

## **The Economic and Demographic Effects on Housing Tenure Choice in Pakistan**

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### **Abstract**

*This paper provides an in-depth analysis of homeownership in Pakistan based on micro-level household data of 2004-05. To analyze homeownership at the country level, probability function is estimated by using linear, Probit and Logit models. Since the presence of highly insignificant parameters in the regression equation is expected to have eroded the quality of other parameters. Therefore, stepwise elimination procedure is applied to drop insignificant variables in the light of Theil's Benchmark Criterion. The interpretation of regression coefficient in the non-linear probability models is not very straightforward. Therefore probability derivatives are computed for all the independent variables. The results of our analysis indicate that there are several demographic, social and economic factors, which are responsible for the variation in decision regarding homeownership across households. Among these factors: household size, age, and education of household head, effects positively in this decision. Whereas sex (if household head is male), number of earners in the household and residential location of the household effects negatively in the decision of homeownership.*

**Key Words:** Pakistan, Housing tenure Choice, Homeownership.

**JEL Classification:** R21, R22 and R29

### **1.1 Introduction**

The distinction between the housing consumption of homeowners and renters is well acclaimed. There exists a large amount of literature, though mostly for developed countries, focusing on the explanation of housing tenure choice, which is the most important decision about the nature of housing consumption. The neoclassical models of housing demand are based on several assumptions about consumer behavior, the nature of the housing commodity, and the housing market. Homeownership decision is assumed to parallel consumer decision-making. The object of consumer decision making is considered not to be regarding the observable heterogeneous commodity of housing; it is rather regarding an unobservable homogeneous commodity called housing services (Muth (1960) and Olsen (1969)).

The determinants of housing demand as researched by neoclassical housing economists are principally income, price and taste. Household demographic characteristics such as age, household size, sex, marital status and residential location are used to proxy the effects of taste factors on housing consumption. Occupation, education of the head and his/her spouse and numbers of household head's children going to school are included in housing demand models on the grounds that they influence the future income potentials of the households. The variables such as age, marital status, sex of household head, household size, education of household head and his/her spouse, number of earners in family, region, number of children in schools, and occupation of the household's head may also be affecting tenure choice. Generally, these variables relate to the household's status in the life cycle and the degree to which it is mobile or settled.

The plan of this paper is as follows. In section 1.2 gives the data sources. In section 1.3 variables determining homeownership are discussed. Section 1.4 presents the empirical methodology in which 1.4.1 presents a linear probability model, 1.4.2 presents non-linear models, 1.4.3 presents Logit model and 1.4.4 presents Probit model. Section 1.5 presents the results of estimation. Section 1.6 consists of discussion.

## 1.2. Data Sources

The data for this study are taken from *the Household Integrated Economic Survey (HIES) 2004-05*.<sup>1</sup> The universe of *HIES* consists of all urban and rural areas of all the four provinces (Punjab, Sindh, KPK, Balochistan) as defined by the provincial governments. Military restricted areas have been excluded from the scope of the Survey. The total number of households surveyed in *HIES* is 14244 of which 5658 households are from urban areas and 8586 households are from rural areas.

## 1.3 Variables Determining Homeownership

The idea of using household characteristics as determinants of housing consumption decision is intuitive as we observe some connection in homeownership and household socioeconomic conditions, for example, household with higher income and more education may prefer to own a house rather than rent it in. In choosing these determinants we have considered the standard practice in the literature and the particular socioeconomic situation prevailing in Pakistan. The data availability of these variables is important to finally choose the set of determinant.

The dependent variable is taken as housing tenure choice. Thus, we construct binary variable for housing tenure choice assigning the value of one of homeownership and zero to rent occupied houses, subsidized rent houses or rent-free houses. The independent variables are classified into six categories. These are a) demographic variables, b) variables describing marriage of the head of household, c) education related variables, d) economic variables, e) variables describing occupation of the head of the household, and f) variable describing the residential location of the head of the household. All the independent variables interact with residential location of the household. The interacted independent variables are also classified as above, except obviously the residential location itself. The complete list of dependent and independent variables is presented in Table 1.1.

