Measuring Housing Affordability in an Emerging Market: The Lifetime Income Approach

Gary John Rangeli
Universiti Sains Malaysia, Georgetown, Malaysia

Jason Wei Jian, Ng
Monash University Malaysia, Bandar Sunway, Malaysia

Thangarajah@M. Thiyagarajan, Murugasu
Monash University Malaysia, Bandar Sunway, Malaysia

Wai Ching, Poon
Monash University Malaysia, Bandar Sunway, Malaysia

†Corresponding author.
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Abstract

The problem of housing affordability is a phenomenon that affects both developed and developing countries across the world. Researchers have tried to operationalize measures of housing affordability, resulting in measures such as the median multiple approach, the expenditure-to-income ratio and the residual income approach. Using the lifetime income approach developed by Abeysinghe and Gu (2011), we analyze housing affordability in a developing country at various household income percentiles. The results show that households at the 25th income percentile cannot afford any type of dwelling in Malaysia. For the 40th income percentile and those households at median income levels, high-rise and terrace housing is affordable. However, we document significant downward trends in the housing affordability index and the mortgage affordability index starting in 2009, which indicates increasing housing stress for households at or below the median income. Based on the results, we contribute to the literature on housing affordability by suggesting general proposals to ameliorate the housing affordability problem in the context of a developing country such as Malaysia.

Keywords: Housing affordability, lifetime income, Malaysia, real estate.
Introduction

Housing affordability has been a major concern in many countries, as shelter is a basic necessity for the well-being of society. As such, many governments have pursued a policy of encouraging home-ownership, albeit with mixed results.\(^2\) Malaysia has been no exception. Historically, the Malaysian government has taken a laissez-faire approach to housing. Since the 1960s, the provision of housing has been largely left to the private sector rather than an aggressive government-driven social housing program (Goh, 2013). This period was followed by the idea of “cross-subsidization”, whereby housing developers who had been given free reign to establish private market housing would yield profits. In return, they would use part of these profits to subsidize low-cost housing units (Chua, 2013).\(^3,4\)

However, the “cross-subsidization” approach has led to unintended consequences. Some housing developers have taken advantage of the need for low-cost units, special discounts, and mandatory units allotted to the Bumiputera\(^5\) to continually increase prices of private housing (Goh, 2013). House prices in Malaysia...

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\(^2\)The U.S. federal government’s encouragement of homeownership led to the establishment of the Federal Housing Administration (FHA) with the goal of stimulating the housing market after the Great Depression. The U.S. Congress further chartered government-sponsored entities (Freddie Mac, Fannie Mae, and Ginnie Mae) to improve the efficiency of the mortgage market (Dickerson, 2009). Lax lending standards encouraged by successive U.S. government administrations in order to promote the “American dream” lead to the disastrous contagion effect of the sub-prime crisis, which culminated in the Great Recession. At the other extreme, the establishment of the Housing Development Board (HDB) by the Singapore government in 1960 to provide public housing for its citizens has been a tremendous success in encouraging homeownership. Direct intervention in the housing market by Singapore’s government has led to one of the highest homeownership rates in the world, 90.9 percent as of 2016.

\(^3\)This is in stark contrast to the policies of the neighboring Singapore government, which embarked on a massive social housing program encompassing all facets of public housing starting with the provision of public housing to its financing.

\(^4\)Since the late 1970s, developers have had a compulsory quota of 30 percent low-cost housing for most private residential projects.

\(^5\)Bumiputera is a Malay term for the Malays and indigenous peoples of the country. In the aftermath of the 1969 race riots, the Malaysian government implemented the New Economic Policy (NEP) in 1971, which focused on affirmative policies for the Bumiputera. One of its provisions is the mandatory allotment of private housing and a 10 percent discount for property purchases by the Bumiputera.
have steadily increased from 2010 to 2015 with an average increase of 9.2 percent. This increase is three times the growth from 2000 to 2009, which was 3.4 percent (Cheah et al., 2016). Recent research has also shown that this continuous, steep ascent in house prices has occurred without a structural break since mid-2009, implying the formation of a housing bubble (Yip, Wong and Woo, 2016). Several media reports have highlighted that increases in household income have lagged behind house price increases, which has aggravated the housing affordability conundrum (Lee and Lye, 2014; The Star, 2014b).

The increasing disparity between increases in house price vis-à-vis income increases has led to renewed vigor in government circles and a slew of private sector proposals to bridge this affordability gap. Several demand-driven proposals seek to increase the ability of households to purchase a home. These include a proposal to have housing developers be housing loan end financiers (Habibu, 2016); to have commercial banks increase housing loan tenures from the current maximum of 35 years to 40 years (The Star, 2016b); and one recommending that the Employees Provident Fund (EPF) allow contributors, who are first-time homebuyers, to withdraw a larger proportion of their mandatory retirement savings for mortgage repayment purposes (Gho and Willy, 2016). Other measures have been targeted at increasing the supply of affordable housing for certain targeted income groups through methods such as the adoption of industrialized building techniques that lower the cost of construction while improving the speed of delivery. Specific targeted government measures include (i) the formation of a National Housing Council (NHC) with the explicit objective of developing appropriate actionable plans for the provision of housing priced between RM150,000
and RM450,000; (ii) the creation of 1Malaysia People’s Housing Program (PR1MA) with the mission of planning, developing, constructing, and maintaining high-quality housing that meets the expectations of the middle-income group in urban areas; (iii) introducing a My First Home Scheme (a home financing program) for young singles and young couples earning less than RM5,000 and RM10,000, respectively; and (iv) providing developers with a RM30,000 subsidy per unit of low-cost and medium-cost housing built, priced at a maximum of RM45,000 and RM170,000, respectively (The Star, 2013b).

Although many of these proposals and initiatives seek to resolve the housing affordability conundrum, progress has been slow, as evidenced by the 1.7 million households (25 percent of the population) in Malaysia that have yet to own a home as of September 2013 (The Star, 2013a). Government initiatives such as PR1MA have been criticized for a “lack of focus” and have even allowed “second-time house buyers” the opportunity to participate in balloting for PR1MA-developed housing despite a waiting list of 1.3 million first-time applicants (Gho and Willy, 2016; Surendran, 2016). The shortage of affordable housing can result in serious economic and emotional implications for households, especially those in the low- to middle-income groups. A longitudinal analysis of households’ movements in Australia found significant mental deterioration for households faced with housing costs exceeding 30 percent of their household income (Bentley et al., 2011). The provision of housing affordability is further complicated by the lack of a unified operational definition of affordable housing among researchers. Even developers have created their own definition of what constitutes affordable housing (The Star, 2014a). In all, determining whether the current measures
and proposals being undertaken can alleviate their housing affordability challenges needs to be understood from the perspective of house buyers.

This paper seeks to address the housing affordability problem from the perspective of house buyers via the provision of a long-term housing affordability index (HAI) that considers the lifetime income of households. The HAI would be an improvement on the current measures, which primarily use current income to measure housing affordability. The HAI can also be used to complement the arsenal of analytical tools used by a financial institution in assessing the eligibility of households for financing.6

We analyze housing affordability from the perspective of both median income households and households earning less than the median income. This is important because the Malaysian government has emphasized uplifting the well-being of the households in the bottom 40 percent income group (referred to as the B40 households) (Economic Planning Unit, 2015). We develop not only a generic long-term HAI for Malaysia but also dissect the housing supply by type of dwelling, which allows for a more in-depth view of the housing affordability problem. Analyzing long-term affordability by type of dwelling allows policy makers to develop appropriate housing strategies through the NHC by specifically targeting the supply of the housing type that provides the highest return on investment.

Gan and Hill (2009) categorized housing affordability into purchase affordability, repayment affordability, and income affordability. A mismatch between the three may lead to unaffordability in a home purchase. Gan and Hill’s (2009) housing affordability

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6We envisage the use of the HAI by financial institutions in much the same way as insurers use actuarial tables to alleviate the problem of adverse selection.
measurement considers the entire distribution of household income and house prices and constructs the affordability measure using the value-at-risk concept rather than focusing solely on the median house price to income ratio. This allows housing affordability to be divided into short-term and long-term affordability perspectives. According to Gans and King (2004), households with short-term affordability issues have sufficient lifetime income for a house purchase but have short-term financing issues. Specifically, these households have difficulty making a down payment to purchase a house. Meanwhile, long-term affordability issues pertain to having insufficient incomes to pay for the house, i.e., these households face repayment constraints.

