Abstract—There are many approaches to measure housing affordability. The approaches are Price to Income Ratio (PIR), Rent to Income Ratio (RIR), Housing Expenditure to Income Ratio, Market Basket Measure, Quality Based Measure and Residual Income Measure. Price to Income Ratio (PIR) is often used as indicators of measuring housing affordability. The objective of this research is to examine housing affordability in Pulau Pinang by using Price to Income Ratio (PIR) approach. The sample of this research comprises individuals who own a low-cost house at Pulau Pinang. The convenience sampling technique is used for this research with regression method as its analytical tool. The findings indicate that Price to Income Ratio (PIR) is a valid and easy approach to measure housing affordability in Pulau Pinang.

Index Terms—Housing affordability, price to income ratio, regression method.

I. INTRODUCTION

Housing acts as a focus of economic activity, a symbol of achievement, social acceptance and an element of urban growth. To most individuals, housing represents the largest single investment of a lifetime. However, others see housing as a shelter and to fulfill their fundamental needs only [1]. Affordability is the ability of a person in providing something, which is usually referred to his ability in financial terms. A household is having affordability issues when there is a lack of adequate income to be used for household expenditures and other households needs besides housing [2]. Concept of housing affordability is generally to determine income affordability of a person to pay for housing monthly instalment. Socioeconomic characteristics as type of dwelling unit, length of stay, employment and income have shown positive effect on the overall housing satisfaction [3]. There are many research have been done about housing affordability and majority of the research are focused on housing affordability of tenant. Many approaches have been using to measure housing affordability.

There are six approaches identified to measure housing affordability such as Price To Income Ratio (PIR), Rent To Income Ratio (RIR), Housing Expenditure To Income Ratio, Market Basket Measure, Quality Based Measure and Residual Income Measure. These approaches are important to measure income affordability of a person to pay for monthly housing payment. Housing affordability measure are using for many reasons such as to explain the type of household expenditure, to analyze the trend with comparison on type of different household, to determine who are qualified to get a housing subsidies, to define housing necessity for public policy, to predict household applicable to pay for a rent or housing loan and to choose housing unit before decide to buy or rent the house [4]. So, it is important to understand about housing affordability approach.

II. PRICE TO INCOME RATIO APPROACH

This research only focus on one approach namely Price To Income Ratio (PIR) which means the ratio of median house prices to median familial disposable incomes in percentage or years of income. Individuals applied this ratio as a basic component of mortgage lending. PIR are a measure of the affordability of housing. Increases in housing prices cannot deviate indefinitely from growth in the income of potential buyers. If housing prices outpace income growth, at some point households will no longer be able to afford buying and demand will dry up, bringing prices down [5]. PIR is a method that shows the ratio between current market value of housing unit that household plans to purchase to the total annual income of the household, which can summarize between Current Market Value of Housing Unit and The Total Annual Income of Household. For low income group and middle income group, a PIR method is the ratio between Mean Free-Market Price of Dwelling Unit to The Mean Annual Household Income. This shows the different between different group of income household. PIR provide a useful insight of the overall performance of the housing market for example, the total demand and supply of housing for a local market. PIR also provides information like the level of sustainability of human settlements with housing affordability such as the impact of market force and housing policies for example the new housing policy from China government.

A. Formula of PIR

The formula is;

For individual;

\[
PIR = \frac{HP}{Y}
\]

Price Income Ratio = Current market value for housing unit

For group of household;

\[
\frac{\text{Median ratio of free market price for housing unit}}{\text{Median of household annual income}}
\]

PIR is a method by calculating the median house price

Norazmawati Md. Sani@Abd. Rahim

divided by gross annual median household income. It's also
called a “Median Multiple” method. Two intermediate
measures are required in this method, i.e. median annual
household income and median house price.

1) Median household income: Household income is
defined as gross income from all sources, including
wages, salaries, incomes from businesses or informal
sector activities, investment income, and, where
information is available, income in kind such as
consumption of agricultural product which might have
been sold.