## 1.4 Empirical Methodology

Our dependent variable is binary response variable and there are three approaches available to estimate the regression models with such dependent variables: linear probability model, Logit model and Probit model. We start our analysis of linear probability model because it is comparatively simple and can be estimated by Ordinary Least Square (OLS) method.

## 1.5 The Results of Estimation

To analyze homeownership, probability function is estimated by using linear, Probit and Logit models. Table 1.2 (Table 1.2 can be available at request) shows that with only few exceptions there is not much difference in the qualitative nature (sign and significance of parameter estimates) of results across the three models. It appears that the most important sets of independent variables affecting the decision of homeownership are demographic variables, households' education variables and residential location of the household. Our results are consistent with the findings of Gibb (2000) for Scotland and the opposite of the results of Gyourko *et al.* (1999) for the U.S.A.

The independent variables of the model interact with residential location. It shows that some of the important factors affecting the decision of homeownership when variables are interacted with residential location are demographic variables and some variables in the set of households' education and economic status of the family.

In the first group of independent variables (household demography), the estimation shows that the sex of the head of the household has insignificant effect on homeownership in Logit and Probit model.

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<sup>1</sup> *Household Integrated Economic Survey (HIES)* is conducted under the project of *Pakistan Social and Living Standard Measurement Survey (PSLM)*.

The group of household head's marriage includes the marital status of the head of household. A never married head of the household has less probability of owning a home than currently married category in all the three models. A never married household head is likely to have a lesser probability of homeownership. Similarly, a divorcee/widow/widower head of the household has a negative and insignificant effect on probability of homeownership in all three models. This is an expected result regarding the Pakistan's housing consumption because the divorced / widow/widower usually settles with relatives after divorce or death of the spouse. Also they may have some dependents and they have to bear the consumption expenditures on them. Süheyla and Zeynep (2005) also confirm this result for the U.S.A., but Bourassa (1995a) comes up with opposite results for the two main cities of Australia, namely Sydney and Melbourne.

The third group of variables is household education. The results show that the number of household heads' children going to school has a positive and insignificant effect on the probability of homeownership in all the three models. A head's education that has a bachelor's degree and professional/higher education has a positive but insignificant effect on the probability of homeownership in linear probability model whereas it has positive and significant effect on the other two models. The education level of the spouse of household head does not seem to have a significant effect on the probability of homeownership in any of the three models. The results overall indicate that the education level of households' head matters more in housing consumption decision compared to the education level of the spouse. The same conclusion is found in Bourassa (1995b) for Australia.

The results show that the level of income of the head of household and other income have negative but insignificant effects on the probability of home ownership, though the income of household head is positive but still insignificant in the linear probability model. The number of earning members in the household has a negative effect on the probability of homeownership in all three models but it is insignificant in the linear probability model. Estimates show that the occupation of the head of the household does not affect the probability of homeownership significantly as all the categories of occupation increase the probability of owning a house insignificantly. All the independent variables interact with the dummy variable representing residential location of the household. Here again we find that quite a few parameters are statistically insignificant with some parameter estimates having unexpected signs. Since the presence of highly insignificant parameters in the regression equation is expected to erode the quality of other parameters, therefore it is necessary to drop some of these variables from the regression equation before interpreting parameters of the model. Therefore, the stepwise elimination procedure is applied to drop insignificant variables in the light of Theil's Bench Mark Criterion.

Application of the backward elimination procedure shows that there are some variables that appear with significant parameters in the Probit model (occupational variables such as professional and technician/associate professional/clerks) and but not in the Logit model. Similarly, some variables are significant in Logit model but not in the Probit model. Probit and Logit models are estimated by considering all the variables that are significant in either of the two models. The final estimates obtained with this procedure are presented in Table 1.3. Here it is found that there are some variables that remain insignificant at 5% and 1% level, but their 't' statistics are greater than one in absolute terms. It is observed that estimated regression parameters remain quite stable after insignificant variables are dropped from the equation obtained under any of the three models.

