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Asymmetric Information, Demographics, and Housing Decisions amongst Apartment Households in Nairobi County, Kenya

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Abstract: *The study sought to determine the moderating effect of asymmetric information on the relationship between household demographics and four owner-occupied apartment housing decisions that is choice of neighbourhood, choice of location of apartment house, source of financing and size of house. Using two-stage cluster sampling, 196 owner-occupied apartment households were studied in Nairobi County, Kenya though a sample size of 226 households had been initially selected to participate in the study. Questionnaires were used as the data collection method in an exercise that took place in August 2014. Hierarchical multiple regression analysis was used to achieve the study objective of testing for moderator effects of asymmetric information. Preliminary statistical tests were performed and the same were, to a great extent, in the affirmative. The study found that asymmetric information had a moderating effect on the relationship between demographics and the four housing decisions but the moderation was not statistically significant in explaining any of the four relationships hence the implication that the owner-occupied housing market in Nairobi County, Kenya could be efficient to the extent of the scope of this study. Hence, there was no sufficient evidence to reject the four null hypotheses of the study in view of a significance level of 0.05. The study cites limitations encountered and recommends areas for further study in view of the study findings.*

Keywords: *Asymmetric Information, Demographics, Housing Decisions, Housing Markets, Nairobi County and Apartment Households.*

I. Introduction

Asymmetric information gained significant recognition in real estate/housing markets during the subprime mortgage crisis of 2007-2008 (Dowd, 2009; Purnanandam, 2009; Kroon, 2008). This is a malpractice associated with *hidden knowledge* and *hidden action* where by some parties in a transaction act in a manner which is not observed by their counterparties in a market exchange (Kau *et al.,* 2010). Lofgren *et al.* (2002) indicate that asymmetric information is a common feature of market interactions and that most sellers have better knowledge of products and market conditions compared to most buyers. *Asymmetric information* has been extensively documented as a key concern for households seeking to buy homes (Turnbull & Sirmans, 1993; Phipps, 1988; Northcraft & Neale, 1987). Turnbull and Sirmans (1993) further contend that different homebuyers have varying levels of market information as they transact. With most home buyers being constrained by time and lacking adequate experience in real estate markets, information asymmetry becomes a key concern as home buyers seek to maximize their housing utility. *Demographics* have been cited as key determinants of household mobility (Hood, 1999; Rashidi *et al,* 2012; Koklic & Vida, 2001; Wheaton, 1990). Though extensive literature indicates that demographics explain home ownership decisions, it remains an unresolved issue as to whether asymmetric information has a moderating effect on the demographics-housing decisions relationship.

Housing markets are unique considering that they are largely illiquid, complex, heterogeneous in nature, idiosyncratic and often lack a structured way of disseminating market information (Maier & Herath, 2009; Garmaise & Moskowitz, 2004). Consequently, home buyers are bound to have challenges in making key housing decisions in the face of uncertainty. The decision to buy a residential house is part of personal finance (Kapoor *et al.,* 2007). Lambson *et al.* (2004), Mulder (2006), and Lofgren *et al.* (2002) and Watkins (1998) contend that households, especially those living far from the real property, are *often poorly informed* about the existing housing market conditions and applicable government regulations unlike most property sellers. To alleviate information problems, most home buyers will often resort to use of *decision biases* such as anchoring, heuristics and biased beliefs (Northcraft & Neale, 1987; Turnbull & Sirmans, 1993; Garmaise & Moskowitz, 2004; Lambson *et al.,* 2004).

