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A Study on the Relationship Between the Affordability of Private Residential Property and its Demand in Singapore

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Over the years, private housing prices skyrocketed and the high demand to own private housing remained unmet. Prices influenced the perception of affordability and would also affect the demand for private housing. The urgency to understand the intertwined relationships between housing cost (prices), affordability, and demand especially in the COVID-19 pandemic situation is high. Hence, this research aimed to quantify the relationship or impact of rising prices on the private housing affordability and its demand. The results from this research could conclude that soaring prices lowered the affordability of buyers and delay the purchase of private property shortly. However, the demand to purchase a private property was higher with rising prices suggesting that higher prices indicate more wealth and potential to own a more valuable asset. Affordability is a temporary barrier to own private properties. This implied that the wealth effect from properties likely outweighed that of the consumption or income substitution effect. This understanding of the relative impacts between housing cost, affordability, and demand would contribute significantly to policymaking in providing signals and advice for policymakers to priorities social mobility or investment return from the property market.

Keywords: COVID-19, private housing, private residential property, housing affordability, private housing demand, Singapore

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INTRODUCTION

The Singapore private property market caters to approximately 30% of the population for those that exceed the income ceiling for public housing flats (Abhas, 2018). The pricing of flats, both private and public, have soared over the years and affordability is becoming a more serious concern. A study by (Yuen et al., 2006) reported on the affordability of private housing by Singaporean public housing homeowners. The study indicated that only a small number of retail homeowners could comfortably afford even the simple median-priced private apartments and the ability reduces significantly with housing with a garden. The situation does not seem to be improving as the private housing residential index has been on an upward trend in **Figure 1** (SingStat, 2019). Efforts to reduce the escalation in prices such as additional stamp duties brought short-lived reliefs. As the price of private housing is highly correlated with that of public housing (Phang and Wong, 1997), more affordable public housing could either increase the demand for private housing owing to wealth effect or reduce demand as the prices of private housing fall correspondingly with public housing (Sing et al., 2006).

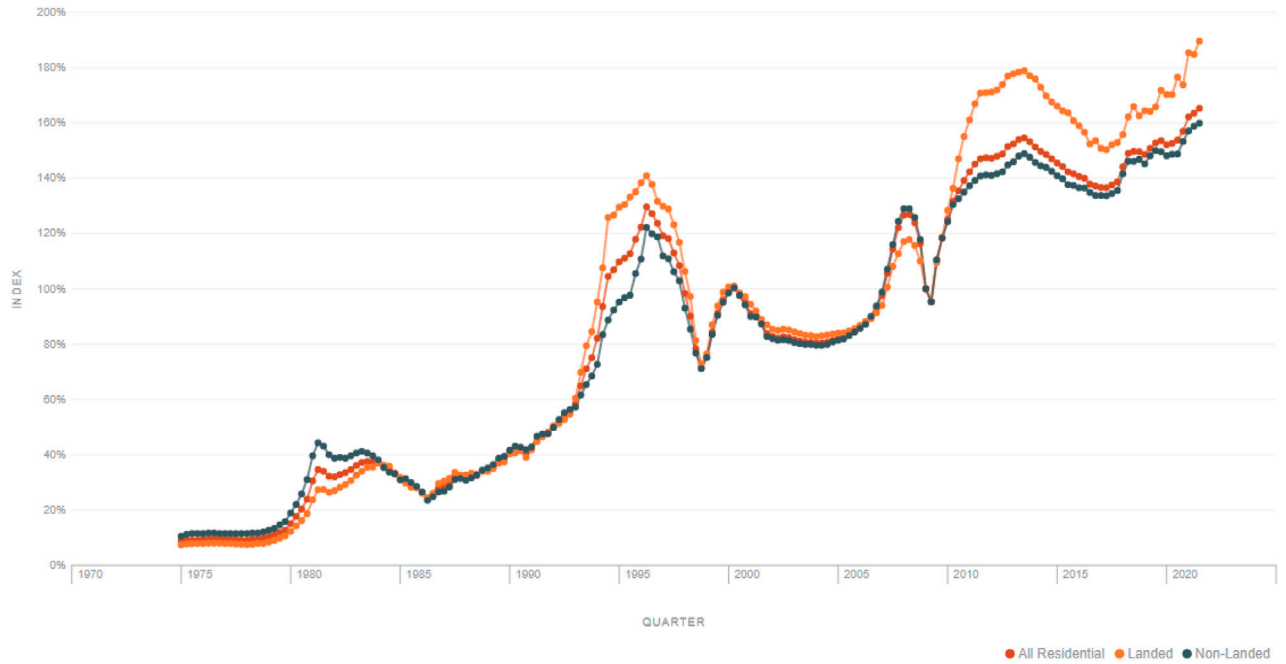

FIGURE 1 | Private housing price index.