Also notice that the interpretation of regression coefficient in the non-linear probability models is not very straightforward. Therefore, we postpone this task for the time being and rather concentrate on signs and significance of various parameters. The first obvious observation is that the estimated value of intercept in all the models are highly significant; suggesting that there are many other factors not included in the analysis that could have significantly affected the probability of homeownership. This observation is further confirmed with low values of  $R^2$ . However, this observation should not necessarily be taken as a poor reflection on the quality of results. The low value of  $R^2$  is a typical phenomenon in cross-section studies, especially when the number of observations is in the thousands. There are inevitably many unknown factors affecting the homeownership decision, no matter how careful one tries to be in selecting the potential explanatory variables. Table 1.3 shows that with only few exceptions there are not much difference in the qualitative nature of results across the two models. It appears that the most important factors affecting the decision about homeownership are household size, age of the household head, educational level of the household head, two categories of occupation of the household head (professional and technician/associate professional/clerk), and residential location of the household.

Some of the variables in interactive form are also significant in the two models. These include household size and age of household head. The effect of the number of household members on the probability of homeownership is positive and significant in the two models. This is likely due to the propensity for households to consist of extended families. The results show that the households headed by men are less likely to own a house as compared to those headed by women and the difference is statistically significant. This may be because female is more responsible by nature than male and therefore more intensive to secure the permanent residential place for their family. Age of the head of the household has a positive and significant effect on the probability of homeownership. It is hypothesized that for given income, assets are likely to increase with age of the household head and for most purchasers it takes time to acquire the necessary wealth, therefore the probability to own a home is expected to increase with age. Gyourko *et al.* 1999 also confirms the same results for the U.S.A.

Education of household head increases the probability of owning a house and on averages higher the level of education, the greater the probability of owning a house. This may be because better educated household heads are more likely to be better aware of the importance of making important decisions affecting future well being of the household. They are also likely to be better informed in making such decision. On the other hand, only one dummy variable representing education level of the spouse of the household head appears somewhat significant. The result shows that household in which the spouse of the household head has secondary or high secondary education as compared to zero-four years of schooling is on average less likely to own a house. We can conclude that the education level of spouse does not play a substantial role in the homeownership decision. In the group of variables representing the economic status of the household; the number of earners in the household has a negative and significant effect on probability of homeownership. Results show that when number of earning members in the household increases, the probability of owning a house decreases. The reason may be that, as explained earlier, with an increase in the number of earners each earning member would feel less responsible to make the long run decision of purchasing homes, which involves substantial investment.

The results show that two professional categories (professional and technicians/associate professional/clerk) as compared to senior officials and managers have a positive but insignificant effect on probability of homeownership. There are likely to be two types of effects of being professional and technicians/associate professional/clerk as compared to senior officials and managers on the probability of homeownership. Professional and technicians/associate professional/clerk as compared to senior officials and manager's possess stronger creative vision, therefore they have a higher probability of purchasing a house. On the other hand, they may invest in other assets like equipment, machinery etc. and thus lower the probability to own a house. The resulting effect is positive but insignificant on the probability of homeownership.

Table 1.3 shows that urban households are less likely to own a house as compared to the rural households and the difference is statistical significant. The reason is that rural households either have their own lands through inheritance or they can buy it at a much lower price as compared to urban households. Furthermore, houses in rural settings are simple and do not involve expensive finishes and fixtures. Most rural residents are used to hard work and they can spare enough times between cropping seasons to engage family labor in the construction of homes. The cost of construction is also low because of the availability of wooden roof, bricks, etc. Thus even poor rural households are quite likely to own houses. Traditionally, hiring a residential place in rural areas is considered to be an unusual practice except for temporary visitors.

