781***	-13,651.380***
		(10.873)	(13.890)	(23.309)	(63.322)	(136.074)	(634.625)
TENURE	67,140.400***	78,085.640***	72,175.210***	69,407.200***	71,061.840***	68,283.520***	66,556.690***
	(1,865.494)	(1,829.258)	(1,846.143)	(1,893.040)	(1,974.207)	(2,023.317)	(2,348.387)
ROOMS	-10,929.300***	-3,552.672**	-1,706.324	-4,669.293***	-10,286.280***	-11,122.690***	-3,008.119
	(1,597.599)	(1,564.774)	(1,581.217)	(1,619.499)	(1,678.686)	(1,715.905)	(1,983.437)
FLOORS	-3,940.218*	-4,872.822**	-2,367.412	977.890	5,790.265**	3,565.991	22,955.140***
	(2,170.375)	(2,127.597)	(2,148.009)	(2,200.100)	(2,273.223)	(2,321.557)	(2,674.075)
LANDAREA	93.405***	93.169***	92.963***	95.796***	101.185***	101.776***	99.324***
	(0.842)	(0.826)	(0.835)	(0.857)	(0.893)	(0.917)	(1.156)
BUILTUP	418.998***	410.012***	412.328***	413.759***	410.718***	413.782***	385.418***
	(2.158)	(2.111)	(2.130)	(2.181)	(2.256)	(2.302)	(2.811)
DUNIVERSITY	1,716.113***	2,146.174***	952.590***	1,278.537***	3,268.176***	3,792.083***	669.465**
	(182.072)	(177.902)	(179.692)	(186.634)	(203.428)	(209.429)	(262.865)
DHOSPITAL	-7,176.285***	-1,409.412***	-3,035.443***	-7,188.202***	-12,850.320***	-13,480.110***	-10,832.630***
	(232.662)	(259.759)	(294.271)	(305.590)	(311.757)	(326.962)	(392.033)
DCITYCENTER	-8,465.017***	-2,224.050***	-3,178.192***	-6,053.541***	-10,210.870***	-10,866.470***	-8,176.955***
	(92.001)	(119.626)	(118.568)	(114.589)	(115.186)	(114.799)	(134.569)
DTRAIN	-1,791.750***	188.889	729.259***	1,888.527***	2,336.355***	2,355.209***	3,514.281***
	(182.063)	(203.872)	(223.404)	(233.924)	(245.946)	(256.005)	(323.165)
2016	19,499.190***	20,235.030***	19,841.700***	19,868.350***	19,366.590***	19,444.560***	22,239.420***
	(2,655.905)	(2,600.286)	(2,626.080)	(2,692.981)	(2,784.920)	(2,853.363)	(3,369.646)
2017	34,815.280***	32,922.570***	32,614.330***	33,467.210***	36,290.040***	36,775.140***	38,018.960***
	(2,618.925)	(2,565.363)	(2,589.836)	(2,655.422)	(2,751.898)	(2,824.914)	(3,360.404)
2018	45,678.050***	43,516.440***	42,821.300***	44,072.600***	44,654.840***	44,842.150***	43,736.080***
	(2,595.040)	(2,540.464)	(2,564.526)	(2,629.622)	(2,723.549)	(2,790.453)	(3,300.557)
2019	43,175.950***	41,882.270***	41,529.330***	41,559.010***	41,460.690***	41,578.870***	42,537.400***
	(2,704.041)	(2,647.984)	(2,672.575)	(2,741.954)	(2,847.991)	(2,927.455)	(3,476.821)
Constant	31,123.760***	-430,222.400***	-347,028.200***	-194,237.200***	39,917.290***	90,450.770***	-8,234.900
	(5,714.187)	(7,718.330)	(7,311.094)	(7,132.220)	(7,035.770)	(7,125.230)	(8,176.956)
Observations	110,906	108,792	107,925	106,429	102,670	95,449	56,702
R^2	0.699	0.719	0.717	0.708	0.702	0.708	0.705
Adjusted R^2	0.699	0.719	0.717	0.708	0.702	0.708	0.705
Residual Std. Error	281,574.500 (df = 110891)	273,092.000 (df = 108776)	274,544.300 (df = 107909)	279,599.800 (df = 106413)	284,810.400 (df = 102654)	281,723.300 (df = 95433)	258,024.300 (df = 56686)
F Statistic	18,361.030*** (df = 14; 110891)	18,557.290*** (df = 15; 108776)	18,240.560*** (df = 15; 107909)	17,223.290*** (df = 15; 106413)	16,148.090*** (df = 15; 102654)	15,437.820*** (df = 15; 95433)	9,019.598*** (df = 15; 56686)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 21: Equation 1 - Non - Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	42,210.750***	44,972.980***	53,160.700***	52,963.920***	49,227.750***	54,925.130***	66,833.930***
	(701.199)	(900.629)	(960.450)	(983.064)	(1,133.063)	(1,469.966)	(3,506.441)
CLOWCOST		14.093	449.550***	385.447***	-379.218***	-2,149.769***	-7,906.510***
		(12.782)	(15.575)	(19.733)	(41.258)	(85.420)	(400.503)
TENURE	64,366.670***	71,879.190***	66,135.110***	64,318.860***	70,580.270***	68,579.220***	59,297.130***
	(1,168.955)	(1,530.692)	(1,530.971)	(1,562.395)	(1,530.684)	(1,539.433)	(1,711.845)
ROOMS	-78,139.460***	-84,387.260***	-79,413.020***	-81,192.740***	-85,885.020***	-84,505.530***	-97,332.350***
	(979.705)	(1,204.367)	(1,209.445)	(1,211.309)	(1,214.113)	(1,213.524)	(1,437.322)
LOTSIZE	652.028***	638.991***	631.130***	634.384***	639.117***	633.792***	614.445***
	(1.663)	(2.022)	(2.027)	(2.028)	(2.027)	(2.052)	(2.541)
DUNIVERSITY	1,793.076***	2,917.773***	2,970.921***	2,863.255***	3,059.515***	2,788.544***	-12.908
	(186.659)	(288.188)	(285.218)	(286.546)	(287.451)	(294.030)	(362.048)
DHOSPITAL	-8,135.079***	-12,840.850***	-11,447.630***	-11,913.470***	-13,236.700***	-13,463.530***	-15,498.650***
	(289.941)	(445.691)	(443.897)	(444.609)	(446.118)	(454.942)	(565.979)
DCITYCENTER	-10,961.260***	-14,339.040***	-7,984.862***	-11,072.200***	-15,397.140***	-15,932.010***	-13,645.540***
	(135.774)	(264.375)	(301.278)	(268.855)	(216.838)	(208.767)	(237.515)
DTRAIN	-2,596.488***	-1,501.367***	-3,090.446***	-2,555.086***	-2,078.633***	-1,748.823***	-8,729.988***
	(297.024)	(409.049)	(409.949)	(411.668)	(411.783)	(420.962)	(529.671)
2016	13,569.170***	13,320.250***	13,135.210***	12,935.980***	13,694.980***	14,030.730***	13,126.740***
	(1,692.368)	(2,211.871)	(2,199.889)	(2,205.776)	(2,215.591)	(2,249.758)	(2,498.679)
2017	24,864.820***	24,658.090***	24,346.980***	24,442.490***	25,353.380***	26,012.780***	22,867.060***
	(1,678.279)	(2,196.170)	(2,184.390)	(2,190.164)	(2,200.074)	(2,231.510)	(2,474.958)
2018	25,295.850***	21,336.030***	21,015.570***	20,989.250***	21,711.960***	23,200.960***	18,671.920***
	(1,679.988)	(2,191.767)	(2,179.985)	(2,185.880)	(2,195.060)	(2,226.789)	(2,473.001)
2019	21,791.970***	17,451.700***	16,676.800***	16,780.250***	18,274.380***	18,412.250***	12,561.600***
	(1,801.926)	(2,344.357)	(2,331.753)	(2,338.035)	(2,347.246)	(2,379.126)	(2,651.651)