In the Malaysian context, it is not uncommon to observe intergenerational transfers from parents to their children with the tacit knowledge that the children will reciprocate these bequests by caring for their aging parents (Lillard and Willis, 1997). Using the extant intergenerational transfer literature, we conjecture that the parental repayment hypothesis is highly prevalent. In this situation, parents finance their children’s human capital investment with the expectation of realizing returns in future. Parental or intergenerational transfers can occur either directly or with the parents acting as guarantors for loans taken out by their children (Barrett et al., 2015).

Intergenerational transfers affect housing decisions in two ways (Barrett et al., 2015; Engelhardt and Mayer, 1998). First, the recipients of transfers generally spend a shorter time saving for a down payment or deposits and have an increased likelihood of transitioning into homeownership. Second, the down payment amount is higher among transfer receipts, as is the value of the house purchased. In Malaysia, it is common for
parents to pay for the 10 percent upfront down payment cost and leave the periodic mortgage repayment to their children (Chin, 2016). This eases the deposit and down payment constraints for their children, particularly if they are first-time homebuyers, who are generally younger people in their early working years and have on average lower incomes. According to Luea (2008), recipients of intergenerational transfers are 1.2 times more likely to purchase a home compared to non-recipients. Using the propensity score matching approach (PSM), Barrett et al. (2015) claimed that those bequest receipts increase the probability of homeownership rates by 4 to 8 percentage points.

This paper focuses on repayment affordability and purchase affordability; it is an extension of Rangel et al.’s (2017) study, which focused on repayment affordability by employing the mortgage-income ratio approach to determine the overall level of housing affordability in Malaysia analyzed at a microlevel. In particular, the study considered the affordability of different housing types for homebuyers across different age groups. Rangel et al. (2017) found that greater housing affordability stress is observed among the younger cohorts. Therefore, it is recommended that homebuyers in these age groups enter the rental market rather than undergoing the undue stress of owning a home.

Although this study borrows ideas from Abeysinghe and Gu (2011), it differs from their work in several ways. First, we focus on the contextual nature of our analysis by using an emerging economy rather than a private housing affordability issue in Singapore. Second, unlike Abeysinghe and Gu (2011) who focus on the housing affordability of a generic housing type, we analyze affordability of the different types of housing available in Malaysia. Third, we give equal emphasis to both repayment
affordability and purchase affordability, and we account for the role of intergenerational or parental transfers in facilitating early entry into the housing market. This allows us to make positive contributions towards policy recommendations. Fourth, based on our empirical results, we provide several in-depth policy recommendations as possible long-term solutions that could ameliorate the housing affordability conundrum plaguing Malaysia.

In the next section, we outline the current measures of housing affordability and detail the strengths and weaknesses of each measure. The third section details the computation of the long-term HAI, extending the work done by Abeysinghe and Gu (2011). That section also discusses the issue of data availability and the various assumptions used in the construction of the long-term HAI. The following section discusses the results and plots the trend of housing affordability by type of dwelling. The results section will then feed directly into the discussion on the proposed measures policy makers can undertake to resolve the housing affordability issue. We conclude the paper with a summary of our major findings and policy measures.

**Literature Review**

Several measures of housing affordability have been used in the extant literature. Much of the extant literature uses the price-income ratio approach in defining the interactions between housing costs and household incomes (Paris, 2007) with the median disposable household income of the sample population commonly used as the income benchmark in assessing housing affordability. For example, the median house price to the median household income approach developed by Demographia International Housing Affordability Survey assumes that a median multiple of 3.0 or less
would be indicative of an affordable housing situation. The advantages of this median multiple approach are that apart from its ease of calculation and comprehension, it provides a general macro view of the housing market and allows for a cross-sectional comparison across countries and trend analysis within a country. However, this approach ignores the role of borrowing and the distribution of household income. Gan and Hill (2009) extended the median house price to income ratio model by considering the entire distribution of household income and house prices, which allows housing affordability to be separated into purchase affordability and repayment affordability.

The extant literature has also documented improvements in the common housing affordability metrics. For example, instead of using a one-dimensional median house price approach, Fisher, Pollakowski and Zabel (2009) proposed an amenity-based house pricing approach that considers structural differences across localities in the Boston metropolitan area (such as locational amenities and direct commuting costs). Despite being a more accurate approach in determining housing affordability, this method requires distributional disaggregated microdata that is usually not easily available. Gan and Hill (2009) would be another example. They proposed modifying the median multiple approach by incorporating an affordability at risk measure. Their measure is operationalized by depicting the entire distribution of household income and house prices. They also differentiate affordability between purchase affordability and repayment affordability. Using this approach, their findings indicate that while purchase affordability remained relatively constant for the Sydney housing market over the observation period, repayment affordability has diverged significantly over the same period.
While the price-to-income indicator measures access to housing purchase affordability, the housing mortgage-income ratio (expenditure-to-income ratio) measures affordability after the household owns a home (Chen, Hao and Stephens, 2010). This measure is thus related to mortgage repayment affordability. Ideally, the rule of thumb for this mortgage-income ratio measure is that not more than 30-35 percent of one’s monthly income should be spent on monthly mortgage repayments. Those paying above 50 percent of their income for housing are categorized as having severe cost burdens (Bogdon and Can, 1997). In Australia, exceeding the 30 percent threshold would signal housing stress (Lamont, 2008) that may cause housing-induced poverty, especially for households at the poverty line (Kutty, 2005). Nevertheless, low-income households that spend relatively little income on housing in absolute terms may still struggle to maintain a basic subsistence level, exhibiting characteristics of housing-induced poverty. Therefore, what is considered affordable by households has a symbiotic relationship to the poverty line since key affordability ratios are tied to residual income (Bramley, 1994). There is also no consensus on where the poverty line should be in relation to the determination of appropriate basic housing standards (Bramley 1990). The advantage of the mortgage-income ratio approach is its simplicity, which makes it a standard tool to measure housing affordability (Tan, 2013) (e.g., the U.S. Department of Housing and Urban Development uses this approach). However, the disadvantage of this measure stems from its rigid imposition of the 30 percent threshold. Maintaining this rigidity would mean that either non-housing expenditures must decrease as income falls (Stone, 2006) or the ratio must decrease accordingly (Hulchanski, 1995; Thalmann, 1999). Using such a fixed measure to determine housing
affordability is also conceptually flawed, as it fails to account for household preferences, changes in quality and housing costs due to neighborhood quality differences and accessibility premiums (Bogdon and Can, 1997). In addition, the accuracy of cross-country comparisons using this ratio could be influenced by cost of living differences and the structure of mortgage repayments across countries (Cheah and Almeida, 2016).

Both the price-income and mortgage-income approaches have been criticized as inequitable because higher income households will enjoy greater disposable income (Whitehead, 1991). Lerman and Reeder (1987) modified the percentage of income measure and employ a quality-adjusted approach to measure housing affordability. They attempt to account for quality changes by using the lowest possible unit cost as a standard that meets adequate housing affordability then differentiating between households that are able to maintain an adequate standard of living and those that are not. However, this quality-adjusted measure does not address the issue of whether there is an adequate supply of affordable housing to meet the needs of lower-income households.

Stone (1993) postulates that housing costs become an issue only when the residual income after the housing expenditure fails to support socially acceptable non-housing expenditures. Stone (2006) proposed the residual income approach, which relies on the identification of non-housing expenditures, the leverage effect, how taxes are derived, and household spending patterns. The residual available for housing reflects the difference between disposable income and the cost of achieving a minimal standard of non-housing consumption. If a household’s actual housing cost payments exceed the income necessary to support its minimal non-housing consumption, the
household is then categorized as shelter poor. Despite this measure better reflecting the ability of households to purchase a house (Cheah and Almeida, 2016), there is a lack of consensus as to what the optimum level of non-housing expenditures is (Bogdon and Can, 1997) and what level of housing expenditure is deemed socially acceptable (Chen, Hao and Stephens, 2010), as normative judgements of what households can afford are inherently tied to the judgments concerning the minimum income requirements for non-housing expenditures (Bramley, 1994).