The home buying process is often associated with choice of residential neighbourhood, choice of location of house, how to finance the house and what size of house to buy (Wong, 2002; Smith *et al.,* 1979; Maier & Herath, 2009; Grether & Mieszkowski, 1974). These decisions are largely influenced by several demographics such as: income, gender, marital status, education, size of family, age, profession, experience and expertise with housing markets, household composition among others (Koklic & Vida, 2001; Hood, 1999;

Beguy *et al.,* 2010; Rashidi *et al.,* 2012). Asymmetric information becomes an important feature in housing markets due to its *unique structure* that makes it hard for relevant market information to be easily accessed by buyers (Aldea & Marin, 2007; Kau *et al.,* 2010). Heuristics, biased beliefs, moral hazards, adverse selection, distance between the buyer and the property and anchoring have been documented as the common manifestation of asymmetric information in the home ownership markets (Phipps, 1988; Northcraft & Neale, 1987; Kau *et al,* 2010; Garmaise & Moskowitz, 2004).

Housing has become a key concern for most households in Nairobi County, Kenya considering that *rental housing is limited* and *quite expensive*. Since the County is the home to the capital city of Kenya, demand for housing has increased due to several factors which include the fact that Nairobi is the metropolitan city, rural urban migration, congestion and a high influx of people coming into the County to search for jobs in the city (Beguy *et al.,* 2010; Imwati, 2010; Oundo, 2010; Rockefeller Foundation, 2005). Nairobi has an estimated population of more than three million people and an estimated annual shortfall of about 150,000 residential housing units (World Bank, 2011) and the fact that about 25% of Kenya's population are living in Nairobi City. Nairobi contributes about half of Kenya's GDP (Oundo, 2011; Nabutola, 2004) with the housing market contributing significantly towards the same. And apartments are the most common form of residential housing considering the spatial constraint facing the County.

II. Research Problem

Unlike other financial markets, the residential housing market is *quite unique* considering that the market is subject to several laws and regulations besides being complex, illiquid and heterogeneous in nature (Mulder, 2006; Maier & Herath, 2009; Garmaise & Moskowitz, 2004). Such complexity has been found to often create housing market inefficiencies which subsequently lead to asymmetric information problems to the disadvantage of most home buyers. Despite there being adequate literature on demographics (Cronin, 1982; Wheaton, 1990; Rossi, 1955; Hood, 1999) and asymmetric information (Northcraft & Neale, 1987; Turnbull & Sirmans, 1993; Lambson *et al.,* 2004) in housing markets, very few studies ,if any, have attempted to explain household apartment decision choices in view of demographics and the moderating effect of asymmetric information on this relationship.

There exists *inconclusive, contradictory* and *fragmented empirical evidence* of asymmetric information explaining household residential mobility. However, much of this evidence on buyer demographics dwells on how household demographics influence the likelihood of owning a home (Cronin, 1982; Case & Schiller, 1989; Rossi, 1955; Hood, 1999); empirical evidence on asymmetric information dwells more on how home buyers alleviate the problem in housing markets and determination of the manifestation of decision biases in the home buying process (Garmaise & Moskowitz, 2004; Turnbull & Sirmans, 1993; Northcraft & Neale, 1987). All the cited empirical work was carried out in developed housing markets: there is yet to be well known similar empirical work in a developing housing market such as the one in Nairobi County, Kenya. And, empirical findings from developed housing markets may vary significantly from findings from developing housing markets such as Nairobi County, Kenya which is unique considering that it is cosmopolitan in nature, highly congested, spatially constrained, multi-ethnic, largely insecure, infrastructure challenges and the fact that it is the home to the Kenyan capital city (Oundo, 2011; Imwati, 2010; Rockefeller Foundation, 2005).

Makachia (2010) indicates that there are *very few well-known housing mobility studies in Kenya*. Most of the empirical investigations in Kenya were carried out in Nairobi but their conceptualization mainly focused on determinants of household mobility, migration flow, housing transformation in the commercial and residential housing markets, household clustering and the role of demographics in explaining housing formation mainly amongst the middle income households (Oundo, 2011; Makachia, 2010; Imwati, 2010; Beguy *et al.,* 2010). None of these studies focused on apartment households despite apartments being the most form of residential housing in Nairobi County, Kenya. In addition, the studies do not make attempts to explain how demographics determine residential housing choices with the moderating effect of asymmetric information on this relationship. It is on the basis of these conceptual, contextual and empirical gaps that this study was carried out.