Housing is a fundamental citizenship right in Singapore and is seen as a cornerstone to fairness, equality, equity, and mobility. Balancing the private housing demand and prices is a key part of the government's housing policies. However, most research analyzed the correlations between the public and private housing markets through quantitative statistical models focusing mainly on the prices. There was a lack of research into the drivers for price and demand changes in the market. Furthermore, the perceived affordability of private housing could significantly affect the demand for private flats either for investment purposes or to obtain one residential unit before the prices spike even further (DeoBardhan et al., 2003).

Source

SingStat (2019), the study happened in the midst of the COVID-19 pandemic where news and reports suggested the surge in demand for private properties to be snapped out given the downward pressure from a declining economy. That remains to be tested and validated from this research.

Given that the decreasing affordability of private housing remains a key concern for the residents in Singapore and a critical issue debated regularly during elections and in parliament, it is imperative to evaluate the change in affordability perceptions especially in the year of the pandemic and also investigate the relationship between prices on affordability and demand. Home ownership remains a basic right under the promise of the leadership. Hence, even if the prices are rising, the flats could still be potentially affordable especially to the right target group of customers. This justifies the need to understand further on the perceptions of the buyers and develop a more accurate assessment of the current conditions of the affordability of flats. The fretting issue is that the trend is continuously growing while increasing pressure on those intending to acquire private property since they could hardly fulfill the financial requirements needed. Even if the prices are soaring, the intention to purchase properties may not have dropped. Hence, understanding this problem would help the property developers and the policymakers to understand how retail consumers are affected and the recommended ways to act on the research issue.

Affordability becomes a crucial issue compounded when demand for private property is high. Buyers demand private properties for multiple reasons such as capital appreciation, the luxurious standard of living, status symbol etc. Addressing these research issues are critical in contributing more qualitative data on the affordability of private housing, both perceived and real, and the relative impacts on the demand for housing. It is relevant and useful to understand the perception and attitudes of Singaporeans towards the changes in private residential property prices and future demand (Xiao et al., 2016), (Wijburg et al., 2020). Moreover, the context of the research is that it is conducted during the COVID-19 pandemic duration and the perceptions could significantly differ from normal periods due to the greater uncertainty and economic dwindle that the country is currently facing. The study adopted the descriptive research approach that aimed to understand the relationship between Singaporean housing pricing, affordability, and buyers' demand. To capture this information, a questionnaire survey method was used to collect the information from 200 respondents selected by using convenience sampling. In the present scenario, the following objectives are studied in this research:

- To assess how housing cost has affected the perception on the affordability of the private housing;
- To evaluate the expected demand for private flats shortly before lastly evaluating the relationship between private houses' prices and the demand;
- To assess the perceptions of the effectiveness of housing policies on private residential accurately from the retail buyers.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The literature would help cement basic understanding in Singapore's housing prices, context, demand, and trends. Available research in affordability measures and housing cost (prices) would be studied to draw references for the research methodology in this research. Extending from past frameworks in measuring affordability attitudes and pricing dynamics on demand of properties would enhance the contributions of this research to the field. The relationship between prices with affordability and demand were also reviewed to provide an understanding of the insights derived from past research and seek validation with Singapore's market from this research.

Singapore's housing history and trends

Affordable housing has been one of the key concerns of the government since 1964 where it established a home ownership scheme for supporting a low-income group of people where they could purchase a public house (Lin, 2011). In 1990–1996, there was a boom in the number and price index of private residential property, which indicated long-term essential factors, including rapid household formation, savings growth, and high income and also short-term influential factors, including foreign purchasing interest and low-interest rates. This would reduce the affordability of private housing for buyers who are restricted by rules to purchase private housing due to income ceiling. Homeownership becomes harder for the sandwiched class. Thereafter, changes of rules in 1993 enabled the Central Provident Fund to be used in facilitating homeownership by covering mortgage interest charges and allowing larger loans (Lin, 2011). The Singaporean government announced in May 1996 a set of administrative and prudential actions for market stabilization. This freed away more state land acquired for development purposes and restricted purchase of properties by non-Singaporeans.

Singapore leadership views private housing as a market for the upper echelons of society (Edelstein and Lum, 2004). Edelstein and Lum conducted an econometrical empirical analysis of the association between housing price and consumption and found no significant impact on aggregate consumption but rather growing wealth effects from the 1990–2002 time period. Private housing not only indicated an affluent status but proliferated wealth inequality among the residents. To reinforce the market, the Singaporean government further relented on stamp duties on both buyers and sellers. The developers were also pushed to allow purchasers to defer their payments through a deferred payment scheme as long as the property had not been completed. The rising numbers of the middle classes demanded more private properties despite rising prices given that, first, expected large positive wealth effects; second, status symbolism of private property; and third, perceived to be qualitatively superior private flats compared to public houses attracted greater buying interests.

By 2000, the private property prices had risen by 40% although they declined after the dot-com bubble collapsed in 2001 and following the September 2001 attack and 2003 SARS pandemic (Lily et al., 2012). The result led to the government lifting capital gain charges and allowing non-Singaporeans to obtain Singapore property loans (Addae-Dapaah, 2014). The next significant period was in Q3 2009 where the property price index increased by 15.8%, which was the greatest quarter-on-quarter rise since Q1 1981. The government withdrew loan schemes, increased land supply, and failed to renew previous developers' concessions. The measures taken initiated the curve point of better price control, and in 2013, the government enforced cooling measures that set boundaries on pricing and fostered housing affordability to a great extent (Lee et al., 2013).