Much of the literature has largely focused on ratio calculations with their emphasis on current income. Quigley and Raphael (2004) argue that the choice of housing involves substantial transaction costs. The choice of housing is interrelated with decisions concerning the proximity of schools, the location of neighborhoods, the provision of public amenities, and the availability of natural surroundings. Thus, housing choice is likely to be determined by households’ self-assessment of permanent income rather than current income. Therefore, other studies have subsequently proposed using lifetime income instead of current income (Böhlmark and Lindquist, 2006; Goodman and Kawai, 1982). The ideal assessment of long-term affordability would be a comparison of house prices, a static point-in-time variable, to lifetime income (wealth), a similar static-in-point time variable. As mortgage payments are time-varying, the ideal comparison would be against permanent income, which is also time-varying. In this paper, we extend the work of Abeysinghe and Gu (2011) and compute a Malaysian HAI. We also modify this measure to compute a Malaysian mortgage affordability index (MAI), which accounts for intergenerational transfers unique in the Malaysian context.

**Methodology**
We follow the methodology of Abeysinghe and Gu (2011) in computing the Malaysian HAI, as will be illustrated in this section. In essence, the HAI requires the lifetime income of Malaysian households and the Malaysian house prices as the two inputs in its calculations. Data on the latter is directly obtained from Malaysia’s National Property Information Centre (NAPIC), while data on the former requires prediction, as detailed in the following subsection. We also modify the HAI to introduce the Malaysian MAI to recognize the role of the intergenerational transfers that help to ease the house buying process in Malaysia.

*Predicting Lifetime Income*

The crux of computing the Malaysian HAI lies in predicting the lifetime income of Malaysian households according to the year of birth of the head of household. Obtaining these forecasts essentially comprises two steps. First, the annual incomes of households as their heads of household age from 30 to 60 have to be predicted using a panel regression model. Second, using an appropriate discount rate, these annual incomes are summed together with the households’ estimated accumulated savings to obtain their lifetime income. To accomplish this calculation, Malaysian household income data by age groups were obtained.

Household income data by age groups were obtained from the Department of Statistics Malaysia (DOSM). These data and statistics were derived from the Household

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7 The choice of these age values will be explained later in this section.
8 Household income is defined as the overall income accrued by household members, whether in cash or in kind, received repeatedly in the reference period. The four sources of income that can be accrued by households are income from paid employment, self-employment, income from property and investments, and current transfers received.
9 The age groups in the dataset refer to the 9 five-year interval age groups, ranging from 20 to 64 years, to which a head of household belongs. The head of household is defined as any member, whether male or female, who is considered to be head of the household by other members. The head of household must be an income recipient and aged 15 years or over.
Income and Basic Amenities Surveys conducted by the DOSM from 1995 to 2014. Specifically, the incomes obtained were monthly income levels at the 25th, 40th, 50th and 75th percentiles. However, as the survey is not conducted on an annual basis, the household income data were only available for the following nine survey years: 1995, 1997, 1999, 2002, 2004, 2007, 2009, 2012 and 2014.

The data collected constitutes a pseudo-panel (Deaton, 1985), whereby in each of the survey years, the cross-sectional survey includes a different set of randomly selected households. Therefore, the same household is not tracked over time, making it impossible to establish a proper panel dataset that would have been ideal in predicting lifetime incomes. Instead, we use the dataset to track the age-income profile of cohorts defined by the year of birth. However, as with Abeysinghe and Gu (2011), the difficulty is that the data does not provide a complete income profile from ages 20 to 64 for every birth cohort. In other words, the data only allow for a partial tracking of the age-income profile of cohorts. For example, in Table 1 below, incomes for the cohort C61-65 in our sample are available only over the 30-54 age range.\(^\text{10}\) To overcome this limitation, we estimate a panel regression model to predict the missing income points to obtain complete age-income profiles for each cohort.

**Table 1: Cohort plan from income data obtained from the DOSM**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>C71-75</td>
<td>C71-75</td>
<td>C76-80</td>
<td>C76-80</td>
<td>C81-85</td>
<td>C81-85</td>
<td>C86-90</td>
<td>C86-90</td>
<td>C91-95</td>
</tr>
<tr>
<td>25-29</td>
<td>C66-70</td>
<td>C66-70</td>
<td>C71-75</td>
<td>C71-75</td>
<td>C76-80</td>
<td>C76-80</td>
<td>C81-85</td>
<td>C81-85</td>
<td>C86-90</td>
</tr>
<tr>
<td>30-34</td>
<td><strong>C61-65</strong></td>
<td><strong>C61-65</strong></td>
<td>C66-70</td>
<td>C66-70</td>
<td>C71-75</td>
<td>C71-75</td>
<td>C76-80</td>
<td>C76-80</td>
<td>C81-85</td>
</tr>
<tr>
<td>35-39</td>
<td>C56-60</td>
<td>C56-60</td>
<td><strong>C61-65</strong></td>
<td><strong>C61-65</strong></td>
<td>C66-70</td>
<td>C66-70</td>
<td>C71-75</td>
<td>C71-75</td>
<td>C76-80</td>
</tr>
</tbody>
</table>

\(^\text{10}\)In Table 1, birth cohorts are denoted by Cxx-xx. For example, C61-65 refers to the sample group whose head of household was born between 1961 and 1965.
To increase the number of observations available in our dataset for the panel estimation, we obtained the monthly household incomes of the nine age groups for the missing survey years using interpolation via the cubic spline. Thus, we are able to obtain smoothed values of monthly household incomes for the years that the DOSM did not conduct the survey. We then arranged the data in a panel format and estimated the following regression model of Abeysinghe and Gu (2011) to subsequently generate a complete age-income profile for each cohort in our sample:

\[
\log Y_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \sum_{j=1}^{J} \alpha_j Cohort_j + \varepsilon_{it}
\]  \hspace{1cm} (1)

where \(i = 1, 2, \ldots, 9\) (representing the nine age groups in our sample), \(t = 1, 2, \ldots, 20\) (representing the twenty years from 1995 to 2014 in our sample), and \(j = 1, 2, \ldots, 13\) (representing the thirteen birth cohorts present in our sample). The variable \(Y\) refers to real monthly incomes\(^{11}\) while the \(Age\) variable records the age of the head of household corresponding to age group \(i\) in time period \(t\). The \(Cohort\) variables are dummy variables representing the various birth cohorts present in our sample, shown in Table 1.\(^{12}\) Equation (1) recognizes that there are many cohorts alive in any particular year and

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\(^{11}\)CPI = 100 for base year 2010.

\(^{12}\)Birth cohorts are in reference to the heads of the households.
subsequently allows for the life-cycle component and cohort effects on income to be separated.\textsuperscript{13}

Recalling that the augmented household income dataset is gathered according to age \textit{groups} on an annual basis from 1995 to 2014, we demonstrate how the cohort values, and subsequently the age values, for equation (1) were derived.\textsuperscript{14} As an illustration, Table 2 shows an abstract of the panel data layout for only the 20-24 age group. Column 1 represents the time dimension, $t$, of the panel data in equation (1) from 1995 to 2014, while Column 2 represents the first cross-section dimension of the panel data (i.e., $i = 1$) corresponding to the 20-24 age group listed in Column 3. Based on the age range in Column 3, the corresponding years of birth relative to the year in Column 1 are computed and recorded in Columns 4 and 5. The middle value of the 2 years of birth are recorded in Column 6. Based on these mid-year birth values, the corresponding birth cohort was classified and recorded in Column 7. After taking the mid-year of the respective cohorts listed in Column 8, the age values in Column 9 were derived by taking the difference in values between Columns 1 and 8. We repeat this process for the remaining eight age groups to establish the full panel dataset. The cohort and age values in Columns 7 and 9, respectively, for all the age groups are the ones used in equation (1). The cohort plan listed in Table 1 was also derived through this process.

\textsuperscript{13}The life-cycle component effect on income refers to changes in income due to changes in age, while the cohort effects on income refers to changes in income resulting from “changing education and economic opportunities and other factors” (Abseysinghe and Gu, 2011; pp. 1880) that arise over the passage of time.

