Statistical Standard, Methodology and Application

Measuring Housing Affordability In An Emerging Market: The Lifetime Income Approach

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Outline

- Background
- Introduction
- Literature Review
- Methodology
- Results
- Policy Implications
- Conclusion

1. BACKGROUND

BACKGROUND

- **Strategic Thrust 2**: Improving wellbeing for all

- Providing adequate and quality affordable housing to poor, low- and middle-income households.

BACKGROUND

11th Malaysia Plan: "One House Per Household" By 2020

May 22, 2015 Home Loan, News Updates, Properties

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Written by Fiona Ho

Putrajaya has revealed plans to build 47,000 homes for poor households and 606,000 homes for low and middle-income earners under the 11th Malaysia Plan tabled by Prime Minister Najib Razak on May 21.

The "one house per household" pledge was part of its second core thrust to improve public welfare. It will be done through a three-pronged strategy, which will target specific groups

BACKGROUND

- Government measures include
  - Formation of a National Housing Council
  - Creation of 1Malaysia People's Housing Program (PR1MA)
  - My First Home Scheme
  - Subsidies for developers per unit of low-cost and medium-cost housing built

1.7 MILLION

HOUSEHOLDS

BACKGROUND

Homes just aren't that affordable, says Bank Negara

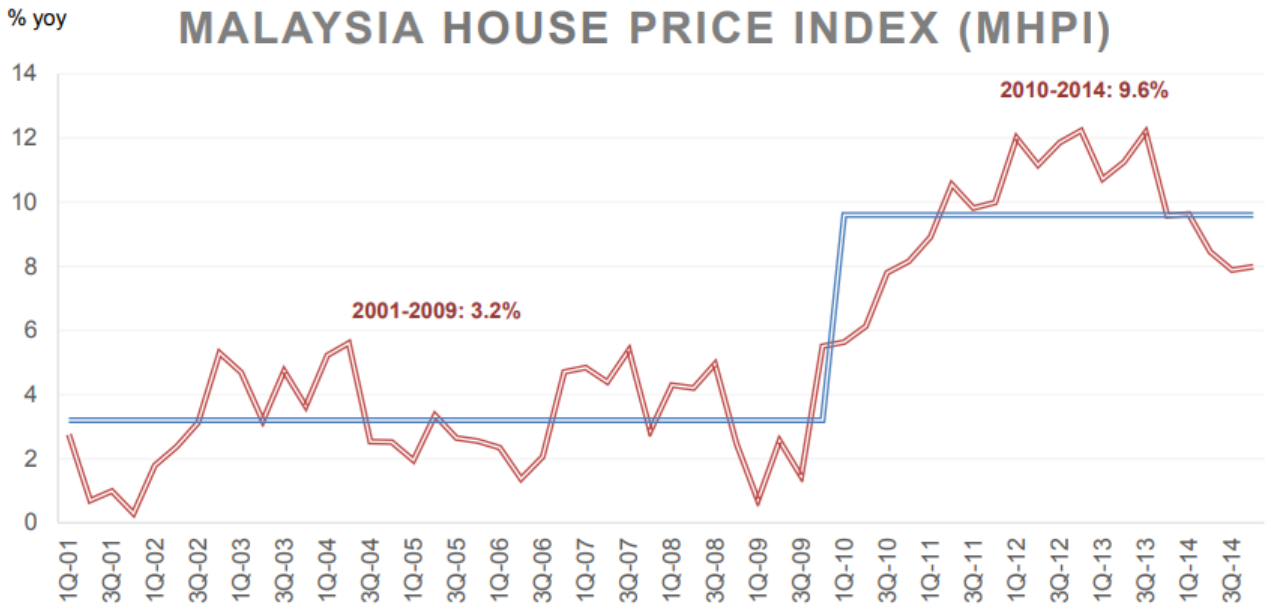
PROPERTY

Friday, 13 Oct 2017

Rising prices: A view of houses at Damansara Heights and its surrounding areas. The latest available data reveal that the median house price in Malaysia is 4.4 times the median annual household income.

BACKGROUND

House prices increased by 9.6% during 2010-2014, almost 3 times faster than the average increases during 2001-2009



Graph obtained from Cheah et al. (2016)
Data source: National Property Information Centre, NAPIC

BACKGROUND

- Continuous, steep ascent in house prices has also occurred without a structural break since mid-2009, implying the formation of a housing bubble (Yip, Wong and Woo 2016).

- Increases in household income have lagged behind house price increases, thus aggravating the housing affordability conundrum (Lee and Lye 2014; The Star 2014).

MEDIAN HOUSE PRICE

4.4X

MEDIAN ANNUAL HOUSEHOLD INCOME

SERIOUSLY UNAFFORDABLE

2. INTRODUCTION

- Median Multiple ratio

Median Multiple Approach: Affordability Thresholds

Rating	House Price-to-Income Ratio
Severely Unaffordable	5.1 & Above
Seriously Unaffordable	4.1 to 5.0
Moderately Unaffordable	3.1 to 4.0
Affordable	3.0 & Below

Source: Demographia International (2015), National Property Information Centre, Department of Statistics, Malaysia and Bank Negara Malaysia estimates

Diagram: Bank Negara Annual Report 2016

INTRODUCTION

- Median multiple ratio is a **short-term** housing affordability measure.

- Provides incomplete picture of housing affordability as it ignores the **long-term** affordability perspective.

INTRODUCTION

- Distinction between **short-term** and **long-term affordability** (Gans and King, 2004).

- Short-term affordability
  - –Concern households which may have sufficient lifetime income for a house purchase, but have short-term financing issues;

- Long-term affordability
  - – Concern households which have insufficient lifetime incomes to pay for a house.