III. Objective of the Study

The specific objective of the study was to determine if asymmetric information has a statistically significant effect on the relationship between demographics and choice of neighbourhood, choice of location of apartment house, source of financing and size of apartment house amongst apartment households in Nairobi County, Kenya.

IV. Review of Literature

Owning a home is often the *most expensive asset* for most households hence the need for mortgage financing. In addition, *most households often face a budget constraint* as they seek to buy their homes (Clayton, 1998; Phipps, 1988). Koklic and Vida (2001) cautions that the home buying process is rather complicated hence the need for a lot more involvement from buyers. Consequently, *housing market intermediaries* (like landlords, property developers, surveyors, property agents and financial institutions) play a crucial role in overcoming asymmetric information problems (Watkins, 1998; Mulder, 2006). However, *information inefficiency* in housing markets is often attributed to *time* devoted by market participants in searching for market information and the *cost of matching buyers and sellers* (Fu & Ng*, 2001).

Watkins (1998) contends that information is crucial in property markets. Households are often not well informed about the prevailing housing market conditions. Hence, most home buyers enter housing markets with certain biases on information and conditions that are set to prevail in the housing markets (Turnbull & Sirmans, 1993). Unlike other markets, housing markets will often be *undersupplied with market information* such as zoning laws and regulations, availability of public utilities and other nearby developments, road improvements among others (Clauretie & Sirmans, 2006). Buyers who live near a property will often access relevant market information in the process of reading local papers, driving around the neighbourhood or while shopping unlike those who reside in a distant far and often limited by time (Lofgren *et al.*, 2002). Buyers can obtain market information through *formal search* (by reading newspaper adverts or using market intermediaries) or engage in *informal information search* by asking friends, reading housing vacancy signs and contacting family (Galvez & Kleit, 2011).

Similarly, Phipps (1988) indicates that *personal and cognitive biases influence decision choices*. In complex environments, people are often limited in terms of their cognitive abilities for processing information and for making judgment in complex environment: the home buying process is not an exception to this. Simonsohn and Loewenstein (2002) document *anchoring bias* by indicating that buyers who are accustomed to high prices often buy larger and more expensive homes than their counterparts who are accustomed to low prices.

Extensive literature has documented *household demographics* as a key factor in explaining residential housing decision choices. The location of a house is a crucial decision for most households (Mair & Herath, 2009). Choice of residential neighbourhood is influenced by a household's income and value of the house (Smith, *et al*. 1979). Households relocate to adjust their housing stress though they are constrained by finances (Phipps, 1988). The Rossi (1955) classical household mobility study attributes household relocation to size of family, education and changes in employment status; the study found that change of employment status, attainment of higher education and increase in household size all influenced mobility while the presence of school going children (in a family) restricted household mobility. In Allegheny County US, Cronin (1982) found that household income, household expenditure levels, size of the household, age, race, and education of household head to be some of the critical demographics influencing the choice of a residential housing unit. Quigley and Weinberg (1977) found that age, income and duration of residence were not directly affecting the decision by a household to move. Hood (1999) found that marital status had a strong influence on home ownership unlike family size; as the family size exceeded four, fewer families actually owned homes. In the US, Mundra and Oyelere (2013) found that the older the household head, being a female and higher educational attainment increased chances of home ownership. In Spain, Fisher and Jaffe (2003) found that the probability of owning a home increased with age and educational attainment.

Empirical evidence indicates that *housing markets are largely inefficient* due to the unique structure of the market which poses information problems to most buyers (Wang, 2004; Clayton, 1998; Fu & Ng*, 2001). *Asymmetric information* has been cited to influence decisions besides leading to buyer decision biases. Phipps (1988) indicates that heuristics have been empirically cited as rules governing housing decisions. The Garmaise and Moskowitz (2004) empirical investigation on 7 states in the US confirmed the presence asymmetric information in the housing markets. The study found that buyers alleviated their asymmetric information by buying properties with long income history, avoiding trades with informed agents, and making short distance moves. Northcraft and Neale (1987) found that price anchors influenced valuations by both amateurs and experts. In their Baton Rogue Louisiana US study, Turnbull and Sirmans (1993) confirmed the presence of asymmetric information since first-time buyers lacked the experience of repeat buyers and hence, they lacked important insights when collecting and utilizing relevant market information. However, some studies did not confirm the presence of asymmetric information in some housing markets (Turnbull & Sirmans, 1993; Watkins, 1998).