\textsuperscript{14}We thank Tilak Abseysinghe for his generosity in sharing with us a redacted version of his dataset used in Abeysinghe and Gu (2011) to illustrate how the cohort and age values were computed.
Table 2: Abstract of the panel data layout for the 20-24 age group

<table>
<thead>
<tr>
<th>Year (t)</th>
<th>Age Group (i)</th>
<th>Age Range</th>
<th>Year of Birth (Upper value)</th>
<th>Year of Birth (Lower value)</th>
<th>Mid-Year Cohort</th>
<th>Mid-Year of Cohort</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
<td>20-24</td>
<td>1989</td>
<td>1985</td>
<td>1987</td>
<td>C8690</td>
<td>21</td>
</tr>
</tbody>
</table>

After estimating equation (1), the coefficient estimates were then used to predict the annual incomes of Malaysian households as their heads of household ages from 20 to 64 years for each of the birth cohorts present in our sample. This method provides us with a complete age-income profile for each of the birth cohorts. The lifetime income for each birth cohort is then computed as per Abeysinghe and Gu (2011):

\[
W_{a,j} = \sum_{i=a}^{A} \frac{\bar{Y}_i}{(1+r)^{l-a}} + TS_{a-1} \tag{2}
\]
where $W_{a,j}$ denotes the expected lifetime income for a household whose head of household is of age $a$ and born in birth cohort $j$, $\hat{R}_i$ denotes the predicted annual household income when the head of household is of age $i$, and $r$ is the discount rate. The first term in equation (2) represents the discounted present value of the expected household income when the head of household ages from age $a$ to $A$. In this paper, we set $a = 30$ and $A = 60$, as 30 years is the recommended age for a Malaysian household to consider purchasing a property (Rangel et al., 2017), while 60 years is the retirement age for a Malaysian worker. We also set $r = 0.085$, the average lending rate of commercial banks during the observation period. The second term in equation (2), $TS_{a-1}$, represents the total savings accumulated by the household when the head of household is of age $a - 1$. Specifically, since $a = 30$, the second term (i.e., $TS_{29}$) represents the total savings accumulated by a household when the head of household is 29 years old. Assuming that one starts saving at the age of 25 in the Malaysian context, $TS_{29}$ is defined as

$$TS_{29} = \sum_{i=25}^{29} (1 + r_s)^{29-i} S_i$$

(3)

where $r_s$ denotes the interest rate for savings and $S_i$ denotes the amount of household savings when the head of household is of age $i$. Essentially, $TS_{29}$ in equation (3) is the sum of annual household savings as the head of household ages from 25 to 29 years, with annual interest earnings accounted for. The amount of annual savings for households, $S_i$, is estimated as $S_i = \hat{P}_i s_i$, where $\hat{P}_i$ is the predicted household income when the head of household is of age $i$ (obtained from equation (1)) and $s_i$ is the savings rate for $i = 25, 26, ..., 29$. 

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The savings rate was obtained from Bank Negara Malaysia’s (BNM) 2012 annual report, which reported different savings rates for different monthly income brackets as per the findings of Murugasu, Ang and Tng (2013).¹⁵ The findings were based on the 2009/2010 HES and concluded that households in different income brackets have different consumption levels and hence different savings rates. We assume these savings rates to be representative of savings across birth cohorts. Similar to Abeysinghe and Gu (2011), it is posited that birth cohorts born before 1970 have no savings.¹⁶ For the compounding of interest on these savings, we use BNM’s monthly statistical bulletin, which provides the actual 12-month fixed deposit savings to denote interest earned by the households on their savings. Total savings (including interest) were subsequently calculated using equation (3) for the birth cohorts C71-75, C76-80, C81-85, C86-90, and C91-95. As we do not have estimates of future interest rates, we used the latest 12-month fixed deposit rate in 2016 (3.18 percent) to calculate the future interest earned on savings from the ages of 28 to 29 for the C86-90 birth cohort and from the ages of 25 through to 29 for the C91-95 birth cohort. The interest rates on savings, which have remained stable at approximately 3 percent since 2011, will presumably continue to remain within this range in the future. We have no reason to assume that there will be increased volatility in future savings interest rates.

Given that the birth cohorts in equation (1) are five-year intervals, the lifetime income values obtained through equation (2) are also a time series at five-year intervals.

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¹⁵Note that the savings rates utilized were derived from only one Household Expenditure Survey (HES). As such, we do not have similar data made available for other periods when this similar survey was conducted. Murugasu, Ang and Tng (2013) only used the 2009/2010 survey to run their analysis.

¹⁶Abeysinghe and Gu (2011, p. 1883) state “the predicted savings rates from APS (average propensity to save) becomes zero and negative as we move to years before 1970. We set the negative savings rate to zero”. We realize the same assumption, as Singapore and Malaysia are neighboring countries that are essentially culturally linked.
corresponding to the thirteen birth cohorts present in our sample. By assigning the computed lifetime income values from equation (2) to the mid-year of their corresponding five-year birth cohort, we applied cubic spline interpolation to ultimately obtain a time series of lifetime income values at an annual frequency from 1933 to 1993. In other words, through the cubic spline, we augment the original set of expected lifetime incomes associated with the 13 five-year interval birth cohorts to obtain the expected lifetime incomes associated with each of the years of birth from 1933 to 1993.

**Malaysian House Prices**

We obtained the quarterly publications of Malaysia’s NAPIC, which provided data on average house prices and indices for years 2003 to 2015. Specifically, data on house prices and indices for those years were available for the four housing types in Malaysia, terrace, high-rise, semi-detached and detached housing, and for the overall average house price. However, for the years 1988 to 2002, the NAPIC publications reported data only on the house price indices for the overall house price and the four housing types. Nevertheless, by using these house prices indices and matching the 2015 house prices with their corresponding house price indices, it was possible to impute the average house prices for 1988 to 2002. All house prices were converted to real terms with 2010 used as the base year.

**Malaysian Housing Affordability Index**

Having obtained lifetime household incomes and Malaysian house prices, the Malaysian HAI for individuals aged $a$ in year $t$ is defined as

\[ \text{Malaysian HAI} = \frac{\text{Lifetime Income}}{\text{House Price}} \]

\[ \text{where Lifetime Income} = \sum_{i=1}^{13} \text{Income}_i \]

\[ \text{House Price} = \frac{\text{Average House Price}}{\text{House Price Index}} \]

\[ \text{House Price Index} = \frac{\text{House Price}}{\text{Base Year House Price Index}} \]

\[ \text{Base Year House Price Index} = 2010 \]

---

\[17\] The house price index for the overall average house price is referred to as the Malaysian house price index (MHPI), which is a measure of overall house prices calculated as the weighted average of the four sub-indices measuring the house prices for the four housing types in Malaysia.
\[
HAI_{a,t} = \frac{W_{t-a}}{p_t^h}
\]  
(4)

where \(W_{t-a}\) is the lifetime income expressed by the year of birth \((t - a)\), and \(p_t^h\) is the average price of the housing type in year \(t\). For example, since we have selected \(a = 30\) in this paper, \(HAI_{30,2014}\) indicates the HAI for the 30-year age group in 2014.

There are a few points to note about the HAI (Abeysinghe and Gu, 2011). First, the index captures both short-run and long-run affordability, not just the latter. This is because in addition to accounting for the incomes earned after the age of 30, the index also accounts for savings accumulated before the age of 30. Therefore, even for a 30-year-old individual who has no inherited wealth, these savings will be useful for making the needed down payment in purchasing a house. Second, an increase in the index represents an improvement in housing affordability. As the reciprocal of the HAI denotes the portion of lifetime income spent on a house, an increase in the index means that a smaller portion of lifetime income is being spent on a house. Third, in this paper, we define the optimal cut-off value for the HAI to be 3. The common rule of thumb is that no more than one-third of income should be used for mortgage payments. Therefore, by applying this rule, \(HAI = 1/0.33 = 3\). Any property types that have an HAI value greater than 3 are thus defined as within the affordable range.