INTRODUCTION

- Short and long term measures lead to **different policy approaches**.

- Quigley and Raphael (2004) expressed **concern over the use of annual incomes** in assessing affordability:

  "when housing affordability is measured by…ratios based on annual income… housing will appear to be less affordable for the very young and very old; it will appear to be more affordable to households at the peak of their lifetime income profiles" (p. 194)

- House purchases are a big expenditure for a household – any purchase decision is most likely to be made on the basis of one's **assessment of his permanent income** instead of current income.

INTRODUCTION

- Despite the shortcomings of short-term measures, measures of long-term housing affordability have **remained elusive** partly due to data constraints (Abeysinghe and Gu, 2011).

- Ideal assessment of long-term affordability is to compare house prices (a static point-in-time variable) to lifetime income (also a static point-in-time variable).

- There is currently **no measure** of long-term housing affordability in Malaysia.

INTRODUCTION

- This paper introduces the long-term **Housing Affordability Index (HAI)** and **Mortgage Affordability Index (MAI)** for Malaysia.
  - Indices by dwelling types; not a generic one.
  - Not just based on median incomes, but also for the 25th and 40th income percentiles.

INTRODUCTION

- Housing Affordability Index
  - –Improves upon current measures which primarily uses current incomes.
  - – Can be used by financial institutions to assess the eligibility of households for financing.

- Mortgage Affordability Index
  - –Accounts for intergenerational transfers from parents to their children in facilitating early entry into the housing market.
  - – Based on common practice in Malaysia whereby parents pay for the 10% upfront down payment cost, and leave the period mortgage repayment to their children (Chin, 2016).

3. LITERATURE REVIEW

LITERATURE REVIEW

Metric	Description	Advantages	Disadvantages
Price-to-income ratio (PIR) **(Paris 2007)** Purchasing Affordability Approach. **(Gan and Hill 2009)**	Housing Cost vs Median Disposable Income (Demographia International Housing Affordability Survey) Median multiple < 3 Affordable. If household can finance house with less than 3X their annual household income than it can be considered as affordable.	Easy to calculate, comprehensive, provide general macro view of the housing market and allow for cross-sectional comparison within country and across counties.	It ignores role of borrowing and distribution of household income.
Mortgage-to-income ratio (MIR) (**Chen, Hao and Stephens 2010**) (Expenditure-to-income ratio) Repayment Affordability Approach. **(Gan and Hill 2009)**	Ideally: The mortgage repayment should not be >30%-35% of monthly disposable income. Mortgage repayment >50% of monthly disposable income → severe cost burden. **(Bogdon and Can 1997)**	Simplicity in making standard tool to measure the housing affordability. **(Tan 2013)**	The mortgage repayment of 30%-35% rigid. If disposable income reduces, non-housing expenses have to reduced **(Stone 2006),** or the ratio must decrease accordingly **(Hulchanski 1995 and Thalmann 1999)** Cross-country comparison using 30%-35% not suitable due to differences in cost of living and structure of repayment. **(Cheah and Almeida 2016)**

Whitehead 1991 criticized PIR and MIR as inequitable because higher income household enjoy greater disposable income

LITERATURE REVIEW

Metric Measurement	Descriptive	Advantages	Disadvantages
Residual Income Approach (RIA) **(Stone 2006)**	Residual income available to support socially acceptable non-housing expenditures after accounting for housing expenditures. If the household's housing cost exceeds the minimum income necessary to support non-housing consumption → household is 'shelter poor'	Measure better reflects the ability of household to purchase a house. **(Cheah and Almeida, 2016)**	Lack of consensus to what is the optimum level of non-housing expenditures or deemed to be socially acceptable. **(Bogdon and Can 1997; Chen, Hao and Stephens 2010)**
Modified median multiple approach **(Gan and Hill 2009)**	Median multiple approach, but incorporate an affordability at risk measure. Operationalized by depicting the entire distribution of household income and house prices.	Differentiates between purchase and repayment affordability.	Requires distributional disaggregated micro-level data that may not be easily available.
Lifetime Income Approach **(Bohlmark and Lindquist 2006; Goodman and Kawai 1982)**	Long term housing affordability depends on lifetime income rather than current income. This approach compares the house price at static-in-time with lifetime income at a static-in-time.	Acknowledges that house purchase is based on assessment of one's lifetime income and not just current incomes.	Data not easily available for computation.

4. METHODOLOGY

METHODOLOGY - Overview

- We follow the methodology of Abeysinghe and Gu (2011) in computing the HAI.

- In essence, the HAI requires **2 inputs** in its calculations:

1. **Predicted lifetime income** of Malaysian households according to the year of birth of the head of household;

2. Malaysian **house prices**.

METHODOLOGY – Predicting the Lifetime Income of Households

- 3 essential steps:

1. Use available data to construct a **pseudo-panel dataset**;

2. Estimate a **panel regression model** and **predict annual incomes** of households as their heads of household age from 30 to 60;

3. Use an appropriate discount rate and **sum** these annual incomes together with the households' estimated accumulated savings to obtain **lifetime income**.

METHODOLOGY – Predicting the Lifetime Income of Households

- Data
  - **Household monthly income** data by age groups were obtained from the Department of Statistics Malaysia (DOSM).
    (Age groups refer to the age of the head of household).
  - Obtained incomes at the **25th, 40th, 50th and 75th percentiles**.
  - However, **survey was not conducted on an annual basis**: data only available for the following 9 survey years: 1995, 1997, 1999, 2002, 2004, 2007, 2009, 2012 and 2014.