Constant	17,299.760***	73,767.590***	-106,747.300***	-10,033.320*	108,159.600***	133,408.000***	185,462.200***
	(3,068.362)	(8,202.245)	(7,584.831)	(6,064.489)	(5,151.356)	(4,898.541)	(5,495.181)
Observations	110,087	80,868	80,840	80,828	80,401	77,974	59,139
R^2	0.711	0.673	0.677	0.675	0.676	0.678	0.635
Adjusted R^2	0.711	0.673	0.677	0.675	0.675	0.678	0.635
Residual Std. Error	182,711.300 (df = 110074)	204,956.100 (df = 80854)	203,821.600 (df = 80826)	204,346.500 (df = 80814)	204,719.900 (df = 80387)	204,577.500 (df = 77960)	198,336.200 (df = 59125)
F Statistic	22,617.100*** (df = 12; 110074)	12,827.410*** (df = 13; 80854)	13,036.560*** (df = 13; 80826)	12,935.880*** (df = 13; 80814)	12,872.890*** (df = 13; 80387)	12,630.450*** (df = 13; 77960)	7,900.851*** (df = 13; 59125)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 22: Equation 2 - Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	8,973.037***	10,155.910***	14,076.590***	23,574.140***	19,438.970***	13,252.290***	32,210.730***
	(248.092)	(416.956)	(534.310)	(717.135)	(1,063.600)	(1,519.621)	(4,845.153)
CLOWCOST		1,143.921***	1,259.186***	1,248.270***	-1,071.687***	-4,448.269***	-15,522.220***
		(13.886)	(17.978)	(30.351)	(76.408)	(151.265)	(666.071)
TENURE	67,242.660***	76,826.650***	70,148.740***	68,013.540***	71,039.700***	69,528.590***	66,861.590***
	(1,865.832)	(1,833.450)	(1,857.342)	(1,901.481)	(1,970.685)	(2,018.942)	(2,369.125)
ROOMS	-10,933.890***	-5,151.508***	-3,688.455**	-6,308.120***	-10,379.230***	-10,879.460***	-3,142.234
	(1,597.706)	(1,568.133)	(1,590.471)	(1,625.787)	(1,677.240)	(1,714.383)	(1,995.475)
FLOORS	-3,936.116*	-4,629.526**	-2,774.891	1,119.424	5,998.536***	4,591.875**	21,663.790***
	(2,170.508)	(2,133.183)	(2,162.068)	(2,210.101)	(2,272.316)	(2,320.408)	(2,688.161)
LANDAREA	93.409***	93.650***	93.626***	96.518***	101.317***	101.808***	98.777***
	(0.842)	(0.828)	(0.840)	(0.860)	(0.892)	(0.917)	(1.163)
BUILTUP	419.017***	409.830***	412.401***	413.307***	410.324***	413.019***	387.015***
	(2.159)	(2.117)	(2.144)	(2.191)	(2.255)	(2.302)	(2.833)
DUNIVERSITY	1,711.013***	2,952.827***	1,778.369***	1,876.062***	3,258.747***	3,509.086***	439.452*
	(182.082)	(178.752)	(180.362)	(186.746)	(202.126)	(208.676)	(264.721)
DHOSPITAL	-7,169.669***	-1,640.264***	-3,851.974***	-7,856.986***	-13,343.720***	-13,574.750***	-10,596.580***
	(232.671)	(260.510)	(296.299)	(308.632)	(311.728)	(325.414)	(391.052)
DCITYCENTER	-8,456.821***	-2,549.133***	-4,022.743***	-6,805.711***	-10,401.690***	-10,725.820***	-8,053.941***
	(91.980)	(119.281)	(117.613)	(113.048)	(112.150)	(112.501)	(135.057)
DTRAIN	-1,775.970***	216.917	886.035***	1,962.900***	2,319.325***	2,453.362***	3,591.938***
	(182.027)	(204.343)	(224.778)	(234.943)	(245.768)	(255.731)	(323.362)
2016	19,505.840***	20,223.570***	19,688.080***	19,826.270***	19,418.510***	19,625.010***	22,006.800***
	(2,656.065)	(2,607.129)	(2,642.878)	(2,704.968)	(2,783.480)	(2,851.687)	(3,388.538)
2017	34,813.920***	32,935.540***	32,698.870***	33,614.620***	36,523.500***	36,808.540***	37,916.130***
	(2,619.083)	(2,572.127)	(2,606.436)	(2,667.303)	(2,750.502)	(2,823.116)	(3,380.575)
2018	45,669.670***	43,543.870***	43,056.310***	44,247.570***	44,818.630***	44,816.660***	43,913.050***
	(2,595.196)	(2,547.157)	(2,580.944)	(2,641.379)	(2,722.146)	(2,788.603)	(3,320.938)
2019	43,183.080***	41,767.530***	41,462.050***	41,466.810***	41,597.410***	41,748.410***	42,810.830***
	(2,704.205)	(2,654.961)	(2,689.669)	(2,754.169)	(2,846.519)	(2,925.711)	(3,494.891)
Constant	30,737.660***	-438,245.400***	-319,426.600***	-162,659.200***	63,790.470***	96,176.400***	-5,443.937
	(5,714.227)	(7,951.148)	(7,484.660)	(7,292.592)	(7,012.438)	(7,027.725)	(8,128.568)
Observations	110,906	108,792	107,925	106,429	102,670	95,425	55,883
R^2	0.699	0.718	0.714	0.706	0.703	0.709	0.705
Adjusted R^2	0.699	0.718	0.713	0.706	0.703	0.709	0.705
Residual Std. Error	281,591.400 (df = 110891)	273,810.800 (df = 108776)	276,300.600 (df = 107909)	280,843.900 (df = 106413)	284,662.900 (df = 102654)	281,513.300 (df = 95409)	257,618.300 (df = 55867)
F Statistic	18,357.860*** (df = 14; 110891)	18,421.970*** (df = 15; 108776)	17,918.240*** (df = 15; 107909)	17,008.310*** (df = 15; 106413)	16,171.920*** (df = 15; 102654)	15,466.740*** (df = 15; 95409)	8,907.009*** (df = 15; 55867)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 23: Equation 2 - Non-Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	42,222.710***	44,265.300***	50,850.110***	49,359.210***	39,562.880***	46,159.710***	64,560.180***
	(694.659)	(888.706)	(949.401)	(992.154)	(1,129.822)	(1,432.562)	(3,392.412)
CLOWCOST		33.302**	395.968***	185.358***	-1,412.492***	-3,762.389***	-9,273.475***
		(14.688)	(17.250)	(24.903)	(54.472)	(105.064)	(457.462)
TENURE	64,832.810***	71,867.410***	66,727.310***	68,644.980***	70,009.470***	67,485.720***	61,955.680***
	(1,167.042)	(1,512.003)	(1,520.428)	(1,542.972)	(1,507.666)	(1,517.223)	(1,707.398)
ROOMS	-77,692.640***	-83,351.800***	-79,941.620***	-82,513.830***	-85,575.960***	-82,687.460***	-95,893.450***
	(979.639)	(1,193.816)	(1,198.286)	(1,197.509)	(1,195.888)	(1,198.087)	(1,444.218)
LOTSIZE	651.896***	639.575***	634.929***	638.415***	639.097***	633.482***	615.227***
	(1.662)	(2.010)	(2.012)	(2.014)	(2.008)	(2.032)	(2.534)
DUNIVERSITY	1,764.173***	2,583.035***	3,370.667***	2,914.966***	1,991.734***	1,281.228***	199.999
	(186.487)	(288.195)	(283.203)	(283.988)	(282.579)	(289.342)	(358.837)
DHOSPITAL	-8,132.174***	-13,118.270***	-12,454.090***	-12,752.000***	-13,916.410***	-13,932.160***	-13,433.020***