Affordability construct

The critical construct that needs to be evaluated in this study is the affordability of private housing. Addae-Dapaah (2014) defines housing affordability as an expression of both material and social peoples' experiences, set up as households and relating to personal housing situations. Affordability is not necessarily just an absolute accounting of cost for an individual but rather the relative burden of housing on the purchasing power. If an individual has to bear a high mortgage rate to obtain a house of choice, the property should be considered as unaffordable. Stone's definition was established from a comprehensive review of affordability indicators and standards in the United States. Further literature such as (Lee et al., 2013) affirmed that the affordability of a house depends on the ability of a household to offset its charges comfortably in combination with other regular charges, including food, healthcare, transport, utilities, etc. A basic measure includes simply calculating the income percentage used to pay mortgages (Huo and Chen, 2021) to quantify affordability. The research indicated that affordability measures the capability to balance with other expenses. Similarly (Huo and Chen, 2021), it is also seen that household income and the stage of economy affects the affordability of land and housing. However, (Ziółkowska-Weiss, 2021), when studying the satisfaction with the selected indicators of the quality of urban space, highlighted that accessibility to recreational tourism in the city, public transport, possibilities of finding a job, and quality of the natural environment do have a crucial impact along with affordability to an individual.

However, Ziółkowska-Weiss (2021) found that these methods are limited because comparisons to annual income would make housing appear significantly less affordable for the very young and very old (Micallef et al., 2022). Instead, they estimated the gains in housing prices relative to other goods over the years and empirically compared the homeownership capital to that of rental value to conclude that the housing prices are not becoming less

affordable in the United States (Tajani et al., 2022). The argument was that a consumption modelling approach was more robust than measuring perceptions of affordability. Anacker (2019), on the other hand, posits that numerous grants and subsidies in Singapore are given to first-time buyers, mostly in the younger age ranges who are looking to start a family, which increases affordability amidst redistributive welfare policies. In Singapore, subsidies and grants play a huge role in making housing affordable for both private and public markets. In 2011, Minister Khaw reported that without grants, the resale housing prices have risen by 37%, and the new flat is 15%, whereas median income growth increased by 38% (Jakabovics et al., 2014). With grants, the new flats increased by only a mere 6%, with an almost 100% discount. The policies keep flats affordable. Although Anacker (2019) has not dived into an empirical investigation, the argument of flats purchases as a consumption expense could be further studied quantitatively using (Ziółkowska-Weiss, 2021). Moreover, the policies and subsides should be enabled to increase of affordability for housing (Micallef et al., 2022), (Tajani et al., 2022).

In this study, housing affordability would be measured from the subjective perception of survey respondents on their ability to afford private residential houses. Lennartz (2017) affirmed that housing affordability is a perception of how much the family is willing to pay for the residential cost in the range of incomes, which this study would adopt. Furthermore (Lennartz, 2017), the team adopted a similar measure of surveying Yemen residents on their perception of affordability of their houses in different residential zones coinciding with a categorical variable in this research's survey of the location where the owners are living and intending to purchase in Singapore. Hence, the relationship within the domain may be hypothesized as follows:

H1. Higher prices have no significant relationship with the affordability of private residential properties.

Housing cost and affordability

Notwithstanding that affordability encompasses the actual housing cost as part of the evaluation, an understanding of the determination of housing prices helps to significantly contribute to the research. In the research by Anacker (2019), the availability of development was a great determinant of the housing prices. Further evidence by Jakabovics et al. (2014), Lennartz (2017), and Ronald and Dewilde (2017) indicated that housing prices increase due to retrenchment of local, state, and national governments from pursued austerity or social policies, which has resulted in reduced funding for developing affordable housing. However, in Singapore, in the recent decades, property developers have shifted from building out (outwards expansion), to building up (upward expansion with high-level buildings) and to building in the back (densification of available space) (Peterson, 2018). This trend is an indication of reduced land availability resulting in increased housing prices after development. Housing pricing is thus likely to increase in Singapore considering it as a small-sized populated country with limited land supply. Ferrari et al. (2021) argue that the along with the housing cost and affordability, the differences among household structures to distinct types of accessibility (jobs, education, and leisure) do have an impact. The results point to a high disparity between accessibility levels, especially in the accessibility to jobs. Xiao et al. (2021) found evidences that the rapid process of urbanization and urban expansion also impacts the travel costs and limits job accessibility for the economically disadvantaged population. Such an issue also contributes to housing cost and affordability. Also, structural factors such as high housing prices and sprawling development significantly contribute to the demand and also to housing costs.