Further *empirical evidence* has supported the existence of *asymmetric information* in housing markets while other studies have concluded otherwise. Evidence by Lambson *et al.* (2004) contradicts the findings of Turnbull and Sirmans (1993) and Myer, He and Webb (1992). Turnbull and Sirmans (1993) use 151 real property transactions and conclude that out-of-town buyers do not pay significantly different prices than their in-

town counterparts. Similarly, Myer *et al.* (1992) conclude that out-of-country buyer premium does not exist. Contrastingly, Miller *et al.* (1998) findings support Lambson *et al.* (2004) since they use 421 observations (with 30% of them being Japanese buyers) and find that Japanese buyers paid higher real property prices for real property purchases in two Honolulu neighbourhoods in the late 1980s. Similarly, Northcraft and Neale (1987) find an anchoring bias in the real estate market: when they asked amateur and expert valuers to give valuations of houses upon giving them some reference prices, the former priced them highly than the latter. The study found that the influence of experience with the real estate market and buyer expertise was dependent on demographics such as age, gender, years lived in the area, and whether one had ever bought a house within the area or they were first-time buyers.

V. Methodology

The study adopted a *descriptive cross-sectional design.* This design is appropriate when the objective is to describe characteristics of certain groups with the study of variables occurring at a single point in time (Burns & Bush, 2010; Churchill Jr. & Iacobucci, 2005). *County housing data* was used on the justification that counties are 'rich' in demographics due to their cosmopolitan nature. Empirical studies have largely investigated *apartment households* in cosmopolitan settings unlike other types of residential houses (Case & Shiller, 1989; Lambson *et al.*, 2007; Eubank & Sirmans, 1979; Cronin, 1982; Garmaise & Moskowitz, 2004).

The *target population* of the study was households who had bought their apartments two years preceding the data collection exercise which took place in August 2014- 86 apartments had been built for sale over this period. The *unit of analysis* was the apartment household while the *respondent* was the individual who bought the apartment house. *Two-stage cluster sampling* method was adopted for the study on the justification that the method divides the population into different clusters each of which contains individuals with different characteristics (Black, 1999). Cluster sampling divides the area into a number of smaller non-overlapping areas like families in the same block which are similar in social class, income, ethnic origin and other characteristics (McDaniel Jr. & Gates, 2010; Cooper & Schindler, 2003). In studying households in Mlolongo Township in Machakos, Kenya and households in Kaloleni and Buruburu estates in Nairobi, Kenya, Imwati (2010) and Makachia (2010) both used two-stage cluster sampling respectively.

A good *sample* should be *adequate* and *representative*. Using SMART methodology (2012) (which is popular with cluster sampling studies) a sample size of 226 apartment households was selected in a representative manner (see Table 1 below) though 196 responded by filling the questionnaire. The sample was adjudged to be adequate in view of a 0.535 KMO score. The households were clustered into 2, 3 and 4 bedroomed apartment households on the assumption that demographics are bound to differ across the 3 categories of apartment houses. In particular, 1 and 5 bedroomed apartments were purposely excluded from the study since such units are uncommon in Nairobi County.

SMART methodology formulae:- $$n = \frac{(t^2 \times p \times q)}{d^2} \times DEFF$$

where: n= sample size (number of households); t= linked to 95% confidence interval- for cluster sampling (2.045); p= expected prevalence (a fraction of 1 i.e. 10% - 0.10); q= 1-p (expected non-prevalence i.e. 1-0.10 = 0.90); d= relative desired precision (5% i.e. 0.05) and DEFF (Design Effect) of 1.5. Design effect is a 'corrector factor'to account for the heterogeinity between clusters with regard to the measured indicator and it is only used to determine sample size in cluster sampling. If there is no previous information about design effect, then 1.5 is used (SMART methodology, 2012).