METHODOLOGY – Predicting the Lifetime Income of Households

- Original income dataset

	1995	1997	1999	2002	2004	2007	2009	2012	2014
20-24									
25-29									
30-34									
35-39									
40-44									
45-49									
50-54									
55-59									
60-64									

METHODOLOGY – Predicting the Lifetime Income of Households

- Augmenting the income dataset

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
20-24																				
25-29																				
30-34																				
35-39																				
40-44																				
45-49																				
50-54																				
55-59																				
60-64																				

METHODOLOGY – Predicting the Lifetime Income of Households

- A **proper panel dataset** would have been ideal in predicting lifetime incomes.
- However, this is not possible as the **same household is not tracked over time**.
- Instead, we construct a **pseudo-panel** from the augmented income dataset, whereby we track the age-income profile of **birth cohorts**.

METHODOLOGY – Predicting the Lifetime Income of Households

- Construct pseudo-panel; Create **Cohort** and **Age** variables. For example, for the 20-24 age group:

1	2	3	4	5	6	7	8	9
Year	Age Range	Year of Birth (Upper value)	Year of Birth (Lower value)	Mid-Year	Cohort	Mid-Year of Cohort	Age	Income
1995	20-24	1975	1971	1973	C7175	1973	22	
1996	20-24	1976	1972	1974	C7175	1973	23	
1997	20-24	1977	1973	1975	C7175	1973	24	
1998	20-24	1978	1974	1976	C7680	1978	20	
1999	20-24	1979	1975	1977	C7680	1978	21	
2000	20-24	1980	1976	1978	C7680	1978	22	
2001	20-24	1981	1977	1979	C7680	1978	23	
2002	20-24	1982	1978	1980	C7680	1978	24	
2003	20-24	1983	1979	1981	C8185	1983	20	
2004	20-24	1984	1980	1982	C8185	1983	21	
2005	20-24	1985	1981	1983	C8185	1983	22	
2006	20-24	1986	1982	1984	C8185	1983	23	
2007	20-24	1987	1983	1985	C8185	1983	24	
2008	20-24	1988	1984	1986	C8690	1988	20	
2009	20-24	1989	1985	1987	C8690	1988	21	
2010	20-24	1990	1986	1988	C8690	1988	22	
2011	20-24	1991	1987	1989	C8690	1988	23	
2012	20-24	1992	1988	1990	C8690	1988	24	
2013	20-24	1993	1989	1991	C9195	1993	20	
2014	20-24	1994	1990	1992	C9195	1993	21	

METHODOLOGY – Predicting the Lifetime Income of Households

- With the pseudo panel, we can (partially) track the age-income profile of cohorts. For example, for the C81-85 cohort:

Year	Age Range	Year of Birth (Upper value)	Year of Birth (Lower value)	Mid-year	Cohort	Age	Income
2003	20-24	1983	1979	1981	C8185	20	
2004	20-24	1984	1980	1982	C8185	21	
2005	20-24	1985	1981	1983	C8185	22	
2006	20-24	1986	1982	1984	C8185	23	
2007	20-24	1987	1983	1985	C8185	24	
2008	25-29	1983	1979	1981	C8185	25	
2009	25-29	1984	1980	1982	C8185	26	
2010	25-29	1985	1981	1983	C8185	27	
2011	25-29	1986	1982	1984	C8185	28	
2012	25-29	1987	1983	1985	C8185	29	
2013	30-34	1983	1979	1981	C8185	30	
2014	30-34	1984	1980	1982	C8185	31	

METHODOLOGY – Predicting the Lifetime Income of Households

- Estimate the following regression model:

$$logY_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \sum_{j=1}^{J} \alpha_j Cohort_j + \varepsilon_{it} \quad (1)$$

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),

$j = 1, 2, \ldots, 13$ (representing the thirteen birth cohorts present in our sample).

METHODOLOGY – Predicting the Lifetime Income of Households

- Y: **real** monthly incomes (base year = 2010);
- Age: age of the head of household corresponding to age group i in time period t.
- $Cohort$: dummy variables representing the 13 birth cohorts ranging from C31-35 to C91-95 present in our sample.

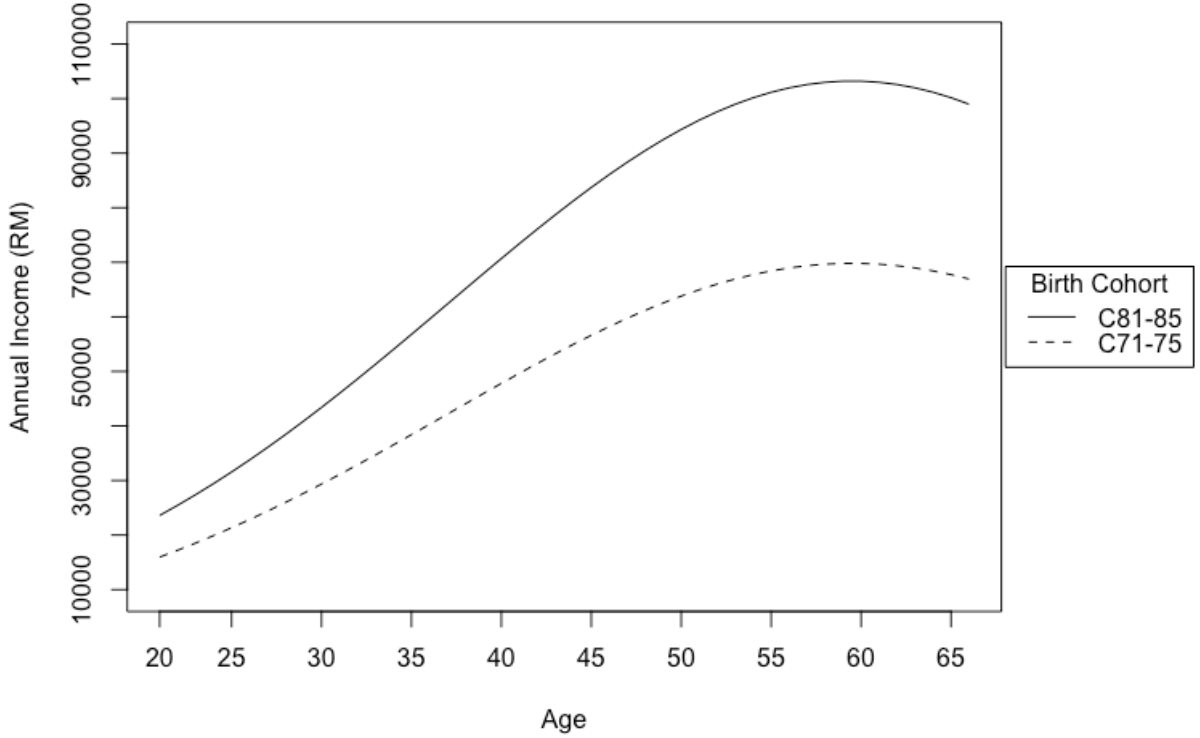
METHODOLOGY – Predicting the Lifetime Income of Households

