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# Access to homebuyer credit and housing satisfaction among households buying affordable apartments in urban Vietnam<sup>1</sup>

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## Abstract

*This study examines the relationship between the access to homebuyer credits and housing satisfaction among those buying affordable apartments, using a sample of 1,000 respondents from our own survey in 2016 in Hanoi, Da Nang and Ho Chi Minh Cities. Our regression analysis reveals the education level, the size and value of apartments are closely linked with the access to preferential homebuyer credits. Notably, we find that the access to preferential home loans has a strongly positive impact on housing satisfaction, after controlling for all other factors in the model. Thus, the finding confirms that preferential home loan programs play an important role in helping low income households own affordable apartments and increase their housing satisfaction. We also find that some other features of their apartments, such as the number of bath rooms and balconies, the distance from the apartment building to schools, bus stations and markets, are strongly linked with housing satisfaction.*

**Keywords:** affordable apartments; homebuyer credit; housing satisfaction; Vietnam

**JEL codes:** D4, D6, D11

## Compliance with Ethical Standards

## Conflict of Interest:

The author declares that he has no conflict of interest in this research

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## 1. Introduction

Rapid urbanization and population growth have created a high demand of housing units in Vietnam's big cities. It is reported that about one fifth (approximately 4.8 million households) of Vietnam's 24.2 million households were living in poor accommodation (WB, 2015). Especially, the housing shortage would continue to rise as the number of urban households are projected to increase to 10.1 million in 2020 (from 8.3 million in 2015) and the proportion of urban population is estimated to reach 50 % by 2040. This shows that about 374,000 additional units are needed in cities annually (WB, 2015).

While Vietnam's approach to housing policy has shifted from a centrally planned public housing approach to a market-oriented system, this market-based approach has not met the demand for more affordable housing (social and cheap commercial housing) and has pushed up house prices beyond the affordability of low and middle income households, especially in big cities (Nguyen, Tran, Vu, & Luu, 2018). Despite the housing price in Vietnam is not so high compared to that in neighboring countries, the ratio of house price to income in Vietnam is very high when the figures in Hanoi and Ho Chi Minh cities (HCMC) are 28 times and 18 times higher than that of Singapore, respectively (CBRE, 2014). Thus, affordable apartments<sup>2</sup> have been in huge demand in urban Vietnam (WB, 2015).

Access to housing finance is considered to be an important factor for low-income residents in buying affordable apartments in urban Vietnam (WB, 2015). Despite the regulations, procedures and conditions of homebuyer credit (e.g., VND 30 trillion package for low income households or commercial home loans) are publicly disclosed and quite straightforward, there have been obstacles to accessing the home loans for home buyers in Vietnam (Hoai Lam, 2018; WB, 2015). This motivates the current study to examine what factors affecting the access of households to homebuyer credits in Vietnam.

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<sup>2</sup> In the current study, affordable apartments include housing for low and middle income households, which were defined according to the Resolution No. 02/NQ-CP on January 7<sup>th</sup> 2013 and WB (2015). Low-income housing is housing with price less than 16 million VND per square meter, while medium-income housing is from 16-30 million VND per square meter.

Housing satisfaction is commonly used as one of the main indicator measuring the overall housing performance in many empirical studies (Nguyen et al., 2018). This is because housing satisfaction denotes the perceived quality of the home in terms of an overall attitudinal evaluation (Aragonés, Francescato, & Gärling, 2002) and the literature shows that housing satisfaction has been widely employed to evaluate the performance of all types of residential environments (Amole, 2009; Aragonés et al., 2002). Therefore, the current study also investigates whether the access of home buyers to homebuyer credits affect their satisfaction with affordable apartments, after controlling for other household and apartment characteristics.

Thus, the main objectives of the current study were to (i) examine factors affecting the access to homebuyer credits and (ii) to measure the impact of home loan access on housing satisfaction among those buying affordable apartments in there big cites of Vietnam. We find that the education level of home buyers and some characteristics of apartments have a close link with the access to home loans. Interestingly, our study provides the first evidence that the access to preferential homebuyer credits have a significant and positive effect on housing satisfaction. Thus, the finding confirms that preferential home loan programs play an important role in helping low income households own affordable apartments and increase their housing satisfaction.