The regression coefficient of the interactive variables provides more insight in the homeownership behavior. The first important observation in this regard is that the positive effect of the number of household members on the probability of owning a house is more pronounced in urban areas as compared to the rural areas and the difference is more significant in the Probit model than in the Logit model. In urban areas as compared to rural areas, this is likely due to the propensity for households to consist of nuclear families. The positive effect of age of the household head on the probability of homeownership is significantly greater (almost twice as much) in urban area as compared to the rural areas, though the effect is significant in rural areas as well. The effect of age of the household head on the probability of homeownership through inheritance could probably be the same in rural and urban areas but the effect of age through accumulation of wealth is likely to be greater in urban areas where economic activity grows faster and the chances of progress with age are greater. The results indicate that the negative effect of the number of children going to school on the homeownership probability is significantly less (in absolute terms) among the urban households as compared to rural areas.

The effect of education on homeownership probability is also generally less in urban areas as compared to rural areas and for two categories of education the difference is statistically significant. In certain cases the positive effect of education on homeownership probability observed among rural households is completely wiped out in case of urban households. The effect of education in urban areas is relatively less because the greater desire of owning a home among educated household heads is somewhat offset by an equally greater desire to own a more valuable home, which requires a greater accumulation of wealth. People with high education tend to own more expensive houses Morgan (1965). Perhaps for the similar reasons income of the household head which has no significant effect in rural areas (and hence dropped as a regressor) turns out to have a significant but negative effect on the homeownership probability in urban areas. Thus, other factors held constant, as income level increases, household standards also rise and they become less likely to own a home compatible with their standards of living. It might be the reason that people spend a greater portion of their budget on household items instead of purchasing a home when their income increases United Nations Development Program (2000).

The results show that number of earners in the household has a negative effect on the probability of homeownership in rural areas. This effect is even larger in urban areas. This result has straightforward interpretation. Holding other things, especially household income constant, an increase in the number of earners means lower levels of income per earner. This reduces the probability of homeownership because no single earner is rich enough to make a decision like buying a home. Another reason might be that some of the earners could be children. Table 1.3 indicates that the probability of homeownership among the households whose heads have the occupation of professional and technician/associate professional/clerk is not significantly different as compared to the other categories. But the parameter estimates show that households whose heads have these two categories of occupation are somewhat more likely to own a house if they live in rural areas and less likely if they live in urban areas. The difference can be attributed to higher cost of buying a home in cities as compared to villages or towns.

For the interpretation of regression parameters, probability derivatives are computed for all the independent variables of Table 1.3. These derivative estimates measure the effects of one unit change in explanatory variables on the probability of owning the house. For a dummy variable, the probability derivative measures the change in the probability of homeownership when the dummy variable takes the value of one rather than zero. It should also be obvious that the probability derivatives in the linear probability (OLS) model are directly given by the corresponding regression coefficients. Since the Probit and Logit models are non-linear, their probability derivatives are not constant. Therefore these derivatives are estimated as the mean of the sample. The results are arranged in Table 1.4.

The table shows that there is not much consistency in results across the three models. According to all the three models, the number of family members has a positive impact on the probability of homeownership. The results show that the marginal effect of household size on the probability of homeownership is quite small (0.3 to 1.2 percent) against the increase in household size by one person. The results indicate that male household heads are at least 3 percentage points less likely to own a house than the female heads according to Probit and linear probability models. The corresponding figure for the Logit model is 6 percent. The age of the household head is positively related to the probability of homeownership. A one-year increase in the age is expected to increase the likelihood of homeownership of the household by about 0.1 percentage points according to Probit and linear models and 0.3 percentage points according to Logit model.

The effect of education of the household head on the probability of homeowner is substantial. For example, according to the Probit specification, a household whose head has five-nine years of schooling is 5 percentage points more likely to own a house as compared to a household whose head has a lower level of education. The probability derivatives for the other education dummies can be interpreted likewise. The probability derivative for the professional or higher education is the highest, 27 percentage points in the case of Logit model. As expected, the probability of homeownership increases monotonically with the level of education. The results show that a household is less likely to own a home, if the education level of spouse is secondary/high secondary years of schooling as compared to the lower levels of education and the magnitude of this effect is quite substantial; 11 percentage points in the case of Logit model. The effect of an increase in the number of earners in the household on the probability of owning a house shows that the addition of one earner in the household reduces the probability of homeownership by 1.4, 2.9 and 0.7 percentage points according to Probit, Logit and linear probability models respectively.