- After estimating eqn (1), use coefficient estimates 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.

- We thus have a complete age-income profile for each birth cohort (which are in 5-year intervals).

METHODOLOGY – Predicting the Lifetime Income of Households

Figure 1: Age-income profile for selected birth cohorts (median income)



METHODOLOGY – Predicting the Lifetime Income of Households

- The lifetime income for each birth cohort is calculated :

$$W_{a,j} = \sum_{i=a}^{A} \frac{\widehat{Y}_i}{(1+r)^{i-a}} + TS_{a-1} \qquad (2)$$

$W_{a,j}$: expected lifetime income for a household whose head of household is of age a and born in birth cohort j ;

$\widehat{Y}_i$: predicted annual household income when the head of household is of age i;

r : discount rate;

TS_{a-1} : total savings accumulated by the household when the head of household is of age $a-1$

METHODOLOGY – Predicting the Lifetime Income of Households

- The lifetime income for each birth cohort is calculated :

$$W_{a,j} = \sum_{i=a}^{A} \frac{\widehat{Y}_i}{(1+r)^{i-a}} + TS_{a-1} \qquad (2)$$

Discounted present value of the expected household income when the head of household ages from age *a* to *A*.

a = 30

A = 60

r = 0.085

METHODOLOGY – Predicting the Lifetime Income of Households

- The lifetime income for each birth cohort is calculated :

$$W_{a,j} = \sum_{i=a}^{A} \frac{\widehat{Y}_i}{(1+r)^{i-a}} + TS_{a-1} \qquad (2)$$

Total savings accumulated by the household when the head of household is of age $a-1$

METHODOLOGY – Predicting the Lifetime Income of Households

- Assuming that one starts saving at the age of 25 in the Malaysian context, and $a = 30$,

$$TS_{29} = \sum_{i=25}^{29} (1 + r_s)^{29-i} S_i \qquad (3)$$

r_s: interest rate for savings;

S_i: amount of household savings when the head of household is of age i.

METHODOLOGY – Predicting the Lifetime Income of Households

- The amount of household savings when the head of household is of age i, S_i, is calculated by:

$$S_i = \widehat{Y}_i s_i$$

where

$\widehat{Y}_i$: predicted household income when the head of household is of age i (obtained from equation (1));

s_i: savings rate for $i = 25, 26, \ldots, 29$.

METHODOLOGY – Predicting the Lifetime Income of Households

- Based on this lifetime income formula:

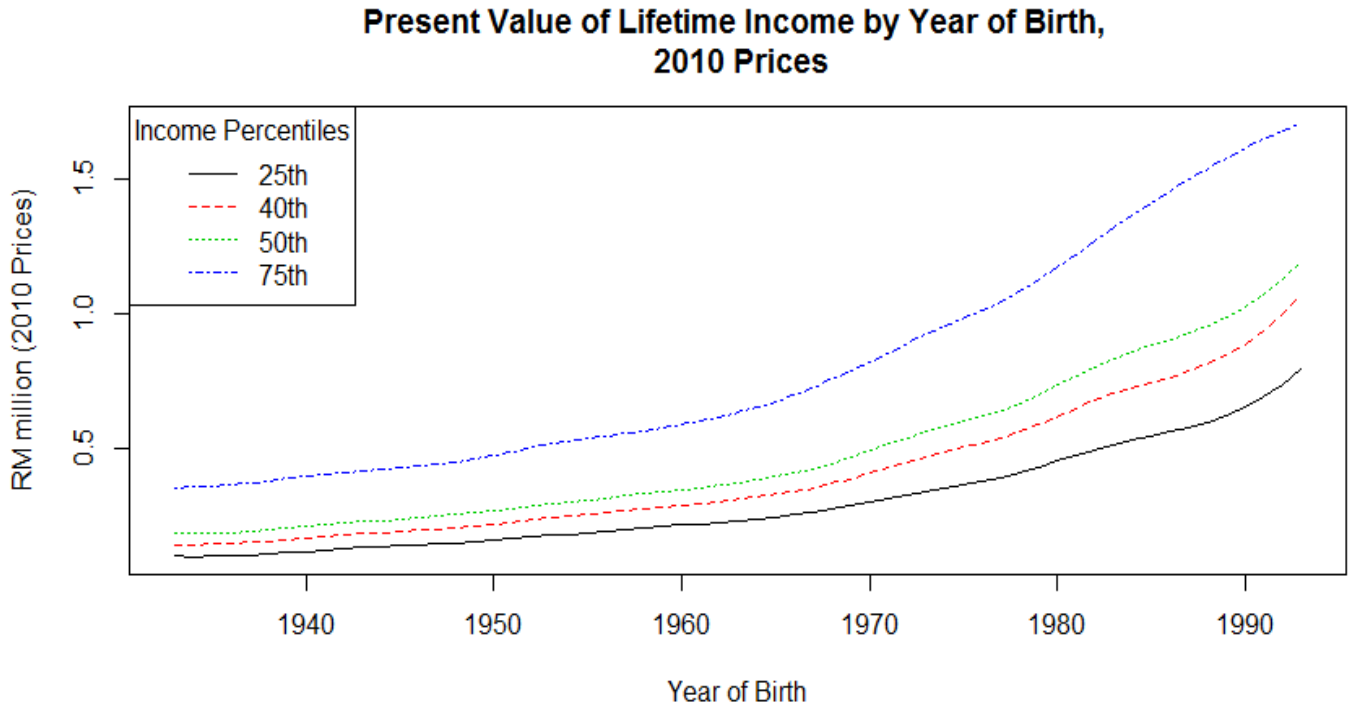
$$W_{a,j} = \sum_{i=a}^{A} \frac{\widehat{Y}_i}{(1+r)^{i-a}} + TS_{a-1} \qquad (2)$$