**Malaysian Mortgage Affordability Index**

In recognizing the Malaysian context of intergenerational transfers whereby young homebuyers rely on financial assistance from their parents due to inadequate savings (Frankenberg, Lillard and Willis, 2002; Lillard and Willis, 1997), we modify the HAI to also compute a MAI given by
\[ \text{MAI}_{a,t} = \frac{W_{t-a}}{0.9(P_t^h)} \]  

(5)

where \( W_{t-a} \) is the lifetime income expressed by the year of birth \((t - a)\) and assumes that \( TS_{a-1} = 0 \) in equation (2). The denominator denotes the mortgage amounting to 90 percent of the average price of the housing type in year \( t \). In this context, we assume that a homebuyer obtains a mortgage worth 90 percent of the average price of the housing type and that the homebuyer, through intergenerational transfers or savings, have sufficient finances to make the 10 percent down payment for the house. As a result, we assume that \( TS_{a-1} = 0 \), as any savings available at the time of purchase would have been depleted in making the down payment, and that the ability to repay the mortgage would have to solely depend on the homebuyer’s expected lifetime income after the house purchase. For the same reasons listed for the HAI, we selected \( a = 30 \) in equation (5) and define the affordable range for a property as one having an MAI value greater than 3.

**Results**

*Predicting Lifetime Incomes*

We estimated equation (1) four times using incomes from the 25th, 40th, 50th and 75th percentiles. Table 3 below reports the estimated coefficients for each of the four regressions and their associated \( R^2 \) values. All the \( R^2 \) values are above 0.85, denoting high levels of goodness of fit of the model.

**Table 3:** Estimated regression coefficients from equation (1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) 25th</th>
<th>(2) 40th</th>
<th>(3) 50th</th>
<th>(4) 75th</th>
</tr>
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<tr>
<td>Age</td>
<td>0.1105***</td>
<td>0.1175***</td>
<td>0.1164***</td>
<td>0.1112***</td>
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<td>(0.0060)</td>
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<td></td>
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<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Age</td>
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<td>-0.0010</td>
<td>-0.0010</td>
<td>-0.0010</td>
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<td>(0.0001)</td>
<td>(0.0001)</td>
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<tr>
<td>C36-40</td>
<td>0.0932</td>
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<tr>
<td></td>
<td>(0.0457)</td>
<td>(0.0539)</td>
<td>(0.0491)</td>
<td>(0.0523)</td>
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<tr>
<td>C41-45</td>
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<tr>
<td></td>
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<td>(0.0510)</td>
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<tr>
<td>C46-50</td>
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<tr>
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<td>C51-55</td>
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<td>C56-60</td>
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<td>C66-70</td>
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<td>(0.0707)</td>
<td>(0.0678)</td>
<td>(0.0680)</td>
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<td>(0.0737)</td>
<td>(0.0709)</td>
<td>(0.0704)</td>
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<td>1.4965</td>
<td>1.2788</td>
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<td>(0.0782)</td>
<td>(0.0750)</td>
<td>(0.0721)</td>
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<td>C86-90</td>
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<td>(0.0975)</td>
<td>(0.0937)</td>
<td>(0.0831)</td>
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<td>(0.1591)</td>
<td>(0.1434)</td>
<td>(0.1408)</td>
<td>(0.1164)</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses. Birth cohort C31-35 has been omitted and is the base reference cohort. *** p<0.01, ** p<0.05, * p<0.1.

A few observations can be made from the regression results reported in Table 3.

First, the significant coefficients for all regressors show that both the lifecycle component effect and the cohort effect on income are present. Second, the estimated coefficients for Age and Age² are similar in magnitude across all the income percentiles after controlling for the cohorts. This means that the lifecycle component effect on income is similar across all income groups. Third, the increasing coefficients for the cohort variables (across all income groups) show that the cohort effect on income is larger for later birth cohorts after controlling for age. This is consistent with the improved education and economic opportunities enjoyed by later birth cohorts. Lastly, the cohort
effect on income is the largest for those in the 25th income percentile and the smallest for those in the 75th income percentile, as reflected by the size of their respective coefficients. For example, take 2 same-aged individuals whose income levels are at the 25th percentile but place one in the C31-35 cohort and the other in the C91-95 cohort. The model predicts that the individual born in the C91-95 cohort will have a 208 percent higher income on average than the other individual. By contrast, this percentage drops to 153 percent if these 2 individuals were earning incomes at the 75th percentile. This suggests a possible narrowing of the income gap between the richest and poorest income groups in the country.

After estimating equation (1), the coefficient estimates were used to generate the complete age-income profile for each of the birth cohorts present in our sample. For example, Figure 1 below plots the predicted age-income profile for the median income groups for the C71-75 and C81-85 birth cohorts. Income can be seen peaking at around the age of 60, 5 years older than that of a Singaporean worker as reported in Abeysinghe and Gu (2011).

**Figure 1**: Age-income profile for selected birth cohorts (median quantile)
After adding total savings, $T_s_{a-1}$, to the discounted present value of the expected household income when the head of household ages from age $a$ to $A$ (i.e., from age 30 to 60) for the respective birth cohorts, we then obtain the expected lifetime incomes associated with each of the years of birth from 1933 to 1993. Figure 2 below plots the expected lifetime incomes according to the year of birth of the household head for the four income percentiles considered in this study. As seen in Figure 2, while all income percentiles have experienced an increase in income levels, the 75th income percentile has seen the sharpest increase with the income gap widening from the rest of the income groups.

Figure 2: Expected lifetime incomes by birth year of household head at different income percentiles
Malaysian House Prices

Figure 3 below plots the time series of the average real house prices from 1995 to 2014 according to the four housing types in Malaysia: high-rise, terrace, semi-detached and detached. High-rise and terrace are the cheapest housing types with the semi-detached and detached housing significantly costlier. Evidently, while house price increases were gradual from 1995 to 2010, the price levels for all housing types sharply increased after 2010. The compound annual growth rate (CAGR) of average house prices for the 2000-2008 period was 2.94 percent. In the 2009-2015 period, the CAGR grew to 8.06 percent. This amounts to almost a fourfold increase in this a short span of time. High-rise dwellings recorded the highest CAGR rise of 9.60 percent for the 2009-2015 period, much larger than the 2.21 percent recorded for the 2000-2008 period.

Figure 3: Time series plot of average real house prices according to housing types, 1995 to 2014
Malaysian Housing Affordability Index

Figure 4 plots the time series of the HAI from 1995 to 2014 by income percentiles for the four housing types computed for the 30-year-old age-group (i.e., $a = 30$, and $t = 1995, 1996, \ldots, 2014$ in equation (4)). The horizontal line in each of the plots in Figure 4 represents the cut-off value at 3; housing types with HAI values above this line represent affordable housing. For all income percentiles, an inverted U-shape curve can be seen for the four housing types. Housing affordability improved in the late 1990s, remained relatively stagnant in the decade after the millennium, and subsequently deteriorated after 2010. Therefore, despite government efforts put in place to address the housing affordability issue, affordability has actually worsened since 2010. In particular, the affordability for high-rise housing has taken the worst hit; its HAI has suffered the steepest decline among all housing types since 2010.

Housing affordability is bleak for the 30-year-old homebuyers at the 25th income percentile, as all housing types are considered unaffordable for them throughout the two
The further decline in the HAI values for all housing types after 2010 reflects further hardship for these homebuyers in affording a house. Regarding the 30-year-old homebuyers at the 40th income percentile, the higher end properties have remained out of their reach over the last two decades. While the terrace and high-rise housing units have remained affordable for them for majority of the observation period, these two housing types have become unaffordable for them in recent years. Specifically, the HAI values for terrace and high-rise housing have dropped to 2.74 and 2.46, respectively, in 2014.

The housing affordability scenario for 30-year-old homebuyers at the median income level is similar to those at the 40th income percentile; the higher end properties have remained unaffordable throughout the observation period and the high-rise housing has been unaffordable since 2014 (HAI = 2.92). The silver lining for these median income earners is that terrace housing is still within their affordable range with an HAI value of 3.26 in 2014. However, given the downward trend in the HAI for this housing type, it may not be too long before terrace housing is also considered unaffordable for the 30-year-old median income earners.

The 30-year-old homebuyers in the highest income quartile enjoy the largest buffer in terms of housing affordability with HAI values of high-rise and terrace housing averaging at more than 6 for the whole observation period. Semi-detached and detached housing are also considered affordable for them for most of the observation period with the HAI values for these two housing types averaging at approximately 3.4. However, it should be noted that detached housing has been at unaffordable levels since 2013 with the HAI value reaching 2.87 in 2013 and dropping further to 2.77 in
2014. However, the semi-detached housing, while increasingly unaffordable in recent years, is still considered marginally affordable with the HAI value dropping to 3.07 in 2014. The respective HAI values of 2.77 and 3.07 for detached and semi-detached housing in 2014 are the lowest HAI values for the observation period. In other words, these two housing types are currently at their most unaffordable levels for 30-year-old homebuyers.