	(289.851)	(441.649)	(439.996)	(441.588)	(440.670)	(447.459)	(558.650)
DCITYCENTER	-10,922.680***	-13,796.860***	-10,352.350***	-13,276.220***	-15,692.840***	-14,987.310***	-13,135.850***
	(135.689)	(238.485)	(253.613)	(234.746)	(198.388)	(195.175)	(231.772)
DTRAIN	-2,422.942***	-1,123.841***	-2,126.939***	-1,500.796***	-1,688.445***	-1,015.391**	-8,560.977***
	(296.172)	(405.847)	(406.010)	(408.977)	(406.585)	(415.402)	(528.221)
2016	13,478.450***	13,149.400***	12,989.730***	12,919.450***	13,570.580***	13,489.100***	12,115.610***
	(1,691.842)	(2,191.482)	(2,183.892)	(2,189.991)	(2,187.374)	(2,219.876)	(2,486.623)
2017	24,690.970***	24,261.810***	24,149.170***	24,189.770***	24,828.660***	24,914.520***	20,473.120***
	(1,677.745)	(2,176.343)	(2,168.903)	(2,174.925)	(2,172.451)	(2,202.355)	(2,469.586)
2018	25,174.530***	21,080.550***	20,906.940***	20,899.200***	21,219.910***	22,256.520***	15,893.490***
	(1,679.471)	(2,173.884)	(2,166.434)	(2,172.544)	(2,169.461)	(2,199.720)	(2,468.948)
2019	21,622.810***	16,940.710***	16,415.950***	16,624.450***	18,002.370***	17,585.030***	9,648.059***
	(1,801.362)	(2,326.550)	(2,318.541)	(2,325.174)	(2,321.168)	(2,351.580)	(2,660.751)
Constant	14,254.440***	60,632.680***	-55,638.560***	41,222.100***	153,492.700***	146,509.300***	171,139.500***
	(3,068.004)	(7,789.595)	(6,885.351)	(5,885.892)	(5,034.174)	(4,718.443)	(5,384.213)
Observations	110,087	81,659	81,631	81,619	81,192	78,765	58,210
R^2	0.712	0.675	0.677	0.676	0.679	0.682	0.640
Adjusted R^2	0.712	0.675	0.677	0.675	0.679	0.682	0.640
Residual Std. Error	182,654.600 (df = 110074)	204,220.700 (df = 81645)	203,491.100 (df = 81617)	204,038.500 (df = 81605)	203,271.100 (df = 81178)	203,055.300 (df = 78751)	196,649.600 (df = 58196)
F Statistic	22,636.850*** (df = 12; 110074)	13,040.100*** (df = 13; 81645)	13,175.330*** (df = 13; 81617)	13,069.240*** (df = 13; 81605)	13,222.490*** (df = 13; 81178)	12,990.130*** (df = 13; 78751)	7,959.126*** (df = 13; 58196)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 24: Equation 3 - Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	6,761.675***	642.334**	3,950.519***	2,227.018***	6,352.640***	11,085.820***	16,691.270
	(188.294)	(288.968)	(347.184)	(568.082)	(1,482.218)	(2,866.978)	(17,645.970)
CLOWCOST		3,466.242***	3,867.274***	2,206.644***	-9,086.898***	-9,777.651***	-21,534.010***
		(53.068)	(60.503)	(103.879)	(298.360)	(613.695)	(3,472.760)
TENURE	68,904.880***	88,010.830***	94,672.950***	122,076.600***	149,452.800***	135,852.300***	184,471.600***
	(1,869.714)	(1,965.933)	(2,080.835)	(2,501.940)	(3,449.385)	(4,071.688)	(8,686.339)
ROOMS	-12,712.490***	401.824	1,243.757	4,114.347**	8,534.382***	22,064.330***	30,635.720***
	(1,596.357)	(1,662.038)	(1,740.924)	(1,987.668)	(2,797.089)	(3,378.772)	(6,772.671)
FLOORS	-5,436.569**	408.423	6,590.404***	19,481.670***	60,787.220***	75,646.000***	122,518.200***
	(2,170.687)	(2,250.330)	(2,363.383)	(2,708.847)	(3,688.720)	(4,251.965)	(8,147.812)
LANDAREA	93.450***	100.875***	106.145***	117.938***	134.925***	147.005***	145.693***
	(0.842)	(0.891)	(0.946)	(1.100)	(1.526)	(1.839)	(3.759)
BUILTUP	421.601***	414.458***	415.749***	413.818***	408.836***	363.502***	317.029***
	(2.156)	(2.225)	(2.323)	(2.640)	(3.604)	(4.421)	(8.751)
DUNIVERSITY	4,108.271***	-696.106***	-977.419***	5,650.779***	23,559.830***	8,094.507***	50.927
	(194.603)	(236.231)	(265.455)	(387.684)	(586.123)	(698.712)	(1,386.311)
DHOSPITAL	-9,165.151***	-1,318.823***	-3,351.955***	-13,664.320***	-38,293.300***	-22,899.730***	-10,901.390***
	(241.035)	(367.264)	(406.001)	(516.610)	(884.110)	(1,241.671)	(2,459.679)
DCITYCENTER	-10,038.240***	-3,291.180***	-4,190.489***	-10,644.840***	-22,077.610***	-11,943.490***	-4,689.220***
	(109.688)	(161.906)	(169.277)	(227.449)	(310.965)	(354.417)	(703.395)
DTRAIN	-4,463.905***	-655.306*	-4,048.491***	-10,012.350***	-14,249.250***	-35,003.770***	-17,457.110***
	(216.997)	(388.320)	(447.569)	(628.684)	(1,137.422)	(1,838.813)	(5,538.269)
2016	19,522.220***	19,641.240***	20,119.770***	18,565.140***	19,818.180***	21,270.940***	-1,113.609
	(2,656.284)	(2,777.404)	(2,925.658)	(3,400.286)	(4,836.874)	(5,948.757)	(12,318.750)
2017	34,674.480***	33,794.550***	34,241.380***	33,887.500***	33,562.300***	35,483.750***	2,797.623
	(2,619.308)	(2,743.761)	(2,896.046)	(3,376.071)	(4,802.883)	(5,932.115)	(12,087.160)
2018	44,995.360***	43,114.330***	42,489.400***	40,948.420***	38,688.260***	38,920.350***	21,774.960*
	(2,595.457)	(2,716.513)	(2,865.885)	(3,331.136)	(4,738.524)	(5,817.654)	(12,018.080)
2019	42,228.820***	41,086.050***	39,644.830***	36,755.950***	32,184.010***	34,410.560***	20,902.520
	(2,704.466)	(2,841.000)	(3,005.271)	(3,501.745)	(5,029.905)	(6,184.946)	(12,832.150)
Constant	41,946.650***	-295,601.100***	-268,905.500***	-101,536.400***	51,501.100***	-117,849.100***	-308,082.600***
	(5,732.774)	(7,729.955)	(7,736.309)	(8,678.621)	(11,376.170)	(13,171.370)	(28,825.360)
Observations	110,906	99,890	92,901	76,655	45,281	27,043	5,977
R^2	0.699	0.716	0.719	0.716	0.722	0.719	0.722
Adjusted R^2	0.698	0.716	0.719	0.716	0.722	0.719	0.722
Residual Std. Error	281,614.800 (df = 110891)	280,179.200 (df = 99874)	285,184.900 (df = 92885)	301,944.700 (df = 76639)	331,133.200 (df = 45265)	314,892.900 (df = 27027)	305,908.300 (df = 5961)
F Statistic	18,353.510*** (df = 14; 110891)	16,809.830*** (df = 15; 99874)	15,847.830*** (df = 15; 92885)	12,911.050*** (df = 15; 76639)	7,846.658*** (df = 15; 45265)	4,602.502*** (df = 15; 27027)	1,033.739*** (df = 15; 5961)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