## **2. Data and methods**

### *2.1. Study site and data collection*

This study was conducted in three big cities of Vietnam, namely Hanoi City, Ho Chi Minh City (HCMC) and Da Nang City. These are selected because Hanoi is the capital, HCMC is the largest city while Da Nang is the largest City in the central region. A multistage sampling technique were used for sample selection for the study. In Hanoi, six districts were randomly selected form the list of districts which have both social apartment and cheap commercial apartment projects. In each selected district, one social apartment project and one cheap commercial apartment project were randomly selected. 25 households living in the selected social apartment project and 50 households living in the selected cheap commercial apartment project were randomly selected, yielding a total of 450 households in Hanoi. The similar sampling method was also applied for the survey of 450 households in HCMC.

$$P_{ij}(j = k | X_i) = \frac{\exp(\beta_k X_i)}{\sum_{j=1}^3 \exp(\beta_j X_i)}$$

In Da Nang City, two districts were randomly selected from the list of districts having both social apartment and cheap commercial apartment projects. In each selected district, one social apartment project and one cheap commercial apartment project were randomly selected. 15 households living in the selected social apartment project and 35 households living in the selected cheap commercial apartment project were randomly selected, generating a total of 100 households in Da Nang. Thus, the total sample for the current study includes 1,000 households in three big cities. The survey was carried out from the beginning of July to the end of September 2016, and the data were collected by means of face-to-face interviews with the heads of households. In our research, respondents are all house owners and thus no house renters were involved in the survey.

### 2.1. Analytical models

The statistical analyses applied in the current study include descriptive statistics and multiple regression analysis. First, we examine factors associated with the access of households to various sources of home loans. Next, we investigate the impact of home loan access, among other household and apartment-related factors, on housing satisfaction among residents living in their affordable apartments in the study area.

Because the response variable (access to home loans) is a polychotomous variable having three categories, a multinomial logit model (MLM) was used to identify factors affecting the likelihood of a household being a non-borrower, a borrower with preferential home loan or a borrower with commercial home loan. A number of studies have used the MNL for estimating the likelihood of a housing borrowing loans from informal or formal credit sources (Doan & Tran, 2015) or the probability of a small and middle-sized enterprise borrowing a formal or informal loan in Vietnam (Nguyen & Luu, 2013).

Let  $P_{ij}(j=1, 2, 3)$  expresses the probability of being in a given borrowing group of a household  $i$  with:  $j=1$  if the household belongs to the non-borrowing group;  $j=2$  if the household falls into the preferential home loan group; and,  $j=3$  if the household is in the commercial home loan group. Then the multinomial logit model is given by

$$P_{ij}(j = k|X_i) = \frac{\exp(\beta_k X_i)}{\sum_{j=1}^3 \exp(\beta_j X_i)} \quad (j = 1,2,3) \quad (1)$$

In order to make the model identified,  $\beta_j$  is set to zero for one of categories, and coefficients are then interpreted with respect to that category, called the reference or base category (Cameron & Trivedi, 2005). Thus, set  $\beta_j$  to zero for one of three groups (says the non-borrowers), then the MNL model for each group can be rewritten as:

$$P_{ij}(j = k|X_i) = \frac{\exp(\beta_k X_i)}{1 + \sum_{j=1}^3 \exp(\beta_j X_i)} \quad (j = 1,3) \quad \text{and} \quad P_{ij}(j = 2|X_i) = \frac{1}{1 + \sum_{j=1}^3 \exp(\beta_j X_i)} \quad (2)$$

which can be estimated using the method of maximum likelihood.

The probability of a household belonging to a given borrowing group was hypothesized to be affected by the characteristics of households and apartments. Also, two dummy region variables were also included in the model to control for fixed-region effects. Table 1 describes the definition and measurements of variables included in the model of borrowing home loans.

$$\mathbf{Home\ loan\ (HLi)} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i \quad (1)$$

In equations 1  $X_{1i}$  is the vector of individual and household characteristics while  $X_{2i}$  is a set of variables reflecting the physical housing characteristics.  $HLi$  represents the home loan decision and  $\varepsilon_i$  is an error term.