The lifetime income values obtained are a time series of 5-year intervals since the birth cohorts to compute $\widehat{Y}_i$ are 5-year intervals.

- Apply cubic spline interpolation to ultimately obtain a time series of lifetime income values at an annual frequency from 1933 to 1993.

METHODOLOGY – Predicting the Lifetime Income of Households

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



METHODOLOGY – House Prices

- Data from the quarterly publications of Malaysia's National Property Information Centre.

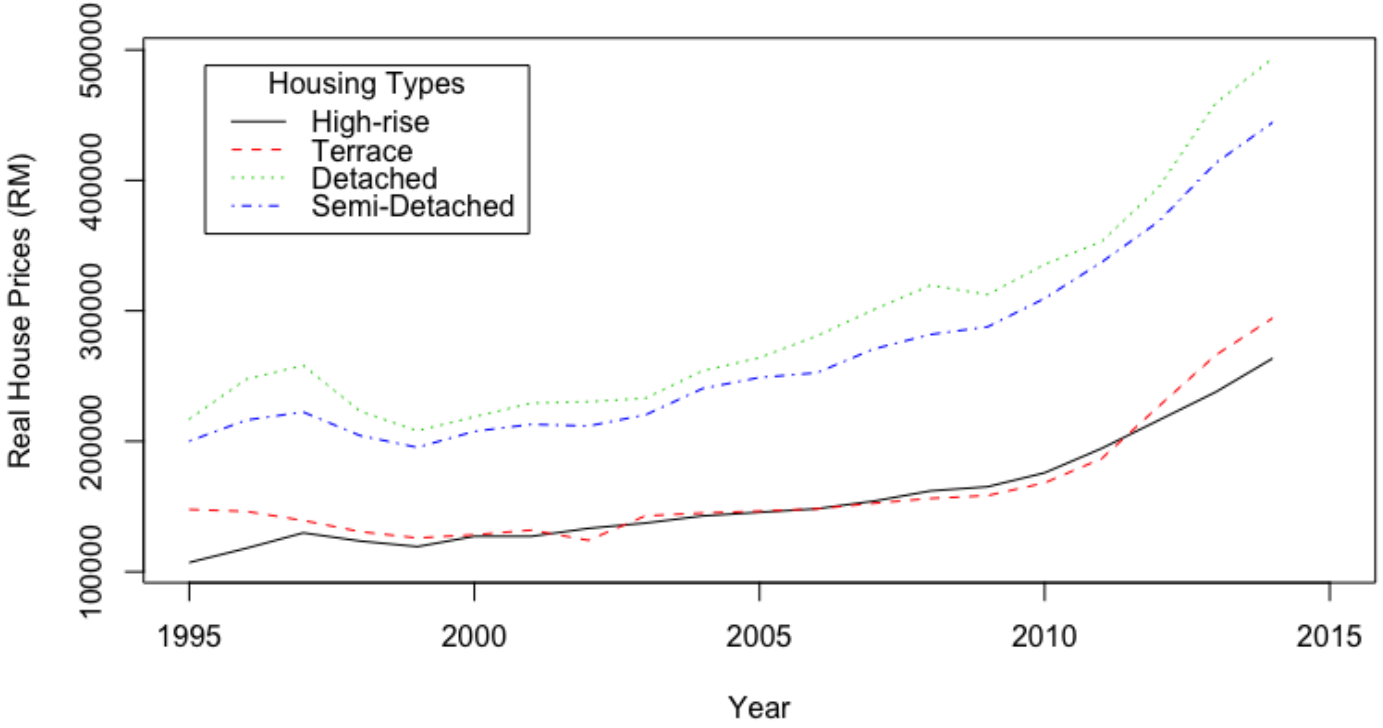
- House prices and indices for the 4 housing types:

1. Terrace
2. High-rise
3. Semi-detached
4. Detached

- All house prices were converted to real terms (base year = 2010).

METHODOLOGY – House Prices

Figure 3: Time series plot of average real house prices according to housing types, 1995–2014.