Table 25: Equation 3 – Non-Landed Properties

	Dependent Variable: Price						
	Unrestricted Model	20km	15km	10km	5km	3km	1km
DLOWCOST	5,833.815***	5,295.596***	6,287.365***	8,145.919***	10,104.990***	-5,881.283***	-5,180.837
	(230.213)	(237.248)	(255.056)	(351.986)	(732.327)	(1,333.164)	(6,273.273)
CLOWCOST		-948.151***	1,418.695***	1,702.713***	-596.792***	-1,572.939***	-10,723.710***
		(48.827)	(49.448)	(54.161)	(107.964)	(210.074)	(1,154.284)
TENURE	76,580.770***	78,058.280***	84,222.340***	81,277.950***	91,208.120***	96,111.160***	89,376.460***
	(1,168.032)	(1,193.045)	(1,197.042)	(1,278.919)	(1,539.498)	(1,793.666)	(3,066.500)
ROOMS	-79,227.610***	-75,191.480***	-72,374.940***	-69,426.140***	-77,676.630***	-86,317.490***	-84,504.430***
	(992.730)	(1,010.127)	(1,017.325)	(1,055.929)	(1,191.024)	(1,381.017)	(1,903.722)
LOTSIZE	667.985***	665.561***	656.390***	661.353***	696.295***	692.753***	665.206***
	(1.659)	(1.668)	(1.692)	(1.737)	(2.045)	(2.511)	(4.251)
DUNIVERSITY	936.138***	405.237**	-2,037.076***	-1,412.527***	-513.778	-7,688.388***	-7,179.475***
	(190.126)	(202.577)	(217.874)	(264.376)	(326.967)	(407.566)	(712.936)
DHOSPITAL	-10,249.430***	-7,789.587***	-8,740.589***	-12,011.670***	-20,519.330***	-19,738.040***	-22,500.580***
	(303.212)	(328.995)	(350.220)	(392.501)	(535.305)	(668.173)	(1,123.773)
DCITYCENTER	-12,233.260***	-16,523.480***	-5,234.688***	-6,565.272***	-14,105.600***	-8,507.653***	-6,606.617***
	(154.270)	(266.668)	(278.699)	(268.099)	(253.287)	(300.294)	(498.292)
DTRAIN	-1,788.018***	-7,057.353***	-8,262.792***	-10,473.380***	-12,674.040***	-12,569.520***	-26,246.670***
	(319.365)	(358.710)	(366.534)	(396.728)	(728.257)	(1,056.924)	(2,519.164)
2016	13,805.330***	13,002.550***	13,749.540***	13,679.470***	14,368.950***	14,909.900***	17,961.590***
	(1,715.047)	(1,725.148)	(1,736.050)	(1,802.782)	(2,207.879)	(2,580.697)	(4,236.107)
2017	24,355.410***	24,034.740***	24,040.900***	24,318.940***	27,819.500***	26,326.890***	32,591.610***
	(1,700.704)	(1,710.093)	(1,721.709)	(1,789.595)	(2,189.888)	(2,548.094)	(4,127.451)
2018	25,567.700***	24,747.720***	25,425.110***	25,656.810***	29,361.880***	22,752.570***	30,038.070***
	(1,702.456)	(1,710.969)	(1,720.954)	(1,790.174)	(2,188.725)	(2,550.849)	(4,080.152)
2019	21,482.770***	20,475.100***	20,900.740***	19,862.950***	20,812.250***	13,526.100***	19,371.580***
	(1,826.024)	(1,835.144)	(1,847.291)	(1,921.544)	(2,348.376)	(2,751.820)	(4,407.637)
Constant	20,401.150***	118,531.000***	-102,046.700***	-77,378.120***	39,852.520***	72,450.510***	104,665.900***
	(3,110.833)	(5,906.764)	(5,411.047)	(4,701.379)	(4,886.700)	(5,106.391)	(8,541.856)
Observations	110,087	108,757	107,113	100,975	77,113	55,817	21,783
R^2	0.704	0.706	0.709	0.711	0.717	0.689	0.661
Adjusted R^2	0.704	0.706	0.709	0.711	0.717	0.689	0.661
Residual Std. Error	185,155.200	185,001.100	184,867.500	186,786.700	199,722.800	198,378.900	199,326.900
	(df = 110074)	(df = 108743)	(df = 107099)	(df = 100961)	(df = 77099)	(df = 55803)	(df = 21769)
F Statistic	21,783.430***	20,095.590***	20,034.200***	19,150.640***	15,037.290***	9,528.276***	3,266.422***
	(df = 12; 110074)	(df = 13; 108743)	(df = 13; 107099)	(df = 13; 100961)	(df = 13; 77099)	(df = 13; 55803)	(df = 13; 21769)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard error stated in parentheses