The table shows that the probability of homeownership is substantially higher among households whose heads are professionals and technicians/associate professionals/clerks as compared to senior officials and managers. We find that the residential location (urban or rural) of the household has a very strong bearing on the probability of homeownership. A household located in the urban areas is on average 20.3 and 35.3 percentage points less likely to own a house than that located in the rural areas according to Probit and Logit models respectively. The corresponding figure for the linear probability model is 28.7 percent. We now discuss the probability derivatives with respect to the interactive variables. The results show that the positive effect of household size on the probability of homeownership is greater in urban areas as compared to rural areas. According to the Probit model, the marginal effect of the increase in household size in the probability of homeownership in urban areas is close to twice as large as in rural areas. Almost similar results hold for the marginal effects of the age of household head.

According to Probit and Logit models, the addition of one child going to school in the household results in a decrease in the probability of owning a house by 0.3 and 0.7 percentage points on average. The corresponding figure for the linear probability model is 0.2 percentage points. Probability derivatives with respect to the dummy variables representing household head's education confirm our earlier conclusion that the positive effect of education on homeownership probability is confined to rural areas whereas in urban areas, the homeownership probability does not change much with the change in the education level of the household head.

The Table 1.4 shows that the effect of household head's income on the probability of homeownership is insignificant among rural households but negative and significant among urban households. Increase in household head's income by 10,000 rupees decreases the probability of homeownership by about one percentage point in urban areas as compared to rural areas. The marginal effect of increase in the number of earners on the probability of homeownership is negative both in rural and urban areas. For example, in urban areas as compared to rural areas the addition of one earner in the family decreases the probability of homeownership by 1.19, 1.74 and 2.57 percent in probit and logit model and linear probability model.

Finally, the probability derivatives with respect to the first two categories representing occupation of the household head (professional and technician/associate professional/clerk) are positive in rural areas but they turn negative in urban areas. The probability of owning a house is relating higher among the households whose heads is service/shopkeeper/sale/skilled agriculture/fishery/craft/trade/plant/machinery/elementary workers; they have a high probability of homeownership. To sum up, the empirical findings reveal that household size, sex, age, education level of households' head, number of earners in household and residential location are the main factors that influence the decision of homeownership.

## **1.6 Summary and Conclusion**

The results of our analysis indicate that there are several demographic, social and economic factors, which are responsible for the variation in decision regarding homeownership across households. In Pakistan, households have different characteristics compared to developed countries so the set of factors that influence their choice of house consumption is also different. Among these factors: household size, age, and education of household head, effects positively in this decision. Whereas sex (if household head is male), number of earners in the household and residential location of the household effects negatively in the decision of homeownership. Therefore, we can conclude that variation in housing consumption among different household is due to demographic, economic and social factors. This study finds substantial differences in homeownership rates between rural and urban areas. In particular, homeownership rates are relatively higher in rural areas where land is much cheaper, family labor can be engaged in construction work with little opportunity cost during the off-peak cropping season, some of the raw materials for construction are relatively cheaper and home quality in terms of finishing and fixtures is generally lower.

Due to the propensity among households to live in extended families and since for most purchases it takes time to acquire the necessary wealth, the number of household members and age of the household head have significant impacts on the likelihood of owning a house. Households headed by females are more likely to own a house because female heads may be more responsible than male heads to secure permanent residential place for the family. It may also be hypothesized that education of household head and his/her spouse is likely to bring better understanding and responsibility and, hence education is likely to increase the probability of homeownership.

In rural Pakistan, the income of the household head does not affect homeownership rates whereas in urban Pakistan, increase in the income of the household head tends to reduce the homeownership rate, indicating that with increase in income, the desired quality of home gets higher, making it less likely to own a house. It is further observed that households with a larger number of earners are less likely to own house as compared to the households where the same income is earned by a few earners who are in a better position to take the important decision of buying a house.