Hence, sample size (n) = $\frac{(2.045)^2 \times 0.10 \times 0.90}{(0.05)^2} \times 1.5 = \frac{4.18202 \times 0.09}{0.0025} \times 1.5$

Sample size(n)= (4.18202 X 36) X 1.5 = 150.55272 X 1.5= 225.82908 ~ **226 households**

Table 1: Sampling of apartments across the County in terms of the 3 clusters

Clusters (Aprt.)	South B & Madaraka	Lavington	Kileleshwa	Langata & Madaraka	Westlands	Upperhill & Nrb. West	**Total**
2 bdrm.	3	0	0	2	2	2	**9**
3 bdrm.	2	1	1	2	2	1	**9**
4 bdrm.	0	2	1	0	1	1	**5**
Total	**4**	**3**	**2**	**3**	**4**	**4**	**23**

Source: Researcher, 2014

Key: bdrm.- bedroomed; **Aprt.**- apartments

Note: From each of the 23 sampled apartments, 10-14 households were randomly selected to form the sample size of 226 households.

Hierarchical multiple regression analysis was used to test for moderation of asymmetric information on the relationship between demographics and the four decision choices (choice of neighbourhood, choice of location of apartment house, source of financing and size of house). In view of Manaf (2012) and Stone and Hollenbeck (1984), hierarchical regression is adopted for this study since it is a straight forward technique to test relationships with the addition of a moderator; this form of analysis is used to perform analysis of interaction variables that produce moderator effects.

VI. Preliminary Tests

Several preliminary tests were carried out. Instrument validity was tested by pre-testing the questionnaire amongst 3 households from each of the 3 clusters. Reliability was tested using Cronbach's Alpha with a score of 0.568 considered acceptable though fairly weak due to the nature of the study. Normality was tested using Q-Q plots and the same was found to be in the affirmative. Homogeneity of Variance was tested using the Variance Ratio of the Levene Statistic (the ratio was found to be 1.927) and was similarly in the affirmative since it was close to the recommended 2.0. Multicollinearity was tested using correlation matrices, Tolerance (the score was 0.9 and above which was way in excess of the threshold of 0.20 recommended by O'Brien (2007)) and Variance Inflation Factors (the score was slightly over 1.0 which did not defy Field (2009) and Denis (2011) who both indicate that the same should not exceed 4 and 5 respectively). Sampling adequacy test was tested using KMO and the same was in the affirmative (the score was 0.535) which is acceptable in view of Field (2005) who indicates that KMO values should be in excess of 0.50.

VII. Results

Using Statistical Package for Social Sciences (SPSS), the results of hierarchical multiple regression analysis were presented in three tables: Model Summary, ANOVA Table and the Coefficients Table. Each of the four study null hypotheses (H_{1-} $H_{4)}$ was to test the significance of the moderating effect of asymmetric information in view of demographics overall versus choice of neighbourhood, choice of location of house, source of financing and size of apartment house at a significance level of 0.05. In view of the model summary table, moderation exists if there is a change in R square (in model 2); the moderation is statistically significant if the change statistic for F (in model 2) is less than 0.05.

The study formulates a regression function only if the model overall is significant based on the results in the ANOVA Table. This is in view of Doane and Seward (2011) who contend that attention is only given to only those predictors that are significant in explaining variation in the dependent variable in line with the principle of *Occam's razor* which advocates for simpler regression models all else constant. Hence, the results of the study are presented as follows.

7.1. Asymmetric Information on the relationship between Demographics and Housing Decisions (H_1-$H_{4)}$

Four hypotheses were formulated to test the moderation of asymmetric information on the demographics-housing decisions relationships. The subsequent subsections present the outcome of the same at a significance level of 0.05.