2) Median house price: The median-priced house is that
house which has 50% of the houses priced below it, and
50% of the houses priced above it. Housing value is
defined as the price at which a house would be sold if
placed on the market for a reasonable length of time by a
seller who is not under pressure to sell.

The impact of increasing rents and house prices has been
most pronounced on households in the lower two income
quintiles, which have experienced declining real incomes
over that period. The growing disparity between house price,
rents and median income, particularly for lower income
households has been a global phenomenon. As building
standards and codes have proliferated and grown
increasingly stringent the gap between the cost of producing
new housing and the house-buying power of low income
United States families has widened [6]. They go on say that
low income United States households have been plagued by
falling real disposable incomes and rising tastes for housing
quality, requiring greater proportions of their income to be
spent on housing.

Workers are willing to pay higher rents and accept lower
wages in order to live in high quality of life cities (e.g., mild
climates, coastal locations). Because housing rent and wage
directly affect housing price and income, this leads to higher
price to income ratios in these cities [7]. Real house prices
and real disposable income are co integrated at the 5%
significance level [8]. While income is a major determinant
of housing demand, other factors also play an important role.
In particular, as most household need to borrow to buy
houses, mortgage rates and credit conditions have a strong
impact on housing demand. The responsiveness of housing
supply, often restricted by land-use planning constraints, also
affects prices. Hence, there is no simple relation between
housing prices and income [9]. Econometric models have the
advantage over simple ratios of taking into account all
determinants of prices (provided the model is well specified).
However, they have their own weaknesses. Notably,
fundamentals explaining housing prices may be
unsustainable, leading to the deceptive impression that prices
in line with fundamentals are not vulnerable to sharp falls.
Such unsustainable fundamentals may include levels of
income, interest rates and the architecture of credit [10].
Fundamentals often cited in support of confident assessments
of the housing market are surprisingly weak at explaining

Nevertheless, high ratios may be a problem from different
perspectives. For example, excessively high housing prices
may cause social problems if access to decent housing
becomes unaffordable for many households, leading in
particular to overcrowding and homelessness. Social and
economic inequalities may be exacerbated by unequal access
to homeownership. In a tight market, the wealth gap between
those able to put a foot on the housing ladder and those who
rent may keep on widening. High housing costs may prevent
a smooth functioning of the labour market and erode the
competitiveness of the economy. Housing price increases
which look unsustainable may raise concerns about financial
stability. Altogether, the need for policy action should be
assessed on the basis of the consequences of high price to
income ratios. The appropriate policy instruments to use will
depend on the nature of the problems associated with high
price to income ratios. High housing prices may result from
rigid housing supply linked to tight supply of land
development, as in United Kingdom and Australia. In that
case, supply-side measure, such as reforming land-use
planning or developing infrastructure, may be warranted. A
number of other structural factors, such as taxation and
regulations, may raise the volatility of housing market [12].
Buoyant prices can also result from unsustainable demand,
which could be reined in by monetary policy tightening or
macro-prudential policies, and may indicate risks of financial
crisis. The financial cycle is most parsimoniously described
in terms of credit and property prices [13].

Every group of income such as low income people,
medium income people or high income people, has different
PIR. For example low income people in Beijing, on year
2002 the PIR is 13.1. PIR for medium income people is 9.24
and PIR for high income people is 3.68 [14]. It shows that
PIR for low income people are higher than medium income
people and high income people. Generally, the ratio of house
PIR in Taiwan has been about 4 or 5; however, this
affordability index rose from 4 to more than 13 during late
1980s because the house prices jumped threefold [15]. This is
caused by rising house prices at Beijing. House price for low
income people are higher compared with house price for
medium income people and high income people. Hence, low
income people will not buy a house but they only rent
the house. Based on [14], the approach to reduce the PIR is active
promotion of housing market for old houses or houses that
sold by first owner of a house. Sale and purchase for this type
of housing must be done easily and briefly. The purpose is to
attract interest of potential buyer to buy the houses. [14] also
used PIR to analyzed housing affordability at Beijing. [16]
have been using this approach for study case at Khayelitsha,
South Africa. [16], used PIR approach to investigate either
the household afford or not afford to buy a house. From the
explanations shows that PIR approach is a familiar approach
using by previous researchers and was chosen to use for this
research.