Figure 4: The HAI of the four housing types for the 30-year-old age group at different income percentiles
Malaysian Mortgage Affordability Index

Figure 5 plots the time series of the MAI from 1995 to 2014 by income percentiles for the four housing types computed for the 30-year-old age-group (i.e., \( a = 30 \), and \( t = 1995, 1996, ..., 2014 \) in equation (5)). The horizontal line in each of the plots in Figure 5 represents the cut-off value at 3, whereby housing types with MAI values above this line represent affordable housing.

The MAI results are generally similar to those of the HAI with all plots displaying the same inverted U-shaped pattern and the 30-year-old homebuyers at the 25th income percentile still being unable to afford all four housing types. The MAI values are also slightly larger than their corresponding HAI values, indicating that housing is considered marginally more affordable on the basis of the MAI. The key differences in results between the HAI and MAI are as follows:

- For the 30-year-old homebuyers at the 40th income percentile, the HAI values indicate that both terrace and high-rise housing are unaffordable. However, based on the MAI, the terrace housing is only marginally unaffordable, with an MAI value of 2.98 in 2014 compared to its corresponding HAI value of 2.74.
- For the 30-year-old homebuyers at the median income level, the HAI values indicate that only terrace housing is considered affordable in 2014. By contrast, the MAI values for both the terrace and high-rise housing rate them both as affordable, albeit on the downward trend for these values.

Figure 5: The MAI of the four housing types for the 30-year-old age group at different income percentiles
Policy Implications and Proposed Recommendations

Several policy implications can be gleaned from these results. Despite numerous measures undertaken by the Malaysian government to alleviate the housing affordability problem, especially for low- and medium-income households, as discussed in the introduction, there has been no significant improvement in access to affordable housing among these targeted groups (Ho, 2017). Although the prior literature has suggested numerous policy measures and recommendations, the majority were developed for housing markets in developed countries. Although useful to an extent, the development of recommendations in a contextual environment is also imperative to advancing our
understanding of what policy recommendations can work for a developing country such as Malaysia. The clamor for workable solutions is all the more imperative when current measures are either piecemeal or lack effective implementation and coordination within different levels of government (The Star, 2013c).

*Increasing the Timeliness and Availability of Housing, Rental, and Income Data*

As in many developing countries, timeliness and the availability of housing and income data is a problem. Although data collection methods have improved, they are still not comparable to the quality available to researchers in developed countries. The Malaysian government has embarked on the MyHome Exchange initiative, which will be a comprehensive database to track the completion status of ongoing housing projects and will provide a better picture of housing demand and supply in the country (Ahmad, 2014). However, information on its progress and availability has been lacking for researchers. What we envisage is that rather than only tracking the status of ongoing housing developments, the database should encompass comprehensive information about existing completed housing projects with information at the transaction level that will enable the development of superior housing indices such as the S&P Corelogic Case-Shiller Home Price Indices.\(^\text{18}\) In terms of timeliness, we envisage that house price indices be updated at a higher frequency. Currently, the Malaysian house price indices and average house prices are updated with at least a half-year lag. A quarterly lag frequency would improve the timeliness of data, giving house buyers valuable information when making a home purchase decision. Such frequency would be on par

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\(^{18}\)The Case-Shiller house price indices are developed based on data on repeat sales of single-family homes. They allow the tracking of the price trend of the same representative single-family home over time and are deemed to provide better representation of house prices trends compared to indices developed using transactional data without the identification of repeat sales.
with house price indices updates from Singapore’s Urban Redevelopment Authority (URA).\textsuperscript{19}

The lifetime income measure of housing affordability requires timely household income data. Currently, the DOSM conducts household income surveys in two-year intervals. Data timeliness could be further enhanced if the survey was conducted on an annual basis. A good example would be the Household, Income, and Labor Dynamics survey (HILDA) conducted by the Melbourne Institute in Australia.\textsuperscript{20} The advantage of HILDA stems from the fact that it surveys the same households and individuals repeatedly on an annual basis. This type of dataset provides researchers a wealth of information and enhances their ability to engage in various streams of research focusing either on individuals within the household or the household itself. Barring any financial constraints, the Malaysian government, through its DOSM, would benefit from conducting such a survey with a quick turnaround time of the survey results. This type of survey would enable researchers interested in conducting studies on households to enhance the reliability of their research, as the longitudinal nature of such surveys ameliorates the disadvantages of using survey data that are predominantly cross-sectional in nature (Bentley et al., 2011).

The call to develop a vibrant rental market would require the development of a rental index to track the trend of rentals for the country and across states. A rental index would allow households seeking to rent to have the necessary decision-making

\textsuperscript{19}URA releases a flash estimate of the prior quarter’s private residential property price index on the first workday of the first week in the first month of the following quarter. It then releases the finalized index in the final week of the first month of the following quarter.

\textsuperscript{20}Several studies have utilized successive annual waves of HILDA to gauge the effects of housing affordability or the lack thereof and changes in housing affordability. See Bentley, Baker and Mason (2012) and Bentley et al. (2011).
information before committing to a rental contract. Again, the private residential rental index provided by Singapore’s URA would be a suitable example to follow.

*Development of a Vibrant Rental Market*

As the results have revealed that housing affordability has not improved but declined in recent years, we recommend that households whose incomes preclude them from owning a home enter the rental market rather than going through the undue stress of owning a home. In its annual report, BNM has emphasized the need for the development of a rental market for two consecutive years (2015 and 2016). However, the issue with renting is the social stigma attached to it. Renting is seen as a last resort of households as they strive to secure a high value physical asset. Many countries with severe unaffordable housing have a thriving rental market. They also tend to be developed countries.\(^{21}\) The Malaysian government should accord equal status to the rental market in terms of policymaking. Households moving into the rental market can lead to a flexible workforce, which would lead to increased mobility with better career advancement prospects.

One way of developing the rental market would be the establishment of a private real estate investment trust (REIT), which would consist of both commercial and residential properties as part of its property portfolio (Phang et al., 2014). Malaysia currently has 18 listed REITs on Bursa Malaysia (Malaysia’s stock market). The property portfolios of these REITs consist exclusively of retail, industrial, and

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\(^{21}\)BNM (2015) highlights the high percentage of renters in countries where housing has been unaffordable. These countries are mostly developed countries (e.g. Switzerland (56 percent renting), Germany (48 percent), and the U.S. (37 percent)).
commercial properties.\textsuperscript{22} This proposal would allow federal and state government agencies and government-linked firms to be tasked with the provision of affordable housing by selling a proportion of the completed units to the residential REIT for rental purposes. The residential REIT would become an active participant in the affordable housing sector by offering rental and leaseback initiatives. Shares in the residential REIT could be sold to EPF members who would pay for the shares using their statutory contributions.\textsuperscript{23} A federal or state government-linked firm would be appointed as the REIT’s manager with the authority to impose some form of rent control structure to decouple rent increases from market forces. There are several advantages in establishing a residential REIT.

First, a residential REIT will provide further diversification of the property portfolio of its unit holders, as it will comprise of both commercial and residential properties. Malaysia’s commercial property vacancy rate is 10.8 percent, which is higher than the regional average of 6.6 percent and is deemed by BNM to be unsustainable (The Star, 2017a). This is perplexing for current REIT investors, as commercial property constitutes a sizeable proportion of the property portfolio of all listed REITs. Second, a residential REIT with lower rentals will create rental take-up opportunities, especially for lower- and middle-income households. This progressive development will lead to downward pressure on rents in the private market that should reduce both foreign and local investment demand. Third, the tax-free rental income received by the residential

\textsuperscript{22}http://www.malaysiastock.biz/Listed-Companies.aspx?type=C&value=REITs (Accessed on 8 August 2017)

\textsuperscript{23}The EPF is a statutory body established by an Act of Parliament to manage the contributions to the fund from private and non-pensionable public-sector employees. The EPF currently allows its members to withdraw part of their contributions to invest in mutual funds on the condition that should the investment be liquidated before a member’s retirement age, the returns of the investment and the principal will be credited back into the member’s contribution account.
REIT will enhance the returns received by EPF contributors. The tax regime in Malaysia states that if an REIT returns 90 percent of its total yearly income to unit holders, the REIT will be exempt from tax for that year of assessment. Income distributed to unit holders is taxed at a final withholding tax rate of 10 percent, which is an advantage for those in the high-income tax bracket.\footnote{The maximum tax rate for an individual is 28 percent.} REITs are also exempted from paying stamp duties, which can amount to a maximum of 3 percent of the purchase price of a property. When REITs divest their properties, they are also exempted from paying real property gains tax (RPGT) where the maximum is 30 percent.