7.1.1 Asymmetric information on Demographics-Choice of neighbourhood relationship (H_1)

Tables 1a- 1c capture the regression output for the above hypothesis. In Table 1a below, the final output is modeled by taking demographics as the predictor variable (in model 1) then demographics and asymmetric information are captured as the input in model 2 with demographics being the control variable while choice of neighbourhood is the outcome (dependent variable).

Table 1a: Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	Durbin-Watson				
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.410[a]	.168	.112	.816	.168	3.027	12	180	.001	
2	.423[b]	.179	.099	.822	.011	.472	5	175	.797	1.975

Significance level= 0.05

a. Predictors: (Constant) and Demographics.

b. Predictors: (Constant), Demographics and Asymmetric Information.

c. Dependent Variable: Choice of Neighbourhood.

The results in Table 1a above indicate that there is some quantum change in R^2 (R^2 change= 0.011) in model 2 when asymmetric information is introduced into the model upon controlling for household demographics. Hence, asymmetric information has a moderating effect on the relationship between demographics and choice of neighbourhood but the change is not statistically significant since the change

statistic for F (in model 2) is greater than the significance level of 0.05 (p=0.797). Consequently, *there is no enough evidence to reject the null hypothesis (H_1)* that asymmetric information does not have a significant moderating effect on the relationship between household demographics and choice of neighbourhood. Table 1b below presents results on the significance of the model overall.

Table 1b: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.181	12	2.015	3.027	.001[b]
	Residual	119.809	180	.666		
	Total	143.990	192			
2	Regression	25.773	17	1.516	2.244	.005[c]
	Residual	118.216	175	.676		
	Total	143.990	192			

Significance level= 0.05

a. Predictors: (Constant) and Demographics.
b. Predictors: (Constant), Demographics and Asymmetric Information.
c. Dependent Variable: Choice of Neighbourhood

The results in Table 1b above (for model 2) indicate that the model overall is statistically significant since p<0.05 (p=0.005, F= 2.244). However, the study finds that the decline in F-value (from 3.027 in model 1 to 2.244 in model 2) indicates a reduction in the predictive power of the model when asymmetric information is introduced into model 2 as the moderating variable. Table 1c below presents results on beta values for demographic characteristics and asymmetric information.

Table 1c: Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.		
	B	Std. Error	Beta			
1	(Constant)	1.653	.472		3.503	.001
	Gender	-.259	.129	-.142	-2.003	.047
	Age	-.021	.077	-.022	-.276	.783
	Marital Status	.065	.081	.059	.800	.425
	Size of Family	-.087	.067	-.099	-1.300	.195
	Occupation/Profession	-.008	.033	-.019	-.252	.802
	Education Level	-.046	.051	-.068	-.897	.371
	Income of Household	.020	.026	.056	.740	.460
	Household Composition	.189	.069	.202	2.754	.006
	Level of Household Expenditure	.119	.054	.174	2.186	.030
	Experience with Housing Market	-.129	.069	-.139	-1.863	.064
	Expertise in Real Estate Matters	.195	.065	.212	2.986	.003
	Region Affiliation	-.062	.040	-.111	-1.547	.124
2	**(Constant)**	**2.055**	**.740**		**2.776**	**.006**
	Gender	-.317	.139	-.174	-2.271	.024
	Age	-.016	.079	-.017	-.207	.836
	Marital Status	.038	.085	.034	.446	.656
	Size of Family	-.088	.068	-.101	-1.301	.195
	Occupation/Profession	-.006	.033	-.014	-.186	.853
	Education Level	-.047	.052	-.069	-.905	.367
	Income of Household	.024	.027	.067	.881	.379
	Household Composition	.185	.072	.198	2.583	.011
	Level of Household Expenditure	.111	.056	.163	1.995	.048
	Experience with Housing Market	-.102	.072	-.110	-1.410	.160
	Expertise in Real Estate Matters	.200	.067	.218	2.995	.003
	Region Affiliation	-.060	.042	-.107	-1.449	.149
	Moral Hazards by Sellers and Property Agents	-.030	.030	-.077	-.999	.319
	Adverse Selection problems	.001	.025	.002	.032	.975
	Heuristics	-.003	.021	-.012	-.149	.882
	Biased Beliefs	-.015	.022	-.055	-.704	.482
	Anchoring Bias	.018	.021	.063	.846	.398