We also investigate factors affecting the level of housing satisfaction in the current study. Housing satisfaction scores of respondents, taken from a multiple-choice question: “Taken altogether, how satisfied are you with your apartment at present?” The five possible responses to the question are “very dissatisfied,” “dissatisfied,” “neither satisfied nor dissatisfied,” “satisfied,” and “very satisfied.” Thus, for our analysis, housing satisfaction is constructed with a value from 1 to 5, corresponding to “very dissatisfied,” “dissatisfied,” “neither satisfied nor dissatisfied,” “satisfied,” and “very satisfied,” respectively. The literature indicates that housing satisfaction is mainly determined by two groups of factors (Addo, 2016; Baiden, Arku, Luginaah, & Asiedu, 2011; He & Yang, 2011; Huang, Du, & Yu, 2015; Ren & Folmer, 2017): (i) objective attributes of the individual or household, i.e. personal and socioeconomic characteristics; (ii) objective characteristics of the environment, i.e. dwelling and neighborhood characteristics.

As already mentioned, homebuyer credits are of great importance for purchasing affordable apartments in Vietnam (WB, 2015). Thus, homebuyer credits were also included as a variable of interest in the current study. On the one hand, homebuyer credits may have positive link with housing satisfaction because they enable home buyers to own apartments immediately, instead of saving enough money to purchase later. On the other hand, paying interest to borrow home loans to buy apartments immediately may put more financial pressure on home loan borrowers, which in turn may have a negative effect on their housing satisfaction. This suggests that the effect of homebuyer credits on housing satisfaction may be ambiguous.

The equation (2) was used to examine factors associated with housing satisfaction. The equation (2) used the same explanatory variables as those in equation (1) but added the variable of *home loan (HSi)* and  $u_i$  is an error term in the model. Unfortunately, an endogenous problem arises when home loan is an explanatory variable but is jointly determined with housing satisfaction (Wooldridge, 2013). In this situation, the ordinary least squares (OLS) method produces biased and inconsistent estimates (Angrist & Pischke, 2008) and the method of instrumental variables (IV) can be used to obtain consistent estimators (Wooldridge, 2013).

$$\text{Housing satisfaction (HSi)} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 \text{HS(home loan)}_{3i} + u_i \quad (2)$$

We need to search for a good instrument. A reliable instrumental variable must satisfy the following two conditions. First, the instrument must be strongly correlated with the endogenous regressor (home loan) once other exogenous explanatory variables from the structural equation have been netted out. This is often referred to as the “strength” of instrument or the relevance assumption. Second, it must be exogenous in the structural equation (i.e., uncorrelated with the error term), which is commonly called the “validity assumption.” (French & Popovici, 2011) Specifically, the instrument affects housing satisfaction but not the access to home loans. First, the IV method estimates the impact of instrumental variable ( $Z_i$ ) on home loan. Second, the IV method estimates the impact of home loans on housing satisfaction. By following this procedure, instrument affects life satisfaction only through their impact on housing satisfaction.

We used two dummy variables of region (Da Nang and Hanoi)<sup>3</sup> and the value of apartments

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<sup>3</sup> The omitted category is Ho Chi Minh City

( at the buying time) as potential instruments for having homebuyer credits. Different socio-economic characteristics across regions might affect the choice of various home loans and the regional variable is more likely to be exogenous. While the value of apartment might be closely linked with the decision of home loans, this instrument may fail to meet the assumption of instrument exogeneity because the greater value of apartment may directly affect housing satisfaction. The above discussions suggest that several necessary IV tests must be used to confirm whether both requirements of instruments (relevance and exogeneity) are satisfied or at least using a set of invalid and weak instruments that provides imprecise estimates and misleading results can be avoided (Angrist & Pischke, 2008).