The study by Wong and Yap (2003) conducted an open-ended survey of 60 households randomly in private housing areas to investigate if it was a dream for public owners to own a private house, and the intention of location, type of private housing, and mortgage demand for the respondents. The reported result was that price increases since the early 1990s has resulted in many Singaporeans' aspirations for private properties to be dampened as affordability became a serious concern. The government has a very difficult task in balancing the demand for universal housing and the desire for a better standard of living with private properties for Singaporeans. On the other hand, from the mid 1990s to 2007, using a 2.86 multiple of private residential property to median annual household income, the first-time buyers of the 75th income percentile would find it affordable when property prices soared during this period (Abeysinghe and Gu, 2011). Abeysinghe and Gu adopted a lifetime income modeling approach from forecasted annual household earnings for a various birth cohort over the study period. Although this approach would be costly and not implementable for this study, the results contradicted with the conclusion of Wong and Yap (2003). With conflicting insights from the literature, it raised the question on what would be the accurate current attitudes of affordability. notwithstanding the period of economic contractions from the pandemic fallout. Hence, this research is conducted not simply to measure the attitude but to relate the attitudes to the pricing trends and continued aspiration for private properties. Hence, the relationship within the domain may be hypothesized as follows:

H2. There was no significant impact on housing cost on property demand.

Housing affordability and demand

Although rising housing call reduces affordability, the higher prices of private housing could lead to wealth effect whereby buyers find it more attractive to own such properties in anticipation of higher prices in the future (DeoBardhan et al., 2003). Alternatively, income substitution effect would result in a fall in housing demand. Higher housing prices reduced the demand for the houses since they reduced the purchasing power of the buyers' disposable income (Baumol et al., 2011). A rational buyer for a house would consider purchasing the house when the deal is good and could be managed within his/her budget constraints (Mazurek et al., 2019). Mazurek's team stated that the rule of demand affects housing demands whereby consumers would consider not purchasing a house when it is priced beyond their income due to the "price rise income effect". Another reason not to purchase the houses is due to "price increase substitution effect," where potential buyers preferred switching away from house purchase to renting which would be

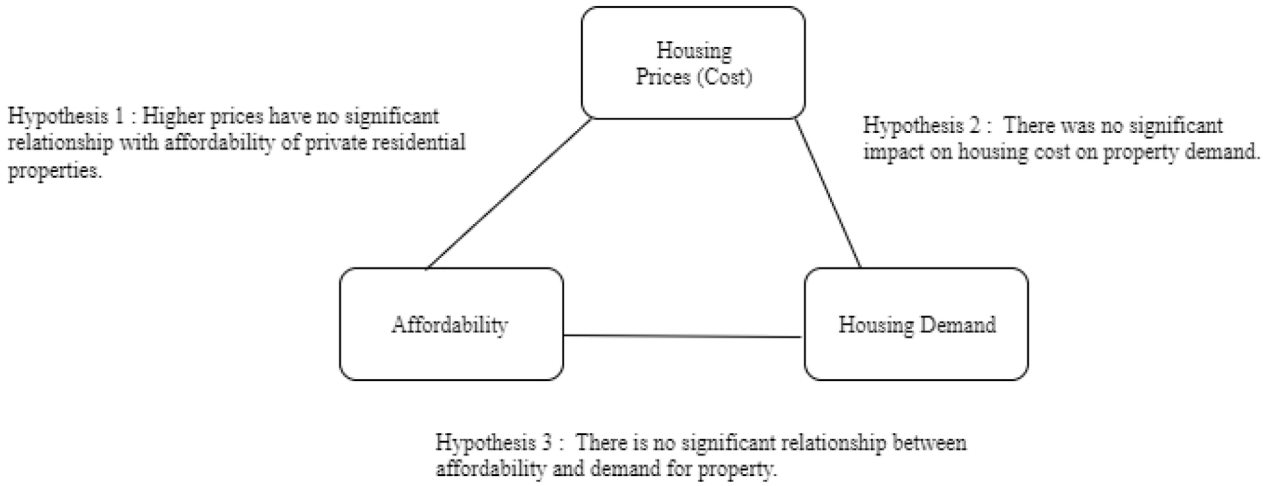

FIGURE 2 | Conceptual model.

more manageable to them (Tajani et al., 2021a). The buyers were affected in purchasing capacity because of COVID-19 and unable to find potential buyers (Tajani et al., 2021b).

Under traditional economic theories, the higher price would reduce the quantity demanded for goods. However, private homes are seen as luxury assets that generate wealth effect for owners, and despite higher prices, the demand for the properties could still increase. Akintoye and Skitmore (1994) constructed a model for private property demand where pricing is not the sole driver. The growth in gross domestic product is positively correlated with the sales volume demand for private residential houses. Given the economic boom with higher income, people have more purchasing power and would purchase better housing to enjoy a higher standard of living or accumulate wealth. Similarly, as the income falls, the cutback on private flats would be severe as purchasing power falls albeit other consumption expenses increase. Another study by Szymańska (2021) argued that the sharing economy is also key along with income and affordability. Quality of life affects the satisfaction of residents through economic, psychological, political, and social impacts. Hsieh and Chuang (2021) found that urban design tools, land-use plans, zoning control, and urban design guidelines do have impact on the demand for housing. Bautista-Hernández (2020) agrees that the vigorous urbanization process marked by deep social and economic inequalities does have contributing issues on housing affordability and demand.