III. CONCEPT OF HOUSING AFFORDABILITY

Housing affordability is one of the key factors that can
describe the socioeconomic stability and development of a
country. Affordable housing is housing that is appropriate for
the needs of a range of very low to moderate income
households and priced so that these households are also able
to meet other basic living costs such as food, clothing,
transport, medical care and education. As a rule of thumb,
housing is usually considered affordable if it costs less than
30 percent of gross household income.

In this context, affordable housing refers to housing that has been developed with some assistance from Malaysia Governments, including through planning incentives. It may include a range of housing types and sizes, including single or multi-bedroom units or houses, as well as studio apartments. It is only available in some locations and eligibility criteria apply.

The concept of housing affordability is measured by the income and expenditures of a household to pay for the price or rental of a house. The expenses allocated for buying a house is 30 percent of household monthly income. Affordable housing is referred to the ability of a household pay for a house. [18] stated that affordable housing concept pertains to the amount of income needed to pay for the house and other household expenditures. It is also defined as a house that can be obtained without serious financing risk which has been set by most countries worldwide as 30 percent income limit. Owning a home for shelter and comfort is central to most families' ultimate plans and also considered definition of personal success.

Housing affordability can be understood as the continuing costs of a mortgage or rents relative to income, problems of accessing affordable housing (e.g., first home ownership), not being able to afford housing costs after meeting other expenditures, or a problem of too low an income or too high housing prices. Even more problematically, affordability can be experienced by household types in different ways; that is, through the employment, transport, health, and other consumption trade-offs that have to be made by singles, sole parents and couples with children as they adapt their circumstances to high housing costs and/or low income. In the case of home buyers, concerns about affordability are typically about the accessibility of home ownership, or the ability of younger households to gain access to home ownership for the first time. So, house ownership is based on the affordability of a person to pay for house.

### IV. METHODOLOGY

The sample of this research comprises individuals who own a low-cost house at Flat Setia Vista, Relau, Pulau Pinang (Picture 1). There are 165 unit of house have been built by SP Setia Sdn. Bhd. with 650 square feet and three (3) bedrooms. The convenience sampling technique is used for this research with regression method as its analytical tool.

### V. CONCLUSION

The findings indicate that Price to Income Ratio (PIR) is a valid and easy approach to measure housing affordability in Pulau Pinang. Overall, PIR are useful indicators to monitor, as deviations from their long-term average may reflect unsustainable developments in housing or mortgage markets. Nevertheless, the ratios are very persistent. If high ratios have adverse social and economic consequences, policy action guided by a careful analysis of underlying factors may be warranted.

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### REFERENCES


Norazmawati Md. Sani@Abd. Rahim was born in Kuala Kangsar, Perak, on July 31, 1978. Norazmawati was conferred the degree of doctor of philosophy (PhD) in housing from Universiti Sains Malaysia, Pulau Pinang on 2007. Norazmawati was holds a first class honours degree in administration and land development from Universiti Teknologi Malaysia, Skudai, Johor in 2001 where previously Norazmawati studied at the Universiti Teknologi Malaysia, Kuala Lumpur and was awarded a Diploma in Valuation in year 1999.

She is a senior lecturer at the School of Housing, Building and Planning, Universiti Sains Malaysia, Pulau Pinang, Malaysia since 2007 until now. She became as a visiting scholar at Sheffield Hallam University, United Kingdom on year 2013 until 2014. Her research interest includes housing affordability, public housing and land development.

Dr. Norazmawati Md. Sani@Abd. Rahim is an associate member of the Malaysian institute of planners at the national level since 2011, committee members in International Association Of Computer Science And Information Technology (IACSIT), on year 2010 until 2011, member of the Transportation Science Society of Malaysia (TSSM) and editors of board for Canadian Journal of Social Science. On year 2011, Dr. Norazmawati was awarded an excellence service award 2011 from Universiti Sains Malaysia, Pulau Pinang, Malaysia. Currently, Dr. Norazmawati have 68 of publications in journals, conference proceedings, articles and magazine in her research area.