**Table 1: Definition and measurement of included variables**

<b>Variables</b>	<b>Definition</b>	<b>Measurement</b>
<i>Dependent variables</i>		
Housing satisfaction	How are you satisfied with your apartment at present?	Five point Likert scale
Home loan	Non-borrowers; borrowers with preferential home loan; borrowers with commercial home loan	Three categories: 1;2;3
<i>Explanatory variables</i>		
Age	Age of respondent	years
Gender	Respondent's gender	1= male; 0= female
Marriage	The marital status of respondents	1=single; 0=married
<i>Education</i>		
Bachelor's	Has a bachelor's degree	1= yes; 0= otherwise
Master's or higher	Has a master's degree or higher	1= yes; 0= otherwise
<i>Employment status</i>		
Pubic employment	Civil servants	1= yes; 0= otherwise
Wage employment	Wage workers that were hired by enterprises, households or individuals	1= yes; 0= otherwise
Self-employment	Self-employment in various economic activities	1= yes; 0= otherwise
<i>Household characteristics</i>		
Household size	Total number of household members	numbers
Young members	Total number of household members aged 14 and younger	numbers
Old members	Total number of household members aged 60 and older	numbers
<i>Economic status</i>		
	Monthly average total household income (million Vietnamese dong) (VND) at the time of a household buying the apartment.	
Middle income	From 10 million to 20 million VND	1= yes; 0= otherwise
High income	More than 30 million VND	1= yes; 0= otherwise
<i>Home loan</i>		
Preferential loans	Borrowed preferential home loan to buy the apartment	1= yes; 0= otherwise



Commercial loans	Borrowed commercial home loan to buy the apartment	1= yes; 0= otherwise
<i>Physical characteristics of apartments</i>		
No furniture	Apartment with no furniture	1= yes; 0= otherwise
Partial furniture	Apartment being equipped with some basis furniture	1= yes; 0= otherwise
Size	Total size of apartments	squared meter
Balconies	Number of balconies	number
Bathrooms	Number of bathrooms	number
Living rooms	Number of living rooms	number
Type of apartment	Which type of apartment does the respondent own?	1=Social apartment; 0=Cheap commercial apartment
<i>Other characteristics of apartments</i>		
Lower secondary school	The nearest distance to the lower secondary school	km
Primary school	The nearest distance to the primary school	km
Kindergarten school	The nearest distance to the kindergarten school	km
The evaluators	The number of households per an evaluator	numbers
Markets	The nearest distance to the markets/ shopping area	km
Bus	The nearest distance to the bus station	km
Park	The nearest distance to the Park	km

### 3. Results and discussion

#### 3.1. Descriptive statistics

Table 2 provides some background information on demographic, educational, employment and economic characteristics of respondents (household heads). It shows that the age, education level, gender and marital status are quite similar between the two groups of home buyers. However, there are some differences in occupational types between the two groups. For instance, the percentage of respondents working in the public sector is much higher (30%) among those buying cheap commercial apartments than those buying social apartments (22%). The proportion of respondents working in the private sector is lower for the social apartment group while the proportion of respondents working as self-employers is similar between the two groups. The data in Table 2 show that 13%, 50% and 38% of the surveyed households are categorized as low-, middle- and high-income groups, respectively. The proportion of low- and middle-income households seems to be higher among those living in SAs, while the number of high-income households is higher for those residing in CCAs.

*Table 2: Descriptive statistics of home buyers by house types*

Home buyers	Cheap commercial apartments (CCAs)		Social apartments (SAs)		All	
Characteristics	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>
Age	37.56	9.84	36.25	7.94	37.10	9,23
Gender	0.56	0.50	0.57	0.50	0.56	0,50
Marriage	0.07	0.25	0.08	0.27	0.07	0,26
Not having a bachelor's degree	0.19	0.39	0.22	0.41	0.20	0,40
Having a bachelor's degree	0.73	0.44	0.69	0.46	0.72	0,45
Above a bachelor's degree	0.08	0.27	0.10	0.30	0.09	0,28
Public employment	0.30	0.46	0.22	0.41	0.27	0,44
Wage employment	0.27	0.45	0.35	0.48	0.30	0,46
Self-employment	0.43	0.50	0.43	0.50	0.43	0,50
Household size	3.59	1.05	3.47	0.96	3.55	1,02
Young members	1.25	0.77	1.25	0.74	1.25	0,75
Old members	0.26	0.59	0.19	0.50	0.24	0,56
Low income	0.11	0.31	0.17	0.38	0.13	0,34
Middle income	0.46	0.50	0.56	0.50	0.50	0,50
High income	0.44	0.50	0.26	0.44	0.38	0,48
Observations	646		354		1000	

As shown in Table 3, 42% of the surveyed households borrowed home loans and the figures are much higher (57%) for those buying SAs than those buying CCAs (34%). On average, the mean value of home loan is about 500 million VND for the whole sample, and slightly higher for those buying CCAs (520 million VND) than those buying SAs (477 million VND). However, a substantially proportion of household buying SAs received loans from the VND 30 trillion package (73%), while the corresponding figure for those buying CCAs is only 41%. By contrast, the share of households borrowing from other preferential and commercial home loans is higher for those buying CCAs.