Understanding the relationship and potentially the strength between housing pricing and demand in Singapore is an urgent issue following serious impacts that could result out of consumers' perception of affordability. The literature described the affordability aspect as an expression of the challenges individual households meet while trying to balance the costs of the potential or actual housing and its non-housing expenditures within the income constraints. Hence, the relationship within the domain may be hypothesized as follows:

H3. There was no significant relationship between affordability and demand for property.

Summary of the literature and research gap

The affordability construct is a composite of more than just housing cost. It contains expectations, experiences, relative socio-economic status, and many other factors. It could also be measured through various methodologies either by comparison to other baskets of goods, median income, or attitude-based surveys. Hence, price does not necessarily result in a fall in affordability. Similarly, owing to the nature of private properties being luxury goods especially in land-scarce Singapore, the price does not necessarily result in a fall in demand for housing. The higher prices of private housing could lead to a wealth effect whereby buyers find it more attractive to own such properties in anticipation of higher prices in the future. On the other hand, income substitution effect would result in a fall in housing demand. Furthermore, demand is also driven by multiple factors other than housing cost which does not exhaustively consist of only national income, purchasing power, grants, subsidies, etc.

The literature established that affordability is not simply a measure of the housing prices albeit housing cost affects the affordability perception in buyers significantly (Jakabovics et al., 2014). However, the relationship between affordability and cost is not consistent across the research, and hence, the relevance to Singapore's context could be minimal. Housing cost further relates to demand either with a negative correlation owing to the price substitution effect (Mazurek et al., 2019) or a positive association arising from the wealth effect (Edelstein and Lum, 2004). Literature in other parts of the world such as the United States suggested extensive research into the measurement of housing affordability using econometrical and macroeconomic modelling approaches that neglected the importance of qualitative perception of affordability (Shaqra'a et al., 2015). This research extends further measurement of

affordability attitudes through survey, drawing references from Shaqra'a and his team's research.

CONCEPTUAL MODEL

This study proposes a conceptual framework to investigate the relationships between housing cost, affordability, and demand in that housing cost being the key driver would affect affordability and demand separately (**Figure 2**).

Source: created for this study

The association of affordability and demand would also be investigated. Thereby, this triangular relationship forms the foundation of this analysis in a bid to overcome the research gap that has persisted given that most research looks at only two variables simultaneously. As the beginning of associating the variables together, the common quantitative survey methodology adopted to access attitudes particularly in Singapore (Phang, 2007) would be utilized for the investigation.

MATERIALS AND METHODS

Following up on the prevailing data and results that were presented in the literature, this study investigated the relationship between affordability and demand by conducting an online survey to collect primary data from the respondents. The mono-method approach that entailed an analysis of quantitative data as positivism was preferred for quantifying the perception of affordability and demand attitudes. Details associated to the methodological approach embraced in the present research are provided below.

Methodological approach

The study adopted a descriptive research approach that aimed to understand the relationship between Singaporean housing pricing, affordability, and buyers' demand. To capture this information, a questionnaire survey method was used to collect the information. Questionnaires are good research methods as they could generate a genuine perception of the housing pricing with the participant's privacy; they are easy to conduct and have broad coverage (Wright, 2005). However, whether they could generate dishonest feedback, take time to receive feedback, and communicate otherwise were not clarified. The survey respondents were chosen through convenience sampling, a non-probability sampling method. In (Shaqra'a et al., 2015)'s study of Yemen resident's perception of the affordability of private housing schemes, the surveyed respondents were 369 for a 26.5 million population. Given that Singapore's population is less than 4 million for residents, 200 respondents were surveyed for the research. The respondents came from all walks of life and were from the general public comprising Singaporeans and permanent residents of Singapore who were either living in public houses or private residence. They either owned a public housing or private condominium. Despite adopting convenience sampling, given the diverse network that has been reached, the respondents covered a wide distributional spread which would reduce the danger of bias results. The questionnaire was administered online via a web link to capture a widely distributed population sample at a cheaper and convenient rate and to ensure safety during data collection. This study and data collection was controlled and focused only within Singapore and was completed within 1 month. The questionnaire quantified the affordability attitudes, pricing trend expectations, and demand expectations of the respondents. This research method was faster and captured a more widely distributed population at a lower cost with the ability to prove or disprove assumptions (Given, 2008).