METHODOLOGY – Malaysia Housing Affordability Index (HAI)

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

$$HAI_{a,t} = \frac{W_{t-a}}{P_t^h} \qquad (4)$$

where,

W_{t-a} : lifetime income expressed by the year of birth$(t-a)$;

P_t^h : average price of the housing type in year t.

- For example, since we have selected $a = 30$, $HAI_{30,2014}$ indicates the HAI for the 30-year age group in 2014.

METHODOLOGY – Malaysia Housing Affordability Index (HAI)

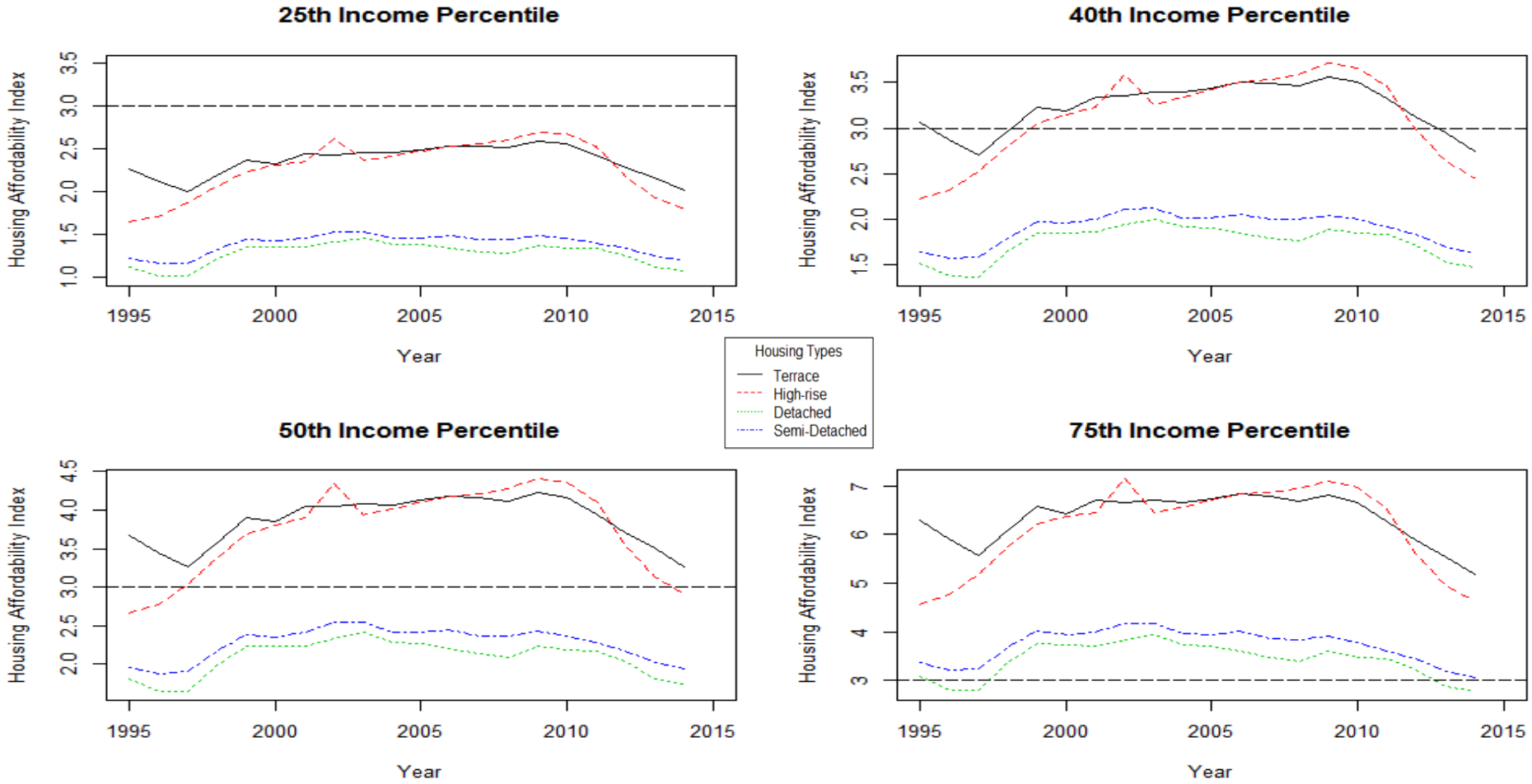
- Index captures both short-run and long-run affordability, not just the latter.
- An **increase** in the index ⇒ an **improvement** in housing affordability.
  - –Reciprocal of the index = portion of lifetime income spent on house.
- We define the **optimal cut-off value** for the HAI to be 3.
  - –Common rule of thumb: No more than 1/3 of income used for mortgage payment.
  - –Therefore, HAI = 1/0.33 = 3.