*Table 3: Descriptive statistics of home loans by house types*

House type	Cheap commercial apartments (CCAs)		Social apartments (SAs)		All	
Home loan sources	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>
Home loan (1=yes; 0=not)	0.34	0.48	0.57	0.50	0.42	0.49
(the value)	520.12	272.38	477.61	181.43	499.92	234.32

The VND 30 trillion package (1=yes; 0=not)	0.41	0.49	0.73	0.44	0.56	0.50
(the value)	518.33	168.44	459.86	139.18	482.22	153.36
The other preferential credits(1=yes; 0=not)	0.11	0.31	0.07	0.26	0.09	0.29
(the value)	454.17	193.88	378.00	116.08	424.87	170.66
Commercial home loan (1=yes; 0=not)	0.48	0.50	0.19	0.40	0.35	0.48
(the value)	536.44	348.11	582.82	278.12	548.83	330.58

Note: The VND 30 trillion preferential credit package for low income home buyers

Regarding the physical characteristics of apartments, the data in Table 4 indicate that the average size of apartments is about 71.7 m<sup>2</sup>. However, the average size of SAs is smaller than that of CCAs. The average number of rooms, bathrooms and balconies is quite similar in the two types of apartments. Unsurprisingly, the average price per m<sup>2</sup> is quite higher for CCAs, while the number of apartments per an evaluator is higher for SAs. Finally, there is no significant differences in between the two types of apartments in the distance from the apartment buildings to the nearest school, park, bus station and markets.

Table 4: Descriptive statistics of apartments

<b>House type</b>	Cheap commercial apartments		Social apartment		All	
	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>	<i>Mean</i>	<i>Sd</i>
<b>Characteristics</b>						
House size ( m <sup>2</sup> )	74.72	18.96	66.06	15.82	71.69	18.39
Balconies	1.21	0.43	1.16	0.37	1.19	0.41
Bathrooms	1.74	0.47	1.59	0.50	1.69	0.49
Living rooms	2.14	0.47	2.01	0.42	2.10	0.45
No furniture	0.15	0.36	0.12	0.33	0.14	0.35
Partial furniture	0.58	0.49	0.61	0.49	0.59	0.49
Full furniture	0.29	0.46	0.33	0.47	0.31	0.46
Price (million VND/m <sup>2</sup> )	17.20	5.70	13.50	3.73	15.90	5.70
No of apartments/an evaluator	74.45	23.33	84.59	22.82	78.03	23.65
The nearest market/ shopping area (km)	1.93	1.26	3.22	2.10	2.39	1.72
The nearest park (km)	2.29	2.47	2.99	2.95	2.54	2.67
The nearest kindergarten (km)	3.02	1.87	3.02	1.84	3.02	1.86
Lower secondary school (km)	1.85	1.19	3.12	1.56	2.29	1.46
Primary school (km)	1.54	1.05	2.25	1.74	1.79	1.37

The nearest bus station (km)	0.54	0.83	0.66	0.57	0.58	0.75
Observations	646		354		1000	

Table 2 presents sample summary statistics about housing satisfaction. The mean score of housing satisfaction was estimated at about 3.46 points for the whole sample and the figure for Hanoi was slightly lower than that for HCMC. About 60% of all respondents said they were satisfied or very satisfied with their home, while 21% said that they were neither satisfied nor dissatisfied, and 19% reported they were dissatisfied or very dissatisfied. A close look at the data by city shows that a higher proportion of respondents living in HCM reported having a higher level of housing satisfaction than did those living in Ha Noi.