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**Table 1.1 Description of Dependent and Independent Variables**

<b>Notation</b>	<b>Description</b>	<b>Measurement</b>
<b>Dependent Variable</b>		
HHH	Housing tenure choice	= 1 if household owns a house = 0 otherwise
<b>Independent Variables: Household's Demography</b>		
N	Number of household members	Count
G	Gender of the head of the household	= 1 if head of the household is male = 0 otherwise
A	Age of head of the household	Years
<b>Independent Variables: Head of the Household's Marriage</b>		
M <sub>n</sub>	Head of the household's state as never married	= 1 if head of the household is never married = 0 otherwise
M <sub>d,w</sub>	Head of the household's state as divorced or widower	= 1 if head of the household is divorced/widower = 0 otherwise
<b>Independent Variables: Household's Education</b>		
S	Number of Children going to school	Count
E <sub>n_5</sub>	First education category of head of the household	= 1 if household head has five–nine years of schooling = 0 otherwise
E <sub>n_10</sub>	Second education category of head of the household	= 1 if household head has secondary and high secondary education = 0 otherwise
E <sub>n_B</sub>	Third education category of head of the household	= 1 if household head has bachelor's degree = 0 otherwise
E <sub>n_P,H</sub>	Fourth education category of head of the household	= 1 if household head has professional and higher degree = 0 otherwise
E <sub>s_5</sub>	First education category of spouse of the head of the household	= 1 if household head's spouse has five-nine years of schooling = 0 otherwise
E <sub>s_10</sub>	Second education category of spouse of the head of the household	= 1 if household head's spouse has secondary and high secondary education = 0 otherwise
E <sub>s_B</sub>	Third education category of spouse of the head of the household	= 1 if household head's spouse has bachelors or higher education = 0 otherwise
<b>Independent Variables: Economic Status of Household</b>		
Y <sub>h</sub>	Monthly income of the head of the household	Thousand rupees
Y <sub>f</sub>	Monthly household income other than income of the head of the household	Thousand rupees
E	Number of earners in the household	Count
<b>Independent Variables: Occupation of the Head of the Household</b>		
O <sub>p</sub>	First occupation category of the head of the household	= 1 if head of the household is professional = 0 otherwise
O <sub>t,c</sub>	Second occupation category of the head of the household	= 1 if head of the household is technician/associate professional/clerk = 0 otherwise
O <sub>w</sub>	Third occupation category of the head of the household	= 1 if head of the household is service/shop/sale/skilled agriculture/fishery/craft/trade/plant/machinery/elementary workers = 0 otherwise
O <sub>o</sub>	Fourth occupation category of the head of the household	= 1 if head of the household is any other profession = 0 otherwise
<b>Independent Variables: Residential location of the Household</b>		
R	Residence category of the household	=1 if household located in urban region = 0 otherwise
<b>All independent variables other than the residential dummy are interacted with the residence dummy.</b>		