Validity and reliability

This study followed the standard steps of the scientific method and logically collected responses from participating individuals, thereby fulfilling the basic tenets of internal validity. The questionnaire interviewed 10 property developers, government officials, and related professionals who are subject matter experts on the topic in the questionnaire design and questions. The construct validity was reviewed with statisticians and compared to past surveys by Shaqra'a et al. (2015) and Phang and Helble (2016) to ensure that the questions were designed appropriately in the respective variable types such as nominal, ordinal, and categorical. Likert scale was employed upon validating with the statisticians as well. The sample size was sufficiently large given the population size and about the research of Shaqra'a et al. (2015). Hence, external validity of the results was achieved in that it can be generalized across a larger population. A pilot study was done and reliability analysis was conducted through Cronbach's alpha measure for each section of the research instrument to understand the reliability of each section. **Table 1** showed that the Cronbach's alpha scores are greater than 0.70, with 0.72 being the minimum score. Nunnally (1978) offers a rule of the thumb where the reliability of the research instrument is recommended if the score is 0.70 and beyond. As such, it can be concluded that the reliability is acceptable.

RESULTS AND DISCUSSION

Respondents' background

In total, 200 respondents participated in the survey and returned a well-distributed result. This section would go in-depth into the significant findings obtained from the research using chi-square test. chi-Square tests are performed to understand the associations and relationships between the variables. The reason for using chi-square tests in study is that it is as a nonparametric test that is applied to ascertain whether there are associations between categorical variables (i.e. whether the variables are independent or related). It helps to test the hypotheses developed in the study. In the chi-square test results, if the p-value is greater than the chosen significance level (α = 0.05), then the null hypotheses is not rejected. Hypothesis testing is conducted to validate and answer the

TABLE 1 | Reliability analysis results

Questions	Cronbach's alpha on standardized items	Number of items
Affordability attitudes	0.81	8
Price expectations	0.72	2
Intention to purchase flat	0.78	2
Reliability score for all items together	0.83	12

TABLE 2 | Gender-wise classification of the respondents

Gender	Number of respondents	Percentage
Female	79	39.5
Male	119	59.5
Prefer not to say	2	1.0
Total	200	100

TABLE 3 | Age-wise classification of the respondents

Age (in years)	Number of respondents	Percentage
18–26	6	3
26–35	20	10
36–45	98	49
46–55	54	27
56–65	21	10.5
Above 65	1	0.5
Total	200	100

TABLE 4 | Details related to housing status

Housing status	Umber of respondents	Percentage
I live with parents/relatives/friends	21	10.5
I own a condominium	47	23.5
I own an HDB property	102	51
I own a landed property	16	8
I rent	11	5.5
Others	3	1.5
Total	200	100

TABLE 5 | Details related to property ownership

Properties owned	Number of respondents	Percentage
0	28	14.0
1	131	65.5
2	24	12.0
3	10	5.0
4	1	0.5
Total	200	100

research objectives and overarching research question. In total, there were 119 men, 79 women, and two unknown genders amongst the survey respondents as observed from **Table 2**. **Table 3** showed the current age groups of the participants have a mode of 36–45-year age range and appears to be fairly normally distributed.

Half of the respondents own a public housing, i.e. HDB (Housing Development Board), whereas 25% own private property as described from **Table 4**. **Table 5** shows that 25% of respondents own more than one residential property. A crosstab analysis found that for these respondents who own more than one property, a larger proportion is in private housing as evident from **Table 6**. This suggested people are buying private properties as an investment for eventual capital gains or upgrade of their current public housing standards which is aligned with the literature (Wong and Yap, 2003).

Affordability

Most respondents purchased the property in their 20s, suggesting that affordability is high given that fresh graduates began approximately at age of 25 for men and 23 for women. From **Table 7**, it is observed that most saved for about 3–5 years before purchasing their first private residential property. Given the younger age and short duration to save for a house compared to the time to build the house, it could be inferred that the affordability is high. However, more than double respondents felt that in the next few years, the affordability for private properties would be lower.

Effectiveness of housing policies

Out of three policies that were asked respectively from **Table 8**, **9**, it is found that the Total Debt Servicing Ratio (TDSR) was seen to be having the most impact in reducing the private residential property prices in Singapore. TDSR ensured that individuals could not borrow too much excessively to speculate in the property market and thereby likely drove down demand and indirectly pushed the prices down. The weighted mean for TDSR is 6 compared to Additional Buyers Stamp Duties (ABSD) of 4.9 or SSD weighted mean of 1.37. The ability to borrow and purchase properties of value higher than annual income is the leverage that many used to evaluate if they could afford a private residential property at the current time, and **Table 10** shows details related to total debt servicing ratio.

Hypotheses testing

The hypotheses testing was analyzed with a chi-square test.

Hypothesis 1. Higher prices have no significant relationship with the affordability of private residential properties (Lennartz, 2017).