*Table 5: Distribution of residential satisfaction by city (% of samples)*

City	Ha Noi		Da Nang		HCMC		The whole sample	
	Cases	Percent	Cases	Percent	Cases	Percent	Cases	Percent
Very dissatisfied	33	6.60%	8	8.00%	21	5.26%	62	(6,21%)
dissatisfied	71	14.80%	8	8.00%	46	11.53%	128	(12,81%)
Neutral	107	21.40%	24	24.00%	82	20.55%	213	(21,32%)
Satisfied	237	47.40%	48	48.00%	198	49.62%	483	(48,35%)
Very satisfied	49	9.80%	12	12.00%	52	13.03%	113	(11,31%)
Mean scores ( SD)	3.39 (1,06)		3.48 (1,06)		3.54 (1,02)		3.46 (1,05)	

### 3.2. Factors associated with the access to home loans

Table 6 presents the results from the MNL (Multinomial Logit) regression. We ran two models using different sets of explanatory variables. The estimation results show that some explanatory variables are statistically significant at the 10% level or lower, with their signs as expected. In addition, the Pseudo-R<sup>2</sup> = 0.20 and is highly significant, suggesting that this model has strong explanatory power (Louviere, Hensher, & Swait, 2000). The results show that the probability of receiving preferential homebuyer credits<sup>4</sup> would be 1.34 times higher for those buying social

<sup>4</sup> Preferential homebuyer credits include the VND 30 trillion package for low income households and other preferential home loans.

apartments (SAs) than for those buying cheap commercial apartments, holding all other factors constant in the model<sup>5</sup>.

Interestingly, education has a significant impact on receiving the preferential homebuyer credit. Those with a master's degree had a chance of borrowing the preferential home loans that is 1.95 times higher than did those without bachelor degrees. Regarding the access to commercial homebuyer credits, while the probability of borrowing commercial home loans would fall by 42% when a homebuyer had a bachelor degree, it would rise by 40% if a homebuyer had a master's degree. However, the results confirm that age, occupation and household size are not associated with the access to homebuyer credits. This might suggest that there is no discrimination in accessing homebuyer credits among the surveyed households.

Table 6: Factors associated with the access to home loans

Explanatory variables	Preferential/VND 30 trillion package credit		Commercial homebuyer credit	
	Coefficient	SE	Coefficient	SE
House type	0.85**	(0.343)	0.20	(0.277)
Age	-0.04**	(0.016)	-0.03	(0.022)
Gender	0.26	(0.176)	-0.10	(0.250)
Marriage	0.45	(0.421)	0.03	(0.583)
Bachelor's degree	0.12	(0.258)	-0.54**	(0.271)
Above bachelor's degree	0.67*	(0.404)	0.88**	(0.413)
Public employment	0.50	(0.313)	-0.42	(0.421)
Wage employment	0.41	(0.255)	0.08	(0.230)
Household size	0.02	(0.239)	0.19	(0.292)
Young members	-0.21	(0.220)	-0.03	(0.254)
Old members	-0.44**	(0.216)	0.04	(0.287)
Middle income	0.53	(0.381)	0.21	(0.374)
High income	0.05	(0.520)	0.11	(0.392)
The value of apartments ( Log)	-1.62***	(0.472)	0.37	(0.402)
No furniture	0.55	(0.401)	0.11	(0.351)
Partial furniture	0.37	(0.262)	0.28	(0.254)
House size (m <sup>2</sup> )	-0.07***	(0.023)	-0.00	(0.025)
Balconies	0.13	(0.214)	-0.10	(0.209)
Bath rooms	0.05	(0.321)	0.05	(0.213)
Living rooms	0.08	(0.284)	-0.10	(0.331)
Lower secondary school	0.11	(0.121)	0.12	(0.105)
Primary school	-0.04	(0.110)	-0.31*	(0.160)
Apartments/an evaluator	-0.01**	(0.006)	-0.01	(0.005)
Markets	0.02	(0.107)	-0.12	(0.078)
Park	0.03	(0.044)	-0.03	(0.048)
Bus station	0.19	(0.166)	0.31*	(0.186)
Kindergarten	-0.27***	(0.088)	0.26***	(0.081)
Hanoi	0.13	(0.378)	-1.54***	(0.334)