It is observed that the NIMBY effects of living next to poor people remains persistent even when adjusting for time.

8.4. Appendix 4: Addressing Heteroskedasticity – Quantile Regression

In Appendix 3, we detected the presence of Heteroskedasticity in our models. Heteroskedasticity refers to the fact that variance of the error term is distributed unequally. The consequence of having heteroskedasticity in our model implies that while the OLS estimates are still unbiased and consistent, the error terms are not. This results in a biased/inconsistent interpretation of the standard errors of β, though β itself remains unbiased and consistent.

To overcome this shortcoming, we have employed quantile regression on the same models as described in Equation 1 through Equation 3 as described in Section 4.2 above. Quantile regression works in a similar way to OLS regression, but instead of estimating the conditional mean "$E_Y f(y|X = x)$", the conditional quantile "$F_Y^{-1}(\alpha|X = x)$" is estimated.

Quantile regression addresses the consequences of Heteroskedasticity by estimating the conditional quantiles respectively. As a result, the robustness of the parameter can be ascertained over the various quantiles.

This section is organized as follows - Table 26 to Table 29 summarizes the distribution of the estimated parameters for β_1 and β_2, by regressing our variables of interest against price quantiles for equation 1, while Table 30 to Table 33 does the same for equation 2 and Table 34 to Table 37 for equation 3.

Equation 1: Estimating the impact of all low-cost housing

$$P = \alpha + \beta_1 DLOWCOST + \beta_2 CLOWCOST + \gamma_i Si + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 D\text{CITYCENTER} + \lambda_2 DTRAIN + e$$

Table 26: Estimated Parameters for "Distance to Nearest Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	1,851***	128	2,204***	188	8,861***	179	10,720***	266	6,001***	944	21,266***	3117
20%	2,614***	110	3,777***	184	9,174***	187	11,827***	334	7,137***	635	26,468***	2655
30%	3,046***	117	4,254***	168	9,627***	185	11,644***	401	6,085***	560	33,437***	2425
40%	3,048***	149	4,735***	157	9,747***	224	10,611***	416	5,182***	542	33,453***	2511
50%	3,002***	111	4,586***	150	9,595***	187	10,548***	390	5,538***	589	29,199***	2420
60%	3,067***	164	4,698***	194	10,256***	269	10,212***	372	6,652***	700	28,490***	2864
70%	3,392***	169	4,662***	195	10,779***	378	10,794***	624	8,773***	941	31,988***	2962
80%	4,110***	225	4,854***	330	11,619***	390	13,643***	682	11,796***	1105	34,125***	3386
90%	6,094***	344	6,379***	415	12,750***	590	16,694***	1236	17,638***	1654	35,423***	3911

Note: *p<0.1; **p<0.05; ***p<0.01

Table 27: Estimated Parameters for "Count of Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	489***	7	516***	11	467***	20	1	50	-1,593***	112	-8,446***	421
20%	550***	6	569***	8	551***	15	170***	41	-1,517***	83	-9,435***	369
30%	601***	5	634***	8	599***	14	265***	39	-1,460***	77	-9,325***	321
40%	650***	5	694***	8	677***	14	306***	35	-1,467***	75	-9,710***	303
50%	699***	5	781***	8	784***	13	352***	35	-1,556***	68	-10,176***	344
60%	748***	6	894***	9	901***	15	385***	36	-1,593***	64	-10,421***	353
70%	811***	7	1,032***	9	1,125***	18	383***	43	-1,762***	74	-10,209***	368
80%	868***	8	1,188***	12	1,397***	19	247***	37	-1,854***	97	-9,216***	416
90%	992***	12	1,466***	19	2,032***	31	155**	74	-1,917***	124	-7,960***	366

Note: *p<0.1; **p<0.05; ***p<0.01

Table 28: Estimated Parameters for "Distance to Nearest Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	27,006***	502	30,274***	298	27,399***	296	22,944***	739	18,680***	967	8,266***	2540
20%	29,373***	489	32,042***	461	28,641***	557	23,387***	473	20,230***	903	18,481***	2057
30%	31,808***	295	34,587***	464	31,591***	492	27,535***	669	27,273***	675	30,559***	2112
40%	33,098***	628	35,968***	566	33,802***	623	31,170***	772	30,403***	878	35,949***	2107
50%	33,896***	564	37,293***	529	34,904***	506	31,695***	500	37,392***	890	40,954***	1987
60%	33,022***	595	36,347***	401	34,976***	574	31,373***	641	45,942***	1188	48,401***	1839
70%	38,764***	1295	40,106***	990	41,486***	1081	38,114***	1379	57,848***	1466	52,981***	2644
80%	48,738***	1125	50,782***	1364	51,587***	1182	52,343***	1391	70,816***	1667	68,008***	3615
90%	66,671***	2366	64,193***	1507	66,927***	1736	78,469***	2679	100,385***	2757	102,374***	6540