Table 1.3 Estimates of Restricted Probability Models for Homeowners in Pakistan

Explanatory Variable	Description	Normal Probability Model (Probit)	Logistic Probability Models (Logit)
Intercept		1.2079 (11.6064)**	2.0247 (9.5174)**
<b>Independent Variables: Household's Demography</b>			
N	Number of household members	0.0285 (3.7116)**	0.0592 (3.6286)**
G	= 1 if head of the household is male = 0 otherwise	- 0.1586 (- 2.5442)**	- 0.3094 (- 2.5947)**
A	Age of head of the household	0.0071 (4.1591)**	0.0147 (4.1288)**
<b>Independent Variables: Household's Education</b>			
E <sub>h_5</sub>	= 1 if household head has five-nine years of schooling = 0 otherwise	0.2303 (4.1349)**	0.4690 (3.9901)**
E <sub>h_10</sub>	= 1 if household head has secondary and high secondary education = 0 otherwise	0.4314 (4.9589)**	0.9081 (4.7142)**
E <sub>h_B</sub>	= 1 if household head has bachelor's degree = 0 otherwise	0.3087 (2.0353)**	0.6378 (1.9170)*
E <sub>h_P, H</sub>	= 1 if household head has professional and higher degree = 0 otherwise	0.5864 (2.3294)**	1.2804 (2.1162)**
E <sub>s_10</sub>	= 1 if household head's spouse has secondary and high secondary education = 0 otherwise	- 0.2756 (- 1.7047)	- 0.5171 (- 1.5429)
<b>Independent Variables: Economic Status of Household</b>			
E	Number of earners in the household	- 0.0659 (- 2.5403)**	- 0.1391 (- 2.5745)**
<b>Independent Variables: Occupation of the Head of the Household</b>			
O <sub>p</sub>	= 1 if head of the household is professional = 0 otherwise	0.1893 (1.1115)	0.3871 (1.0124)
O <sub>t,c</sub>	= 1 head of the household is technician/associate professional/clerk = 0 otherwise	0.1868 (1.1245)	0.4163 (1.1111)
<b>Independent Variables: Residential Location of the Household</b>			
R	= 1 if household located in urban areas = 0 otherwise	- 0.9774 (- 6.6671)**	- 1.6995 (- 6.1873)**
<b>Independent Variables: Household's Demography Interacted with Residence Dummy</b>			
RN	Number of household members*R	0.0223 (2.0277)*	0.0373 (1.6969)
RA	Age of head of the household*R	0.0075 (3.0092)**	0.0107 (2.2388)*
<b>Independent Variables: Household's Education Interacted with Residence Dummy</b>			
RS	Number of children going to school*R	- 0.0152 (-3.0092)**	- 0.0346 (- 1.5323)
RE <sub>h_5</sub>	= 1 if household head has five-nine years of schooling *R = 0 otherwise	- 0.2154 (- 2.8638)**	- 0.4407 (- 3.0072)**
RE <sub>h_10</sub>	= 1 if household head has secondary and high secondary education *R = 0 otherwise	- 0.4454 (- 4.3706)**	- 0.9315 (- 4.3726)**
RE <sub>h_B</sub>	= 1 if household head has bachelor's degree *R = 0 otherwise	- 0.1736 (- 1.0239)	- 0.4044 (- 1.1311)
RE <sub>h_P,H</sub>	= 1 if household head has professional and higher degree *R = 0 otherwise	- 0.3304 (- 1.2314)	- 0.8411 (- 1.3432)
RE <sub>s_10</sub>	= 1 if household head's spouse has secondary and high secondary education *R = 0 otherwise	0.2469 (1.4289)	0.4733 (1.3492)
RE <sub>s_B</sub>	= 1 if household head's spouse has bachelors or higher education *R = 0 otherwise	- 0.0921 (- 1.0227)	- 0.1549 (- 1.0039)
<b>Independent Variables: Economic Status of Household Interacted with Residence Dummy</b>			
RY <sub>h</sub>	Monthly income of the head of the household*R	- 0.0040 (- 2.1288)*	- 0.0064 (- 2.0751)*
RE	Number of earners in the household*R	- 0.0575 (- 1.5169)	- 0.0837 (- 1.1601)
<b>Independent Variables: Occupation of the Head of the Household Interacted with Residence Dummy</b>			
RO <sub>p</sub>	= 1 if head of the household is professional*R = 0 otherwise	- 0.3241 (- 1.6466)	- 0.6079 (- 1.4562)
RO <sub>t,c</sub>	= 1 head of the household is technician/associate professional/clerk*R = 0 otherwise	- 0.3535 (- 1.9175)	- 0.6876 (- 1.7255)
RO <sub>w</sub>	= 1 if head of the household is service/shop/sale/skilled agriculture/fishery/craft/trade/plant/machinery/elementary workers*R = 0 otherwise	0.0699 (1.2557)	0.1325 (1.3426)
Log Likelihood		- 4987.486	- 4986.093

Note: The dependent variable is set equal to one for homeowners and zero for renters. The statistics significant at 5% and 1% levels are indicated by \* and \*\* respectively. Figures in the parenthesis show z-statistics for Logit and Probit models of the estimates.