<sup>5</sup> This is calculated as:  $RRR (relative\ risk\ ratio) - 1 = e^{\beta} - 1 = e^{0.85} - 1 = 1.34$  times (or 134%)

Da Nang	-2.67***	(0.910)	-0.55	(0.405)
Constant	12.83***	(3.222)	-2.30	(2.836)
Wald chi2(58)		769.67		
Pseudo R <sup>2</sup>		0.20		
Observation		1,000		

*Note:* estimates are accounted for apartment project and robust standard errors. \*, \*\*, \*\*\* mean statistically significant at 10%, 5% and 1%, respectively. The omitted categories in the dummy variable analyses are CCAs; female; married; no bachelor degree; self-employment; low income; full furniture; HCM City. The base group: non-borrowers.

We find that the size of apartments and its total value reduce the probability of receiving preferential home loans. Finally, with respect to the provincial level factors that affect the access to homebuyer credits, the results show households living in Da Nang had a lower likelihood of borrowing preferential home loans than those living in HCMC. Also, those living in Hanoi would have a lower chance of borrowing commercial home loans than those in HCMC.

### 3.3. Factors associated with housing satisfaction

Table 7 presents the estimation results from the instrumental variable (IV) method. We used the formal weak instrument test developed by Stock and Yogo (2002) using the value for the test statistic that is the F-statistic form of the Cragg-Donald Wald F statistic (Cameron & Trivedi, 2005). Table 6 indicates that the values of the Cragg-Donald Wald F statistic were 5.751, which exceeds the reported critical value of 5.442, so we can say that the instruments are not weak and satisfy the relevance requirement. In addition, the Hansen J-statistics were not statistically significant and thus confirmed the validity of the instrumental variable (Baum, Schaffer, & Stillman, 2003). The specification tests indicated that the selected instrumental variables are in fact valid instruments. Because the access to homebuyer credits was potentially endogenous, an endogeneity test of this variable was conducted. The results confirm that the null hypothesis of exogenous regressors was rejected at the level (1%), confirming that home loan access is endogenous (Table 7). This results, therefore, show that the IV model is preferred to the OLS model (Baum et al., 2003).

As evidenced in Table 7, the age, occupation and gender of respondents have no impact on residential satisfaction. However, the results show that respondents with a master's degree tend to be less satisfied with their apartments than those without a bachelor's degree. This might be explained by the fact that those with higher education tend to have higher standards and aspirations,

which may make them less satisfied with their home. Similar to other studies (Li & Wu, 2013; Zhu & Shelton, 1996), the current study find no impact of household income on housing satisfaction. Those buying SAs tend to have a lower level of housing satisfaction (about -0.32 points) than do those buying CCAs. This might reflexes the fact that the quality of construction or services of social housing projects might be lower than that of cheap commercial housing projects, which in turns can reduce the satisfaction with housing among those owning SAs. Those buying apartments with no or partial furniture would be less satisfied with their home than those buying apartments with full furniture. Having on more balcony would lower housing satisfaction by 0.17 points while having more bath rooms would increase housing satisfaction by 0.20 points. Unsupprisingly, the longer distance from apartment buildings to lower secondary school, bus station and markets would reduce the level of housing satisfaction among homebuyers. In general, our findings are consistent with previous findings which found that housing satisfaction is substantially affected by a number of physical characteristics of the environment, e.g., dwelling and neighborhood characteristics (Addo, 2016; Baiden et al., 2011; Diaz-Serrano, 2009).

*Table 7: Factors associated with housing satisfaction  
(IV method with 2SLS: Two-Stage Least Squares)*

<b>Explanatory variables</b>	<b>Coefficient</b>	<b>SE</b>
<i>Preferential homebuyer credit</i>	<b>1.81***</b>	(0.689)
<i>Commercial homebuyer credit</i>	-0.69	(0.871)
House type	-0.32**	(0.150)
Age	0.00	(0.007)
Gender	0.00	(0.081)
Marriage	0.18	(0.212)
Bachelor's degree	-0.16	(0.133)
Above bachelor's degree	-0.46**	(0.191)
Public employment	-0.16	(0.161)
Wage employment	-0.07	(0.117)
Household size	-0.12	(0.092)
Young members	0.14	(0.086)
Old members	0.18**	(0.088)
Middle income	0.09	(0.172)
High income	0.20	(0.178)
No furniture	-0.45***	(0.160)
Partial furniture	-0.40***	(0.123)
House size (m <sup>2</sup> )	0.00	(0.007)
Balconies	-0.17*	(0.095)
Bath rooms	0.20*	(0.116)
Living rooms	0.08	(0.112)
Lower secondary school	-0.13**	(0.062)
Primary school	-0.05	(0.053)
Apartments/an evaluator	-0.00	(0.002)
Markets	-0.12***	(0.040)
Park	-0.01	(0.019)