TABLE 6 | Detail of respondents' property ownership vs. housing status

Housing status	Number of properties owned				
	0	**1**	**2**	**3**	**4**
I live with parents/relatives/friends	14	6	0	0	0
I own a condominium	2	29	10	6	0
I own an HDB property	2	84	8	4	1
I own a landed property	0	12	3	0	0
I rent	9	0	2	0	0
If not, do you live with your parents/relatives/friends?	1	0	0	0	0
Others	0	0	1	0	0

TABLE 7 | Details of respondents first property purchase vs. number of saving years

Properties owned	Years saved for the first property				
	0	**1–2 years**	**10 years and above**	**3–5 years**	**7–9 years**
21–30	2	3	5	16	10
31–35	1	4	0	4	2
36–40	0	3	0	2	2
41–45	0	0	2	3	0
50 and above	0	0	0	0	1
I didn't own any property	0	0	0	1	0

TABLE 8 | Details related to seller's stamp duty effectiveness

Seller's stamp duty effectiveness	Number of respondents	Percentage
Not Effective	18	9
Somewhat Effective	22	11
Effective	61	30.5
Very Effective	59	29.5
Extremely Effective	37	18.5
Total	200	100

TABLE 9 | Details related to additional buyer stamp duty

Additional buyer stamp duty effectiveness	Number of respondents	Percentage
Not Effective	5	2.5
Somewhat Effective	1	0.5
Effective	14	7
Very Effective	82	41
Extremely Effective	97	48.5
Total	200	100

TABLE 10 | Details related to total debt servicing ratio

Total debt servicing ratio	Number of respondents	Percentage
Not Effective	6	3
Somewhat Effective	4	2
Effective	32	16
Very Effective	80	40
Extremely Effective	77	38.5
Total	200	100

A chi-square test found that there was a significant difference in terms of the perception of affordability as the price increased in the next 3 years from **Table 11**. **Table 11** showed that more respondents felt that the affordability would be harder thus rejecting the hypothesis at the 5% confidence level. There was sufficient evidence that prices affect affordability perception and soaring price trends beyond 24 months reduce affordability. This result reaffirmed the conclusion of Wong and Yap (2003) that escalating property prices weakened the hopes of buyers to own private property.

Next is to investigate the effects of affordability on demand for residential property.

Hypothesis 2. There was no significant impact on housing cost on property demand (Abeysinghe and Gu, 2011).

The difference between those who want to purchase a property and those who do not is significant at the 1% confidence level from **Table 12**. **Table 12** indicated that respondents who felt that cost is challenging and very difficult have significantly higher intention to purchase a property in the next year. There was sufficient evidence to reject the hypothesis and that affordability has an inverted-U-shape relationship with the demand for property.

On the other hand, the prices are associated with demand strikingly from the conventional wisdom that soaring prices lower the demand for goods.

Hypothesis 3. There was no significant relationship between affordability and demand for property (Bautista-Hernández, 2020).

It is found from **Table 13** that more of those expecting prices to increase in the next year intended to purchase property.

TABLE 11 | hi-Square test on affordability and price trend

24 months price expectations	Private properties are affordable in the next few years		
	No	Not sure	Yes
Prices will continue falling	6	1	2
Prices will increase slightly (1–3%)	26	32	27
Prices will increase (>3%)	34	15	22
Prices will remain relatively stable	11	11	2
Pearson Chi-square	16.072**		
Likelihood Ratio	17.699		
N of Valid Cases	200		

****Significant at 0.01 level.*
***Significant at 0.05 level.*
**Significant at 0.1 level.*
ˆSix cells (40%) have expected count less than 5. The minimum expected count is 2.52.

TABLE 12 | hi-Square test on affordability and property purchase intention

Housing cost of private residence for the next generation	Intention to buy property for the next 12 months	
	No	Yes
Challenging	0	4
Easy	0	1
Moderate	0	5
Very difficult	0	0
Pearson Chi-square	43.644***	
Likelihood Ratio	41.780	
N of Valid Cases	200	

****Significant at 0.01 level.*
***Significant at 0.05 level.*
**Significant at 0.1 level.*
ˆNine cells (60%) have expected count less than 5. The minimum expected count is 0.10.

Table 14 showed that the hypothesis was rejected at the 5% confidence level but the results suggested that alternative hypothesis did not hold as well. Higher expectations of price seem to relate to more demand for property purchase.

Therefore, more affordable housing and expectations of increasing price would increase demand for properties. A possible explanation would follow that of the wealth effect that increasing prices drive demand for investment and capital gains or even as a hedging asset in the long term as buyers stay in their new properties (DeoBardhan et al., 2003). However, higher prices with lower affordability cancelled each other out. Affordability could be improved with income growth or more policies that aim to reduce affordability.

Overall, the results showed that there was significant evidence to reject the null hypothesis and found that respondents felt that affordability would be harder shortly as prices continue to rise beyond the 24 months. Prices influenced the perception of affordability on private housing and respondents would choose to delay the purchase instead. Next, the affordability did impact the intention to purchase a property in the coming year. A lower intention implied that people are likely to withhold plans to purchase a private property thereby reducing the demand. While prices influence affordability and affordability would lead to increased intention to purchase properties, lower affordability did not mean that demand will fall. Affordability appears to have an inverted-U-shape relationship with demand. There was sufficient evidence at a 1% confidence level that higher expectations of price are positively associated with higher demand for private housing. The difference between those who want to purchase a property and those who do not is significant at the 1% confidence level. **Table 13** indicates that respondents who felt that affordability is challenging and moderate have significantly higher intention to purchase a property in the next year. For the extreme ends at which private housing was easily affordable, those who would find it very difficult were registering lower intention to purchase private properties. There was sufficient evidence to reject the null hypothesis and the alternative hypothesis that affordability is positively associated with the demand for property.