Note: *p<0.1; **p<0.05; ***p<0.01

Table 29: Estimated Parameters for "Count of Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	271***	9	291***	11	88***	15	-616***	33	-1,717***	54	-5,169***	325
20%	245***	6	309***	8	142***	10	-637***	26	-1,830***	52	-4,512***	231
30%	226***	7	315***	10	155***	11	-621***	26	-1,862***	48	-4,946***	223
40%	209***	7	323***	9	162***	9	-542***	27	-1,974***	46	-5,347***	220
50%	188***	7	329***	8	170***	10	-543***	21	-1,938***	48	-5,851***	208
60%	147***	7	322***	7	230***	12	-519***	26	-1,835***	61	-6,010***	219
70%	94***	10	343***	11	280***	14	-447***	37	-1,923***	73	-6,282***	289
80%	44***	13	448***	15	397***	22	-384***	50	-2,280***	96	-6,716***	375
90%	-16	24	751***	24	873***	37	-278***	88	-2,856***	167	-7,853***	639

Note: *p<0.1; **p<0.05; ***p<0.01

Equation 2: Estimating the impact of private low-cost housing

$$P = \alpha + \beta_1 DPRIVATE + \beta_2 CPRIVATE + \gamma_i Si + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 DCITYCENTER + \lambda_2 DTRAIN + e$$

Table 30: Estimated Parameters for "Distance to Nearest Privately Managed Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	2,143***	129	2,533***	136	9,163***	195	10,647***	404	4,967***	797	19,554***	3159
20%	2,940***	102	4,225***	99	9,561***	185	11,193***	336	5,660***	667	25,203***	2348
30%	3,377***	134	4,726***	146	10,175***	141	10,656***	378	3,836***	545	32,193***	2427
40%	3,525***	102	5,168***	147	10,204***	235	9,344***	409	2,662***	602	30,499***	2567
50%	3,491***	106	5,383***	138	10,172***	173	9,191***	400	2,767***	649	26,678***	2287
60%	3,683***	153	5,423***	239	10,652***	261	8,661***	510	3,521***	756	26,492***	2788
70%	3,986***	160	5,647***	223	11,528***	334	9,306***	615	5,713***	873	31,387***	2964
80%	4,842***	267	6,084***	330	12,600***	483	12,125***	745	8,269***	1096	33,768***	3290
90%	7,158***	375	7,803***	343	13,969***	543	15,293***	1032	14,206***	1590	37,538***	4399

Note: *p<0.1; **p<0.05; ***p<0.01

Table 31: Estimated Parameters for "Count of Privately Managed Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	634***	9	665***	13	594***	24	-7	61	-1,826***	113	-8,036***	459
20%	700***	7	713***	10	644***	20	31	48	-1,850***	95	-9,136***	360
30%	763***	7	773***	9	682***	17	82*	44	-1,996***	83	-9,463***	327
40%	819***	7	841***	9	763***	17	75*	40	-2,035***	76	-10,209***	309
50%	876***	6	925***	9	870***	17	90**	37	-2,174***	78	-11,329***	309
60%	930***	8	1,059***	11	1,013***	18	86**	41	-2,234***	69	-11,744***	352
70%	1,002***	8	1,219***	12	1,234***	22	-3	44	-2,502***	68	-11,488***	367
80%	1,062***	10	1,350***	15	1,467***	25	-209***	48	-2,696***	96	-10,758***	416
90%	1,200***	17	1,650***	24	2,081***	38	-508***	75	-2,760***	127	-8,665***	560

Note: *p<0.1; **p<0.05; ***p<0.01

Table 32: Estimated Parameters for "Distance to Privately Managed Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	25,741***	446	27,383***	440	25,552***	528	17,157***	691	12,834***	887	3529	2426
20%	28,009***	520	29,093***	452	26,818***	548	17,781***	512	14,456***	887	14,693***	1873
30%	31,032***	488	32,478***	600	30,016***	626	21,764***	716	21,122***	814	27,604***	1976
40%	32,523***	606	34,046***	551	32,297***	635	25,320***	718	25,162***	889	33,986***	1946
50%	32,944***	455	35,437***	546	33,425***	521	27,031***	595	32,171***	828	39,064***	1993
60%	32,447***	538	35,039***	562	33,635***	579	26,949***	595	39,837***	1115	47,481***	1791
70%	38,735***	1336	40,187***	1084	41,205***	1189	31,809***	1306	51,166***	1395	51,744***	2423
80%	48,948***	1317	50,571***	1296	51,202***	1237	49,898***	1482	66,911***	1801	66,801***	3589
90%	70,337***	2358	69,081***	2116	71,982***	2232	71,374***	2722	93,463***	2640	108,657***	5349

Note: *p<0.1; **p<0.05; ***p<0.01

Table 33: Estimated Parameters for "Count of Privately Managed Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	311***	10	256***	11	86***	19	-1,033***	48	-2,394***	63	-6,633***	293
20%	286***	8	287***	9	117***	14	-1,092***	32	-2,464***	48	-5,688***	250
30%	272***	7	287***	10	105***	14	-1,126***	31	-2,608***	50	-6,047***	230
40%	256***	9	294***	9	110***	14	-1,122***	32	-2,747***	49	-6,313***	233
50%	226***	8	289***	7	108***	13	-1,132***	30	-2,807***	52	-6,795***	240
60%	163***	8	289***	9	149***	14	-1,191***	34	-2,882***	60	-7,217***	264
70%	98***	11	290***	12	189***	18	-1,364***	45	-3,166***	74	-7,556***	281
80%	32**	14	377***	19	234***	26	-1,485***	61	-3,770***	95	-8,772***	406
90%	-79***	28	690***	28	545***	50	-2,138***	103	-5,571***	147	-10,531***	559

Note: *p<0.1; **p<0.05; ***p<0.01

Equation 3: Estimating the impact of Government Low-Cost Housing

$$P = \alpha + \beta_1 DGOVERNMENT + \beta_2 CGOVERNMENT + \gamma_i Si + \mu_1 DUNIVERSITY + \mu_2 DHOSPITAL + \lambda_1 D\text{CITYCENTER} + \lambda_2 DTRAIN + e$$

Table 34: Estimated Parameters for "Distance to Government Managed Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	-556***	175	323**	130	-1,695***	289	-11,715***	893	-2846	2168	49,124***	7927
20%	-731***	136	89	176	-1,045***	302	-11,643***	666	-3,649***	830	37,146***	6059
30%	-748***	120	309**	147	-942***	285	-9,593***	470	-1592	1014	37,482***	9066
40%	-905***	110	419***	154	-872***	222	-5,971***	779	709	1021	16,062*	8790
50%	-1,083***	107	632***	140	-477*	270	-3,426***	518	2,188*	1302	11825	7687
60%	-1,294***	123	920***	171	-586**	246	-1,927***	547	3,639***	1253	-5871	7976
70%	-1,523***	147	1,707***	180	-53	257	2,094**	821	3,760**	1499	84	10750
80%	-1,443***	188	2,652***	207	2,578***	365	7,427***	1081	5,433***	1983	8003	11938
90%	-1,424***	242	2,476***	276	6,066***	515	12,758***	1256	10,420***	2719	8566	10335