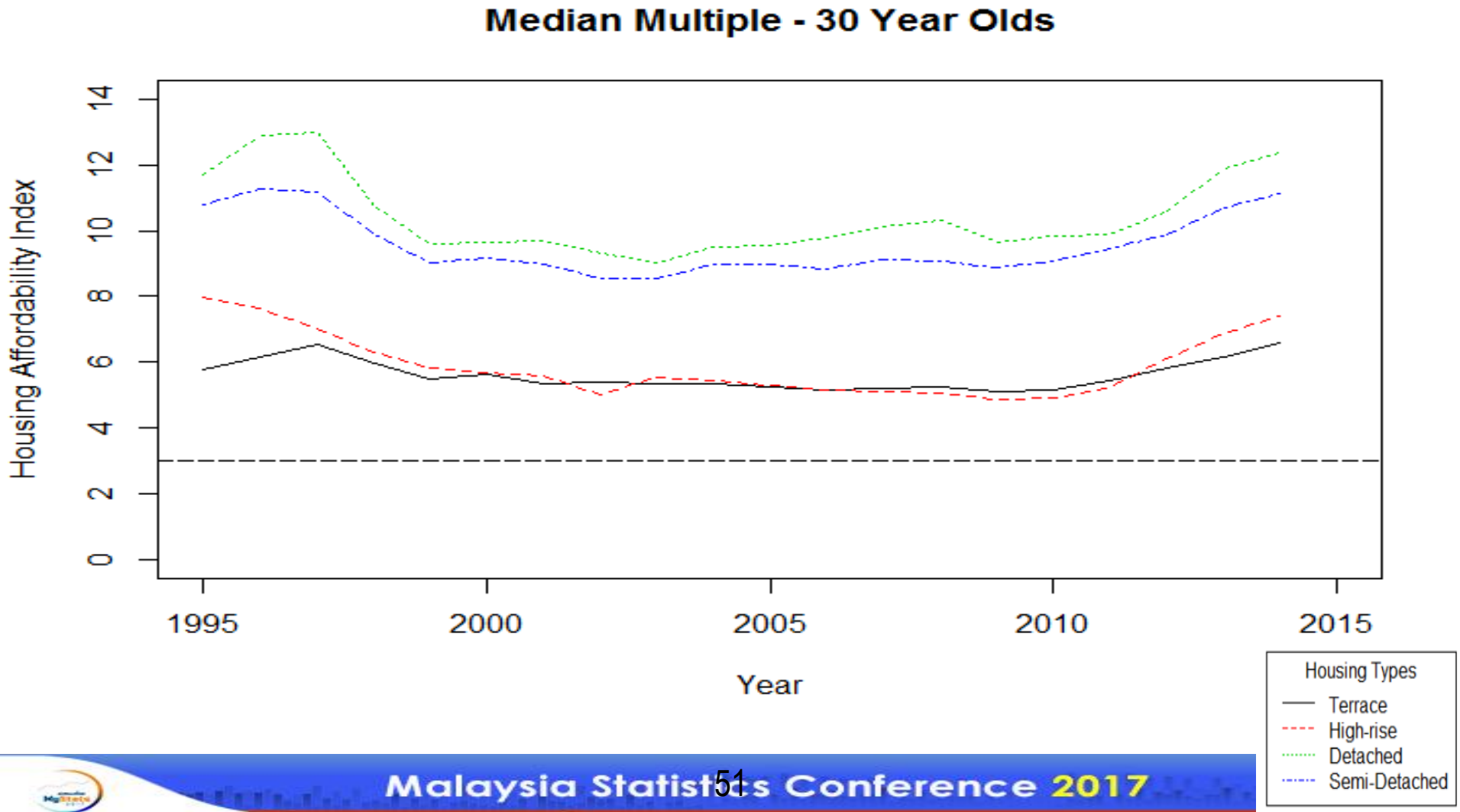
METHODOLOGY – Malaysia Housing Affordability Index (HAI)

HAI > 3

5. RESULTS

RESULTS: HAI Index for the 30-year-old age group




Median Multiple - 30 Year Olds
Housing Affordability Index
0
2
4
6
8
10
12
14
1995
2000
2005
2010
2015
Year
Housing Types
Terrace
High-rise
Detached
Semi-Detached

6. POLICY IMPLICATIONS

POLICY IMPLICATIONS

- Increasing the Timeliness of Housing, Rental and Income Data
  - –Improved data collection methods but can still be further improved to match the quality of that in developed countries.
  - –Malaysian government launched MyHomeExchange initiative in 2014. Information on its progress and availability has been lacking for researchers.
  - –Housing database should encompass detailed information at the transaction level similar to indices such as S&P Corelogic Case-Shiller Home Prices Indices.
  - –House price indices should be updated more frequently. Currently, MHPI are updated with at least a half-year lag.

POLICY IMPLICATIONS

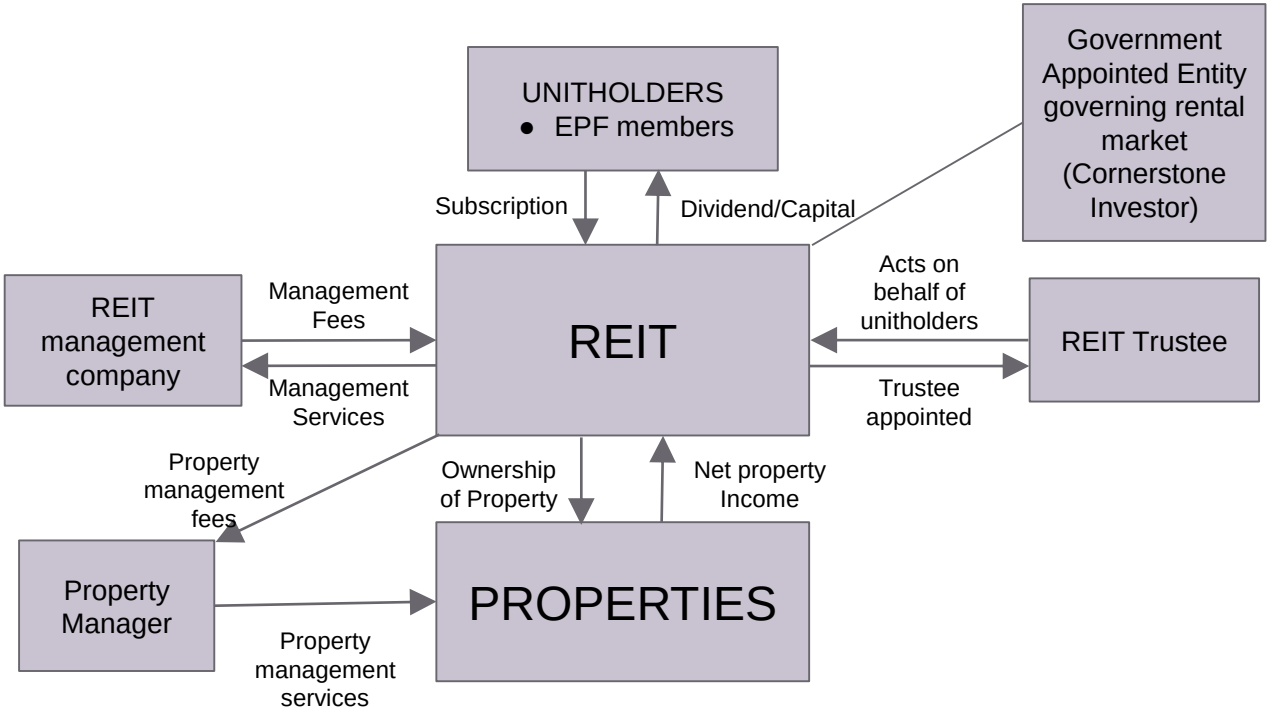
- Increasing the Timeliness of Housing, Rental and Income Data
  - –Consider collecting household income data on an annual basis; and surveying the same households and individuals (e.g. Melbourne Institute in Australia: Houshold, Income, and Labour Dynamics Survey (HILDA)).
  - –Developing a vibrant rental market requires the development of a rental index to track trends of rentals for the country and states.