Bus station	-0.15**	(0.062)
Kindergarten	0.08**	(0.034)
Constant	4.01***	(0.660)
Excluded instrumental variables	The value of apartment; Hanoi, Dang Nang	
Weak identification test (Cragg-Donald Wald F statistic) [Stock-Yogo weak id test critical value at 10 percent]	5.751	
Hansen J statistic ( <i>p-value</i> )	5.442	
Endogeneity test of endogenous regressors: ( <i>p-value</i> )	0.8246	
Observation	1,000	
Centered R-squared	-0.363	

Note: estimates are accounted for apartment project and robust standard errors. \*, \*\*, \*\*\* mean statistically significant at 10%, 5% and 1%, respectively.

As aforementioned, one of main purposes in our study is to examine the relationship between the access to homebuyer credits and housing satisfaction. Surprisingly, we find that respondents with preferential home loans tend to be more satisfied with their home than their non-borrowing counterparts. Specifically, preferential home loan borrowers would have residential satisfaction scores 1.81 points higher than their counterparts, keeping all other factors constant. This may stem from the fact the access to preferential homebuyer credits enabled low income households to own apartments immediately, instead of saving enough money to purchase later. However, we find no impact of borrowing commercial home loans on housing satisfaction.

#### 4. Conclusion and policy implication

The main objective of the current study was to investigate the access to homebuyer credits and its impact on housing satisfaction among residents who live in their own affordable apartments in sampled apartments of Ha Noi, Da Nang and HCMC, Vietnam. We find that 42% of the surveyed respondents took out loans to buy apartments. The figures are much higher (57%) for those buying SAs than those buying CCAs (34%). A higher proportion of households buying SAs received loans from the VND 30 trillion package (73%), while the corresponding figure for those buying CCAs is only 41%. We find that the access to preferential home loans are significantly affected by the education level of homebuyers, the size and value and type of apartments. In addition, our study confirms that the access of households to preferential home loans was not affected by their occupation, age and gender and household income.



The study finds that 60 % the respondents were satisfied or very satisfied with their residences. About 20% were neither satisfied nor dissatisfied while nearly 20% were dissatisfied or very dissatisfied with their housing. Interestingly, our econometric analysis provide the first evidence that the access to preferential homebuyer credits had a significantly increasing impact on the level of housing satisfaction, even after controlling for many other factors and the endogeneity of homebuyer credits. The above findings, therefore, confirm that the preferential home loans not only helped households own affordable apartments but also increased their housing satisfaction. A policy implication here is that housing credit policies such as the VND 30 trillion package should be continued in order to help low-income households to access affordable housing.

Our multiple regression analysis also finds a number of other factors affecting housing satisfaction. Those buying SAs tend to be less satisfied with their housing than did those buying CCAs. Possibly, this might suggest that social apartment projects might have lower quality of services or construction, which made homebuyers less satisfied with their housing. As expected, we find that those buying apartment that are closer to schools, bus stations and markets would feel more satisfied with their housing. This suggests that a prime location of apartment projects would be an important residential housing factor and that affordable apartment projects should be developed in relatively convenient locations. However, Nguyen et al. (2018) noted that such a policy implication raises some challenging questions. A prime location often requires much investments in socio-economic infrastructure (e.g., roads, schools), while such investments may offer low short-term returns for housing developers. Therefore, land prices in relatively prime locations are often too high to make a project affordable for low-income households. This implies that the government policies should support the development of an affordable housing market by investing in socio-economic infrastructure or by putting forward more incentives and preferential policies to encourage developers who invest in less convenient locations.

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