Note: *p<0.1; **p<0.05; ***p<0.01

Table 35: Estimated Parameters for "Count of Government Managed Low-Cost Housing" by Quantile level for Transacted Prices (Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	1,698***	35	1,299***	51	-6	98	-4,587***	255	-4,907***	641	-16,706***	2709
20%	1,925***	28	1,600***	36	437***	72	-4,803***	227	-5,180***	477	-17,062***	1971
30%	2,111***	27	1,801***	31	497***	61	-5,171***	172	-5,476***	389	-18,634***	1897
40%	2,301***	26	2,019***	35	542***	50	-5,556***	174	-5,924***	333	-19,711***	1598
50%	2,479***	24	2,299***	34	652***	61	-6,092***	127	-6,421***	299	-16,628***	1512
60%	2,676***	25	2,652***	38	895***	64	-6,220***	177	-6,588***	310	-16,577***	1726
70%	2,953***	30	3,112***	40	1,355***	68	-6,414***	211	-6,416***	385	-15,140***	2055
80%	3,295***	39	3,842***	58	2,282***	109	-6,579***	248	-6,622***	435	-10,121***	2550
90%	3,948***	56	5,100***	92	4,976***	194	-7,171***	391	-7,598***	645	-14,365***	2038

Note: *p<0.1; **p<0.05; ***p<0.01

Table 36: Estimated Parameters for "Distance to Government Managed Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	1,100***	109	2,419***	90	2,245***	108	992***	347	1,285*	736	43,209***	3959
20%	871***	108	2,620***	86	2,819***	160	588*	305	-915	629	29,799***	3065
30%	1,111***	103	2,863***	99	3,016***	148	1,194***	305	-2,665***	534	19,451***	2815
40%	1,162***	101	3,051***	92	3,402***	114	1,766***	310	-4,326***	490	9,730***	2951
50%	1,080***	110	2,963***	104	3,395***	166	2,809***	372	-5,207***	591	3469	3091
60%	1,368***	111	2,767***	111	3,637***	169	4,074***	328	-5,294***	623	-10,755***	3335
70%	1,697***	141	3,387***	144	3,651***	214	5,954***	509	-5,312***	787	-24,479***	4015
80%	2,913***	213	3,447***	142	2,922***	266	7,423***	648	-9,015***	1210	-44,187***	6136
90%	4,983***	405	4,870***	292	2,406***	429	11,966***	1334	-20,186***	1957	-115,352***	8867

Note: *p<0.1; **p<0.05; ***p<0.01

Table 37: Estimated Parameters for "Count of Government Managed Low-Cost Housing" by Quantile level for Transacted Prices (Non-Landed)

Quantile	20km		15km		10km		5km		3km		1km	
	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.	β	s.e.
10%	-92***	21	664***	30	194***	21	-375***	72	1,481***	131	3,842***	636
20%	-95***	23	930***	16	548***	32	-497***	56	760***	97	-365	549
30%	-63**	24	943***	16	684***	26	-493***	54	301***	91	-4,505***	354
40%	-56***	20	930***	16	750***	22	-592***	50	-188**	88	-6,673***	441
50%	-73***	24	929***	21	795***	29	-461***	64	-247**	117	-8,168***	443
60%	-212***	19	949***	23	922***	34	-184***	69	-82	117	-8,202***	609
70%	-367***	26	1,164***	32	1,107***	40	-63	85	-177	156	-10,601***	630
80%	-282***	43	1,427***	33	1,288***	57	124	127	-1,186***	212	-12,938***	949
90%	-186**	87	2,084***	57	2,159***	94	-874***	208	-4,058***	384	-24,359***	1287

Note: *p<0.1; **p<0.05; ***p<0.01

9. References

Abdullah, Yusfida Ayu, Julieven Nonoi Kuek, Hazlina Hamdan, and Farrah Lyana Mohd Zulkifli. 2017. "COMBATING SQUATTERS IN MALAYSIA: DO WE HAVE ADEQUATE POLICIES AS INSTRUMENT?" *PLANNING MALAYSIA JOURNAL* 16 (6). https://doi.org/10.21837/pmjournal.v16.i6.263.

Azuddin, Aziff, and Nelleita Omar. n.d. "Getting Around: Towards a Decent Daily Commute." *The Centre* (blog). Accessed October 20, 2021. https://www.centre.my/post/getting-around-towards-decent-daily-commute.

Bourassa, Steven C., and Vincent S. Peng. 1999. "Hedonic Prices and House Numbers: The Influence of Feng Shui." *International Real Estate Review* 2 (1):79–93.

Chau, K., Vincent Ma, and Daniel Ho. 2001. "The Pricing of 'Luckiness' in the Apartment Market." *Journal of Real Estate Literature* 9 (1). American Real Estate Society:29–40.

Chin, T. L., and K. W. Chau. 2003. "A Critical Review of Literature on the Hedonic Price Model.Pdf."

Daim, Nuradzimmah. 2021. "MyBeautiful Keluarga Malaysia Initiative to Enhance Low-Cost Dwelling Soon." NST Online. October 27, 2021. https://www.nst.com.my/news/nation/2021/10/740158/mybeautiful-keluarga-malaysia-initiative-enhance-low-cost-dwelling-soon.

Dear, Michael. 1992. "Understanding and Overcoming the NIMBY Syndrome." *Journal of the American Planning Association* 58 (3):288–300. https://doi.org/10.1080/01944369208975808.

DESA, U. 2020. "World Economic Situation and Prospects as of Mid-2020, 2020." *UN DESA: New York, NY, USA*.

DOS. 2020. "Household Expenditure Survey Report 2019." Putrajaya: Department of Statistics Malaysia.

Dziauddin, Mohd Faris, Seraphim Alvanides, and Neil Powe. 2013. "Estimating the Effects of Light Rail Transit (LRT) System on the Property Values in the Klang Valley, Malaysia: A Hedonic House Price Approach." *Jurnal Teknologi* 61 (1). https://doi.org/10.11113/jt.v61.1620.

Endan, Ibrahim Bin. 1984. "Public Housing Policy in Peninsular Malaysia." PhD Thesis, Texas A&M University.

Epple, Dennis. 2011. "Hedonic Prices and Implicit Markets: Estimating Demand and Supply Functions for Differentiated Products" 95 (1):59–80.

Goetz, Edward G, Hin Kin Lam, and Anne Heidinger. 1996. "THERE GOES THE NEIGHBORHOOD?," 102.

Haab, T., and K. Mcconnell. 2002. *Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation.*

Kam, Kenn Jhun, Shi Yi Chuah, Tze Shwan Lim, and Fuey Lin Ang. 2016. "Modelling of Property Market: The Structural and Locational Attributes towards Malaysian Properties." *Pacific Rim Property Research Journal* 22 (3). Taylor & Francis:203–16.