Table 1.4 Probability Derivatives with Respect to Independent Variables

Explanatory Variables	Description	Normal Probability Model (Probit)	Logistic Probability Models (Logit)	Linear Probability Models
Intercept		0.2510	0.4207	0.9028
<b>Independent Variables: Household's Demography</b>				
N	Number of household members	0.0059	0.0123	0.0031
G	= 1 if head of the household is male = 0 otherwise	-0.0329	-0.0643	-0.0309
A	Age of head of the household	0.0014	0.0031	0.0009
<b>Independent Variables: Household's Education</b>				
E <sub>h_5</sub>	= 1 if household head has five-nine years of schooling = 0 otherwise	0.0476	0.0975	0.0296
E <sub>h_10</sub>	= 1 if household head has secondary and high secondary education = 0 otherwise	0.0896	0.1887	0.0487
E <sub>h_B</sub>	= 1 if household head has bachelor's degree = 0 otherwise	0.0642	0.1325	0.0384
E <sub>h_P,H</sub>	= 1 if household head has professional or higher degree = 0 otherwise	0.1219	0.2660	0.0581
E <sub>s_10</sub>	= 1 if household head's spouse has secondary and high secondary education = 0 otherwise	-0.0573	-0.1074	-0.0258
<b>Independent Variables: Economic Status of Household</b>				
E	Number of earners in the household	-0.01371	-0.0289	-0.0070
<b>Independent Variables: Occupation of the Head of the Household</b>				
O <sub>p</sub>	= 1 if head of the household is professional = 0 otherwise	0.0393	0.0804	0.0162
O <sub>t,c</sub>	= 1 head of the household is technician/associate professional/clerk = 0 otherwise	0.0388	0.0864	0.0180
<b>Independent Variables: Residential location of the Household</b>				
R	= 1 if household located in urban area =0 otherwise	-0.2031	-0.3531	-0.2872
<b>Independent Variables: Household's Demography Interacted with Residence Dummy</b>				
RN	Number of household members*R	0.0046	0.0077	0.0099
RA	Age of head of the household*R	0.0015	0.0022	0.0031
<b>Independent Variables: Household's Education Interacted with Residence Dummy</b>				
RS	Number of Children going to school*R	-0.0031	-0.007	-0.0017
RE <sub>h_5</sub>	= 1 if five-nine years of schooling*R = 0 otherwise	-0.0447	-0.092	-0.0269
RE <sub>h_10</sub>	= 1 if secondary and high level of education *R = 0 otherwise	-0.0926	-0.1936	-0.0572
RE <sub>h_P,H</sub>	= 1 if household head has professional and higher degree *R = 0 otherwise	-0.0687	-0.1748	0.0102
RE <sub>s_10</sub>	= 1 if secondary and high secondary level of education *R = 0 otherwise	0.0513	0.0984	0.0163
RE <sub>s_B</sub>	= 1 if household head's spouse has bachelors or higher education *R = 0 otherwise	-0.0191	-0.0322	-0.0286
<b>Independent Variables: Economic Status of Household Interacted with Residence Dummy</b>				
RY <sub>h</sub>	Monthly income of the head of the household (in thousand rupees)*R	-0.0008	-0.0013	-0.0011
RE	Number of earners in the household*R	-0.0119	-0.01740	-0.0257
<b>Independent Variables: Occupation of the Head of the Household Interacted with Residence Dummy</b>				
RO <sub>p</sub>	= 1 if head of the household is professional*R = 0 otherwise	-0.0673	-0.1263	-0.0594
RO <sub>t,c</sub>	= 1 head of the household is technician/associate professional/clerk*R = 0 otherwise	-0.0735	-0.1429	-0.0762
RO <sub>w</sub>	= 1 if head of the household is service/shop/sale/skilled agriculture/fishery/craft/trade/plant/machinery/elementary workers*R = 0 otherwise	0.01452	0.0275	0.0177

Note: The dependent variable is set equal to one for homeowners and zero for renters.