*Establishment of a Single Entity to Provide Affordable Housing*

The current policy of leaving the provision of affordable housing to market forces has not reduced the mismatch between demand and supply. The public-private partnership in developing affordable housing has also not borne much fruit (Abdul-Aziz and Jahn Kassim, 2011; Agus, 2002). The imposition of the “cross-subsidization” policy by the Malaysian government has led to developers building luxury housing in prime locations while building the mandatory low-cost housing imposed by the policy on land plots located far from the city-center, subsequently burdening low-income households as transportation costs rise. The private sector has shown little interest in alleviating the mismatch between the demand and supply of affordable housing. A major reason for this mismatch is the difference in perception between what is deemed affordable by the private sector and by the households. Based on our results, a clearer picture has emerged of what is deemed to be affordable from a lifetime income perspective. The notion that housing costing up to RM500,000 is deemed affordable from the perspective
of the private sector is perplexing to say the least (The Star, 2017b). Statistics have shown that less than 30 percent of new housing launched in 2015 and 2016 were priced below RM250,000 compared to 70 percent during the 2008 and 2009 (Ho, 2017).

As there is little interest or effort on the part of the private sector to increase the supply of affordable housing, the idea of establishing a single entity entirely focused on affordable housing could be the way forward to alleviate the mismatch between affordable housing demand and supply. This measure has been undertaken by South Korea and Singapore through the formation of the Land and Housing Corporation and the HDB in these countries, respectively. This type of entity would coordinate efforts at all levels of government and handle the delivery of affordable housing through the initial steps of land acquisition, planning approvals, and construction and continue through to housing finance. The formation of this entity would then eliminate the need to be wholly dependent on the private sector for the provision of affordable housing. Furthermore, this entity would absorb all ongoing efforts undertaken by all levels of government to ensure a coherent and coordinated effort to increase timeliness in the delivery of affordable housing. Researchers have touted Singapore’s model as a solution for the Australian government to adopt in light of the decline in house ownership among younger Australians, which may lead to future pressures on government pension schemes given that housing equity is indirectly considered the fourth pillar of retirement savings (McLaren, Yeo and Sweet, 2016).

Unlike PR1MA, which engages the private sector in partnership for actual construction, the proposed entity would instead carry out the actual construction directly. That would mean competing with the private sector for construction labor and
other necessary expertise. Much of the labor supply in the construction sector in Malaysia is provided by foreign labor. The Malaysian Immigration Department reported that the number of foreign laborers employed in the construction sector has increased significantly from 68,226 in 2000 to 433,133 as of March 2013.

Competing with the private sector for construction labor would require the entity to provide (i) suitable housing for those workers complete with comfortable living amenities,\(^{25}\) (ii) competitive salaries on par or better than those offered by the private sector,\(^{26}\) (iii) long-term contracts (7-10 years) to ensure low turnover of experienced workers and arranged transport to and from the construction site, and (iv) proper medical care. A ready pool of legitimately employed foreign construction workers would also set the right example for the private sector, pressuring them to register their foreign labor and thus ameliorate the negative effects of unregistered illegal foreign labor in the country (Kong, 2017).\(^{27}\)

The ease of obtaining suitable land for the construction of affordable housing needs support from all levels of government. There have been cases in which government ministries and their agencies have suitable parcels of land but have been reluctant to part with them (Saieed, 2016).\(^{28}\) For the proposed entity to meet the social

\(^{25}\)An initiative has been launched by the state government of Penang to build workers’ dormitories to house foreign workers. While the concept has long been practiced in neighboring Singapore, it has yet to take root on a large scale in Malaysia. Singapore’s Building and Construction Authority (BCA) conducts multiple checks per month on the dormitories. Penalties, including fines of up to SGD10,000 and 12-month jail terms, can be imposed on errant employers who do not provide acceptable housing.

\(^{26}\)Competitive salaries here would also mean salary increases commensurate with increases in annual inflation so as to ensure no reduction in purchasing power.

\(^{27}\)It is estimated that one in every two foreign workers in Malaysia is an illegal worker.

\(^{28}\)This has been the problem plaguing PR1MA. The process of releasing land to PR1MA for the construction of affordable housing has been long and arduous. It has resulted in complaints that PR1MA is too slow in supplying affordable housing in sufficient quantities to close the mismatch between demand and supply.
needs of affordable housing, this long-standing issue of reluctance to part with prime land needs to be resolved holistically through interventions by the upper echelons of government in a top-down directive. Indeed, the Malaysian government has recently warmed to the idea of establishing a single entity to govern the property market (Idris and Zainul, 2017).

Reforming the Land Acquisition Act to Support an Affordable Housing Supply

The price of available land is a key factor affecting house prices, as the private housing developer would have procured land before construction commences. Land prices in Malaysia have increased significantly, leading to a cost pass-through to house buyers (Ong, 2013). A government that seeks to increase the supply of affordable housing needs to either release land from its own landbank for affordable housing or acquire land for this specific purpose.

The government can acquire land by invoking the Land Acquisition Act. Compensation for the land will be determined by the Land Administrator. Dissatisfied landowners can seek a judicial review by submitting land valuation reports and supporting affidavits to support their claims for rightful compensation. Normally, the measure of compensation is based on the market value of the acquired land. However, the government should reform the Land Acquisition Act by tying land value to a certain date when acquiring land for public purposes. There should be no reason for private landowners to benefit from an increase in land value brought about by economic development and infrastructure financed with public funds (Lee, 2006), such as the building of a new road nearby or the construction of a major transportation hub. The

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29The Land Acquisition Act of 1960 allows the government to acquire land from private landowners that is needed for public purposes or for a purpose beneficial to the economic development of Malaysia.
base valuation year can be adjusted over time using a measure of prosperity such as the gross domestic product (GDP).

The government must adopt these drastic measures to ensure that land prices do not spiral out of control. The control of land costs is all the more urgent due to recent massive public investments in transportation improvement through the scheduled construction of the East Coast Rail Line (ECRL) project, estimated to cost RM55 billion, and the Kuala Lumpur-Singapore High Speed Rail (HSR). These major investments in public transportation will surely increase the value of land adjacent to these rail lines and will indirectly increase the cost of housing through the pass-through effect.

Reforming Land Taxes

State governments in Malaysia have the final say in land matters and should therefore impose higher taxes on the value of land. Land taxes are difficult to dodge since land is immovable. While higher taxes on property can discourage investment, a high tax on land creates an incentive to develop idle land. As new public infrastructure increases the value of nearby land, it automatically increases the taxes payable, which will help pay for the said public infrastructure (The Economist, 2015). Stiglitz (2015) argued that the most important basis of disparity between growth of wealth and growth of productive capital is land where much of the increase in wealth stems from rising land values and not from any increase in the amount of land (essentially the productive capacity of the economy as a whole). Such disparities should then be addressed through proper taxation.

Building the Right Dwelling Type
The results clearly show that housing affordability is dependent on dwelling type. Terrace and high-rise housing are the most affordable, especially for households in the 40th percentile and median income range. However, those housing types still remain out of reach for the 25th income percentile bracket. Policies to incentivize terrace and high-rise developments and policies to discourage semi-detached and detached developments should be enacted. These types of policies, such as development taxes that are progressive and discriminate based on the ratio of dwelling to land size, would eventually encourage the private sector to focus on building the appropriate dwelling type that meets the needs of the segment of the population in need of affordable housing.