TABLE 13 | chi-Square test on price trend and property purchase intention

12 months price expectations	Intention to buy property for the next 12 months	
	No	Yes
Prices will continue falling	3	0
Prices will increase slightly (1–3%)	2	6
Prices will increase (>3%)	0	2
Prices will remain relatively stable	12	2
Pearson Chi-square	18.119**	
Likelihood Ratio	18.238	
N of Valid Cases	200	

****Significant at 0.01 level.*
***Significant at 0.05 level.*
**Significant at 0.1 level.*
ˆTen cells (66.7%) have expected count less than 5. The minimum expected count is 0.25.

CONCLUSION

To conclude the research, there are relationships between housing cost, affordability, and demand. To answer the research question, the chi-square and correlational tests conclude that affordability has fallen with the soaring prices and the intention to purchase private residential houses, thereby demand has increased albeit the decision would be delayed. The survey collected 200 respondents in measuring various aspects of the research topic, establishing external, internal, content, and construct validity. The research has been guided by literature that informed a negative correlation between housing demand and affordability and prices, respectively. This was supported in this study and the survey approach used for this research drew reference from the research work of Shaqra'a et al., (2015). The prices will play a pivotal role because the perception of the Dell'Anna et al. (2022) buyer will change for private housing and the study revealed that affordability will revert the relationship (Fan and Sing, 2021) with demand, if sufficient evidence was found in the present study (Ng et al., 2021).

The literature however presented gaps in understanding how Singapore's high costs of private property specifically in affecting the demand of the houses in Singapore. Notwithstanding limited research in Asia on private housing, there were also insufficient material in explaining how prices affect buyers' perception of affordability and demand for housing given the wealth and home ownership effects intertwined with a purchase of property.

Practical implications

This research would contribute to academic understanding of the intertwined relationship between housing cost, affordability, and demand for private properties. Given that prices influence affordability and demand in opposite ways for Singapore, the outcome suggests that people would delay further in housing purchase. The conceptual framework proposed through this study serves as a beginning for more analysis into the intricacies and weightage of pricing and other factors on affordability and demand. From this research, the housing cost has an impact on affordability and demand respectively. The results concluded a different effect with pricing associating with lower affordability yet higher intention to purchase a residential property. A surprise effect was that affordability that is not too high or too low would actually stimulate higher interest in the demand. The results showed a negative association between housing cost and perception of affordability. The research question was addressed in that this research concluded that demand and affordability are affected by housing cost in separate mechanics in Singapore. The results further contribute to policy-making by informed policy makers on balancing the price increase to maintain high demand in private housing while not dampening affordability too much. Moreover, the research found different importance in the housing policies with the total debt servicing ratio that enabled loans, and mortgage extensions were most significant in affecting their ability to purchase a private flat in terms of affordability. People could also use the results to guide their purchase decision by conversely purchasing private properties when others are delaying to get cheaper prices of the flats. This finding was supported by Mazurek et al. (2019), who highlight that the buyer would buy only when the deal is good and could be managed within his/her budget constraints.

Therefore, this study has addressed the missing gap in literature by conducting research into the relationship between Singaporeans' housing prices and buyers' demand. The results from the survey have been analyzed and found that there was sufficient evidence that higher prices influence lower perception of affordability whereas demand for property has not dampened with higher prices. People are likely to delay their purchase instead of dropping the aspiration entirely. Respondents felt that affordability would be harder in the near future as prices continue to rise beyond the 24 months. A lower intention implied that people are likely to withhold plans to purchase a private property, thereby reducing the demand. Yet, higher housing cost drove people to desire purchasing private property most likely as a growing wealth asset.

Future research and development

The generalizability of the findings can be applicable to the cities with similar size and population. Further, this research could be potentially expanded in multiple ways. One direction is to further investigate the relative impacts of the price on affordability and demand to evaluate the scenarios at which certain impacts could be stronger or weaker. Given that this research concluded that prices affect affordability and demand differently, it opens up more critical analysis into the rationale for the disassociation and also validates the effects in other comparable cities such as Hong Kong or London. Singapore provides a lot of subsidies for housing purchase. The relative influence on affordability compared to subsidies and other factors could be investigated to obtain a more complete understanding of the affordability construct for private housing.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

AUTHOR CONTRIBUTIONS

Conceptualization, ER, YC, and NN; methodology, ER and YC; software, ER, YC, and NN; validation, YC, ER, and NN; formal analysis, YC; investigation, YC and ER, data curation, YC; writing—original draft preparation, ER and YC; writing—review and editing, ER, YC, and NN; visualization, ER and NN; supervision, ER and NN. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest: YC is employed by Qingjian Realty (South Pacific) Pte Ltd., Singapore.

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