POLICY IMPLICATIONS

- Development of a Vibrant Rental Market
  - Recommend that households whose income preclude them from owning a home to enter the rental market.
  - BNM has emphasized this in its 2015 and 2016 Annual Reports.
  - More needs to be done to remove the social stigma of renting.
  - Malaysian Government needs to accord equal status to the rental market in terms of policymaking.

POLICY IMPLICATIONS

- Development of a Vibrant Rental Market
  - –One recommendation would be to establish 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) (please see next slide for REIT structure)
  - –Federal agencies tasked with provision of affordable housing will sell a proportion of completed units to residential REIT for rental purposes.
  - –Shares in residential REIT can be sold to EPF members.
  - –Appointment of a REIT manager with authority to impose a form of rent control structure.



Envisaged structure of residential REIT

POLICY IMPLICATIONS

- Development of a Vibrant Rental Market
  - Advantages of residential REIT
    - ▪Further diversification of property portfolio of its unit holders, as it will comprise of both residential and commercial properties.
    - ▪Residential REIT with lower rentals will create rental take-up opportunities, especially for the lower-and-middle income households.
    - ▪This progressive development would lead to downward pressure on rents in the private market that should reduce both foreign and local investment demand.
    - ▪Tax-free rental income received by the residential REIT will enhance returns received by EPF contributors.

POLICY IMPLICATIONS

- Establishment of a Single Entity to Provide Affordable Housing
  - Current policy leaving the provision of affordable housing to market forces has not reduced the mismatch between demand and supply.
  - Imposition of the “cross-subsidisation” policy has led to developers building luxury housing in prime locations while building mandatory low-cost housing imposed by policy on plots far from the city-centre.
  - Establishment of a single entity focused on affordable housing follows measures undertaken by South Korea and Singapore.
  - This entity would coordinate efforts at all levels of government and handle the delivery of affordable housing through initial steps in land acquisition, planning approvals, and construction and continue through to housing finance.
  - Researchers have touted the Singapore model as a solution for the Australian government to adopt (McLaren et al., 2016).

POLICY IMPLICATIONS

- Reforming the Land Acquisition Act to Support an Affordable Housing Supply
  - Price of available land is a key factor affecting house prices.
  - Government can acquire land by invoking the Land Acquisition Act (LAA).
  - Compensation is based on the market value of the acquired land.
  - Government should reform the LAA by tying land value to a certain date when acquiring land for public purposes.
  - Avoid private landowners from benefitting from an increase in land value brought about by economic development and infrastructure financed with public funds (Lee, 2006) such as building of a new road nearby or construction of a major transportation hub.
  - Base valuation year can be adjusted over time using a measure of prosperity such as GDP.

POLICY IMPLICATIONS

- Reforming the Land Acquisition Act to Support an Affordable Housing Supply
  - Control of land costs is urgent due to massive public investments in transportation improvement through the scheduled construction of the East Coast Rail Line (ECRL) & HSR link between KL and Singapore.
  - These major investments will surely increase the land values adjacent to these rail lines and will indirectly increase the cost of housing through the pass-through effect.

POLICY IMPLICATIONS

- Converting Commercial Property for Residential Use
  - In view of the current and impending oversupply of commercial properties, policies should be put in place to allow conversion of older commercial properties to residential use specifically targeted at affordable housing or rental housing.
  - Conversion to a residential property could prolong the lifespan of older commercial properties.
  - Conversions play a vital role in revitalisation process of a neighbourhood and help alleviate growing pressure for residential accommodation (Heath, 2001).

7. CONCLUSION

CONCLUSION

- We adopted a lifetime income approach and introduced the HAI and MAI to measure housing affordability, for different dwelling types, over time.
- Results show that housing affordability had improved from the start of the sample period to 2009, after which it has been on a steady decline.
- Different housing affordability conclusions based on long-run and short-run measures.
- Listed general proposals to ameliorate the housing affordability problem in Malaysia, providing equal emphasis on policy measures that need to be implemented instead of merely documenting a housing affordability problem.

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THANK YOU