Glaeser (2011) argued that the bias towards homeownership in the U.S. has led to the proliferation of the supply of single-family detached homes. Such homes are generally larger and consume more energy than smaller rental dwellings. This is not helped by local zoning rules that prohibit high-density and multiunit dwellings. Further research has indicated that many of these single-family detached homes are located in suburbs, which doubles a household’s travelling distance to the central business district (Glaeser and Kahn, 2010). As such, encouraging people to move to a less centralized location with a lower density only encourages increased energy usage coupled with increased commute costs. Such policies should be avoided by the Malaysian government.

Converting Commercial Property for Residential Use

In view of the current and impending oversupply of commercial properties in Malaysia, policies should be put in place to allow for the conversion of older commercial
properties to residential use specifically targeted at affordable housing or rental housing. The vacancy rates of commercial property in Malaysia stand at 16.3 percent as of 2015, which is more than double the regional average of 6.6 percent. With a significant incoming supply of large projects, this vacancy rate would aggravate the current oversupply situation in commercial property experienced in major urban areas (BNM, 2015).

In an oversupply situation, older commercial properties are at risk of losing out to newer developments and thus would either need to refurbish to compete or run the increased risk of dilapidation and lower future rentals. Conversion to a residential property could prolong the lifespan of older commercial properties. Conversions play an essential role in the revitalization process in a neighborhood and help to alleviate the growing pressure for residential accommodation (Heath, 2001). Although there are technical challenges in the conversion process, adopting conversion-friendly policies can encourage the frequency of conversions.30

Urban redevelopment to ensure efficient use of land through en bloc sales

Much of the urban landscape in Malaysia has been developed such that land for further development is now a scarce resource (The Economist, 2015). The private sector has long complained that escalating land costs are one of the reasons for rising house prices, as these costs are passed on to house buyers (The Star, 2016a). One

30There have been multiple success stories. Heath (2001) has documented evidence of successful conversions of older commercial properties in both London and Toronto. Remoy and Wilkinson (2015) have listed successful adaptive reuse of commercial properties in Sydney. There was also increased conversion activity in Tokyo after the office market collapse in 2002-2003 (Ogawa et al., 2007)
A proposal to alleviate such problems would be to implement the possibility of en bloc sales.\textsuperscript{31}

En bloc sales allow older buildings to be torn down and redeveloped, ensuring sustained economic growth. Owners are able to obtain a higher price for the individual units by selling them collectively. Two city-states at the forefront of en bloc sales are Singapore, which introduced them in 1999, and Hong Kong, which adopted them in the 1990s. The proposal to introduce en bloc sales in Malaysia could help increase the supply of affordable housing by increasing the density of the replacement building. The current issue limiting building sales in Malaysia is that a single holdout can stop an en bloc sale. Other potential issues that may arise include the possible violation of Article 13 of the Federal Constitution.\textsuperscript{32} Furthermore, issues related to the Strata Titles Act (1985) need to be resolved before such changes can be made.\textsuperscript{33} The mechanics of a successful en bloc sale has been extensively researched by Low (1999).\textsuperscript{34}

Reinforcing the Opportunities Presented by the Various Malaysian Economic Corridors

The five Malaysian Economic Corridors initiated in the 9th Malaysian Plan were established to bridge development imbalances throughout the country by promoting free trade and business incentives. The five Economic Corridors are the Iskandar Regional Development Authority (IRDA) in southern Johore, the Northern Corridor Economic Region (NCER), the East Coast Economic Region (ECER), the Sabah Development

\textsuperscript{31}En bloc sales are agreements of sale by the majority of owners in a building to sell the entire building block for redevelopment, effectively denying the possibility of holdouts by dissenting minority owners (Tan, 2014).

\textsuperscript{32}Article 13 states that (a) No person shall be deprived of property save in accordance with law and (b) No law shall provide for the compulsory acquisition or use of property without adequate compensation.

\textsuperscript{33}The existence of single-unit strata needs to be terminated before the redevelopment of the site by the management corporation in order to sell all units under one owner to the redeveloper.

\textsuperscript{34}We do not elaborate on the mechanics of managing a successful en bloc sale, as this is already extensively discussed in Low (1999) and Tan (2014).
Corridor (SDC), and the Sarawak Corridor of Renewable Energy (SCORE). Each economic corridor has its own sectoral focus promoting investment ranging from the agricultural sector to the marine engineering industry.\textsuperscript{35}

Notwithstanding the success in attracting investments (Ali, 2017) to the various economic corridors, much of the emphasis by the federal government has been on providing investment incentives, making land affordable through coordination with the various state governments that have the final say on land matters, and leaving much of the infrastructure development to the private sector. Infrastructure development by the private sector in these economic corridors increases the cost of investing and thus is a divergence from the earlier free trade zone models that were successful in attracting foreign direct investment, which had spillover effects in terms of developing various townships surrounding these free zones.

Therefore, the federal government, in tandem with cooperation from state governments, should endeavor to provide basic infrastructure, such as access roads and transport amenities to and from urban centers and port facilities, in order to ensure the unqualified success of these economic corridors. This would reduce the need for the private sector to provide such amenities, subsequently reducing the cost of investment. Furthermore, affordable housing can be built within the vicinity of points of congregation in these corridors, which will ease the pressures on demand for affordable housing in urban areas. Land would be cheaper to acquire, and the building of affordable housing in these areas would bring about an urban-rural migration. When this happens, an impetus would be provided for potential investors, as these economic corridors have a

\textsuperscript{35}The detailed investment incentives are listed on the following website: http://www.mycorridor.malaysia.gov.my/OI/Pages/Investment-Incentives.aspx
stable and educated workforce coupled with proper basic infrastructure amenities that would indirectly lower the cost of investment. Having these basic infrastructure amenities in place would bring greater workforce mobility.

**Limitations and Possibilities for Future Research**

We identify several limitations of this paper and indicate our thoughts on future research. First, the use of a single data point based on the 2009/2010 HES to calculate the savings rate may not provide the correct level of savings over time. Abeysinghe and Gu (2011) use several surveys to generate the time series variation in the savings rate. Our use of a single data point is due to the lack of data availability and thus could bias the calculation of wealth (age 25-29) before a house purchase is made at the assumed age of 30 years. Further work could be conducted through the analysis of surveys conducted in other periods by the DOSM, and a time series could be developed for the savings rate.

Second, this paper uses the statistics of average house prices across Malaysia as a whole. Although data are broken down into various dwelling types, further research could be done to analyze the data in greater granular detail by focusing on average dwelling prices within the individual states in Malaysia to further pinpoint the hotspots of unaffordable housing. This analysis would allow the Malaysian government to develop strategic policies to rebalance development through the various economic corridors with the building of affordable housing based on the lifetime income model.

Third, the mechanics of federal government and state government coordination needs further research, as all levels of government agreement need to be in sync to ensure that the provision of affordable housing is successful. Comparisons among the
different governance mechanics in other countries and how these can be applied to the scenario in Malaysia need to be further explored. Only by incorporating the success factors adopted in the other countries can Malaysia ameliorate the longstanding problem of affordable housing in a more holistic manner.

Conclusion

This paper adopts a lifetime income approach to measure housing affordability over time and across age cohorts in Malaysia. Our definition of housing affordability is two-fold. The first definition is purchase affordability measured by the HAI; the other is repayment affordability measured by the MAI. In the MAI model, we assumed that the down payment would not be an issue for the house buyer, as inferred from the intergenerational transfers literature. The findings indicate that housing affordability had improved from the start of the sample period to 2009. However, in the aftermath of the Global Financial Crisis, housing affordability has been on a steady decline. For those in the 25th income percentile range, all dwelling types have remained unaffordable over the sample period. As such, these households are encouraged to go into the rental sector, on which the government needs to place more emphasis.

Housing affordability also declines as one moves up the value chain in terms of type of dwelling. While households at the 75th percentile can afford all dwelling types, only terraced and high-rise housing are affordable for households at the median income level and those households at the 40th income percentile for the majority of the sample period. Policy measures to encourage the construction of more of these dwelling types coupled with the reduction of the supply of detached and semi-detached dwellings would be one way to alleviate the housing affordability conundrum.
Lastly, we extensively listed general proposals to ameliorate the housing affordability problem in the contextual nature of a developing country such as Malaysia. This paper provides equal emphasis on policy measures that need to be implemented rather than merely documenting a housing affordability problem. The important test going forward would be how much effort the government of Malaysia will make in terms of manpower and finances to resolve the housing affordability problem.

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