KPKT. n.d. “Laporan Kesejahteraan Komuniti PPR.” Kementerian Perumahan dan Kerajaan Tempatan. https://ehome.kpkt.gov.my/index.php/dl/.

KPKT, JPN. 2018. “Dasar Perumahan Negara (2018 - 2025).” Jabatan Perumahan Negara, Kementerian Perumahan dan Kerajaan Tempatan.

Lancaster, Kelvin J. 1966. “A New Approach to Consumer Theory.” *Journal of Political Economy* 74 (2). The University of Chicago Press:132–57.

Lee, Racheal. 2020. “Know Your Stuff: What the Maintenance Fee and Sinking Fund Are Used For.” *The Edge Malaysia*, 2020. https://www.theedgemarkets.com/article/know-your-stuff-what-maintenance-fee-and-sinking-fund-are-used-%C2%A0.

Ludick, Aliksa, David Dyason, and Alicia Fourie. 2021. “A New Affordable Housing Development and the Adjacent Housing-Market Response.” *South African Journal of Economic and Management Sciences* 24 (1). https://doi.org/10.4102/sajems.v24i1.3637.

Mar Iman, A. H., N. Hamidi, and S. Liew. 2009. “The Effects of Environmental Disamenities on House Prices.” *Malaysian Journal of Real Estate* 4 (2):32–44.

Maslow, A. H. 1943. “A Theory of Human Motivation.” *Psychological Review* 50 (4). US: American Psychological Association:370–96. https://doi.org/10.1037/h0054346.

Ministry of Housing and Local Government (KPKT). 2018. “Dasar Perumahan Negara (2018-2025).Pdf.” https://www.pmo.gov.my/wp-content/uploads/2019/07/Dasar_Perumahan_Negara_2018-2025__.pdf.

MOH. 2019a. “Senarai Hospital Awam Berlesen Bawah AKTA 586.” Ministry of Health. https://www.moh.gov.my/index.php/database_stores/store_view/3.

———. 2019b. “Senarai Hospital Swasta Berlesen Bawah AKTA 586.” Ministry of Health. http://medicalprac.moh.gov.my/v2/uploads/LainKPJKS/Copy%20of%20Hospital%20Swasta%20berlesen%20sehingga%2031.12.19.pdf.

MQA. 2021. “Senarai Program Pengajian IPTA & IPTS.” Malaysia Qualification Agency. https://www2.mqa.gov.my/mqr/akrbyipta.cfm.

Mumford, Lewis. 1961. *The City in History: Its Origins, Its Transformations, and Its Prospects*. Vol. 67. Houghton Mifflin Harcourt.

Nguyen, Mai Thi. 2005. “Does Affordable Housing Detrimentally Affect Property Values? A Review of the Literature.” *Journal of Planning Literature* 20 (1). SAGE Publications Inc:15–26. https://doi.org/10.1177/0885412205277069.

Ooi, Joseph T. L., Thao T. T. Le, and Nai-Jia Lee. 2014. “The Impact of Construction Quality on House Prices.” *Journal of Housing Economics* 26 (December):126–38. https://doi.org/10.1016/j.jhe.2014.10.001.

“‘Over 90% of Tribunal Cases Involve Maintenance Fee Arrears’ | The Star.” n.d. Accessed September 15, 2021. https://www.thestar.com.my/metro/metro-news/2020/10/10/over-90-of-tribunal-cases-involve-maintenance-fee-arrears.

PEMANDU. 2010. “Economic Transformation Programme: A Roadmap for Malaysia.” https://policy.asiapacificenergy.org/node/1271.

Preez, Mario Du, and Michael Sale. 2013. “The Impact of Social Housing Developments on Nearby Property Prices: A Nelson Mandela Bay Case Study.” *South African Journal of Economics* 81 (3):451–66. https://doi.org/10.1111/j.1813-6982.2012.01337.x.

Prime Minister’s Office of Malaysia. 1966. “First Malaysia Plan.” https://www.pmo.gov.my/dokumenattached/RMK/RMK1.pdf.

Ridker, Ronald G., and John A. Henning. 1967. “The Determinants of Residential Property Values with Special Reference to Air Pollution.” *The Review of Economics and Statistics*. JSTOR, 246–57.

Ritchie, Hannah, and Max Roser. 2018. “Urbanization.” *Our World in Data*.

Rosen, Sherwin. 1974. “Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition.” *Journal of Political Economy* 82 (1):34–55. https://doi.org/10.1086/260169.

Santiago, Anna M., George C. Galster, and Peter Tatian. 2001. “Assessing the Property Value Impacts of the Dispersed Subsidy Housing Program in Denver.” *Journal of Policy Analysis and Management* 20 (1):65–88. https://doi.org/10.1002/1520-6688(200124)20:1<65::AID-PAM1004>3.0.CO;2-U.

Sirmans, G., D. Macpherson, and E. Zietz. 2005. “The Composition of Hedonic Pricing Models,” 1–43.

SPAD. 2011. “Greater Kuala Lumpur/ Klang Valley Land Public Transport Master Plan (Urban Rail Development Plan).” https://govdocs.sinarproject.org/documents/prime-ministers-department/land-public-transport-commission/urdp-mp-moc_110913-v1-0.pdf/view.

———. 2016. “Greater Kuala Lumpur/Klang Valley Land Public Transport Master Plan.” Suruhanjaya Pengangkutan Awam Darat. https://govdocs.sinarproject.org/documents/prime-ministers-department/land-public-transport-commission/urdp-mp-moc_110913-v1-0.pdf/@@download/file/URDP-MP-MOC_110913-v1.0.pdf.

Sulaiman, Noralfishah, David Baldry, and Les Ruddock. 2005. “Can Low Cost Housing in Malaysia Be Considered as Affordable Housing ?” In *Book of Abstracts: 2005 European Real Estate Society Conference in Association with the International Real Estate Society - Dublin, Ireland*. Dublin, Ireland: ERES. https://doi.org/10.15396/eres2005_328.

Suraya Ismail, Christopher Weng Wai Choong, Hawati Abdul Hamid, Nur Fareza Mustapha, Gregory Ho, Theng Theng Tan, Muhammad Nazhan Kamaruzuki, and Adam Firouz. 2019. “Rethinking Housing: Between State, Market and Society: A Special Report for the Formulation of the National Housing Policy (2018–2025), Malaysia.” Kuala Lumpur: Khazanah Research Institute.

UN General, Assembly. 2015. “Resolution Adopted by the General Assembly on 25 September 2015, Transforming Our World : The 2030 Agenda for Sustainable Development.” *A/RES/70/1*, October. https://www.refworld.org/docid/57b6e3e44.html.

World Bank. 2015. “Achieving a System of Competitive Cities in Malaysia.”