Significance level= 0.05

a. Dependent Variable: Choice of Neighbourhood

From the results in Table 1c above, the study found that gender of owner of house, composition of household, expenditure level of household and expertise were the only factors with a statistically significant influence on choice of neighbourhood when asymmetric information was taken as the moderating variable. The regression function is captured below:

Y_1= 2.055-0.317X_1 + 0.185X_8 + 0.111X_9 +0.200X_{11}
Where Y_1 = choice of neighbourhood; $X_{1=}$ gender of owner of the house; X_8 = composition of household; X_9= Household expenditure; X_{11}= expertise in real estate matters.

7.1.2 Asymmetric information on Demographics-Choice of location of House relationship (H_2)

Tables 2a - 2c capture the regression output for the above hypothesis. In Table 2a below, the regression function is modeled by taking the household demographics as the predictor variable (in model 1), household demographics and asymmetric information are entered as predictor variables in model 2 with demographics being the control variable and choice of location of apartment house is the outcome (dependent variable).

Table 2a: Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	Durbin-Watson				
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.346[a]	.120	.061	1.061	.120	2.039	12	180	.023	
2	.368[b]	.135	.051	1.066	.016	.627	5	175	.679	1.992

Significance level= 0.05

a. Predictors: (Constant) and Demographics.
b. Predictors: (Constant), Demographics and Asymmetric Information.
c. Dependent Variable: Choice of location of apartment.

The results in Table 2a above show that there is a moderating effect of asymmetric information on the relationship between demographics and choice of location due to the quantum change in R^2 (R^2 change= 0.016). However, the change is not statistically significant considering that the change statistic for F (in model 2) is not significant at a significance level of 0.05 (p=0.679). Therefore, *there is no enough evidence to reject the null hypothesis (H_2)* that asymmetric information does not have a significant moderating effect on the relationship between household demographics and choice of location of apartment house. Table 2b below presents results on the significance of the model overall.

Table 2b: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	27.531	12	2.294	2.039	.023[b]
	Residual	202.489	180	1.125		
	Total	230.021	192			
2	Regression	31.098	17	1.829	1.609	.066[c]
	Residual	198.923	175	1.137		
	Total	230.021	192			

Significance level= 0.05

a. Predictors: (Constant) and Demographics.
b. Predictors: (Constant), Demographics and Asymmetric Information.
c. Dependent Variable: Choice of Location of Apartment House.

From the results in Table 2b above, model 2 overall is not statistically significant since p>0.05 (p=0.066). Similarly, the study further finds that the decline in F-value (from 2.039 in model 1 to 1.609 in model 2) indicates a reduction in the predictive power of the model when asymmetric information is introduced into model 2 as a moderating variable. Table 2c below presents results on regression coefficients for demographic characteristics and asymmetric information.

Table 2c: Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.		
	B	Std. Error	Beta			
1	(Constant)	.968	.614		1.577	.117
	Gender	-.166	.168	-.072	-.991	.323
	Age	-.123	.101	-.099	-1.221	.224
	Marital Status	.086	.106	.062	.812	.418
	Size of Family	.118	.087	.106	1.358	.176
	Occupation/Profession	-.014	.043	-.025	-.319	.750
	Education Level	-.109	.066	-.127	-1.642	.102
	Income of Household	-.023	.034	-.053	-.684	.495
	Household Composition	.072	.089	.061	.806	.421
	Level of Household Expenditure	.172	.070	.200	2.439	.016
	Experience with Housing Market	.121	.090	.103	1.345	.180
	Expertise in Real Estate Matters	.218	.085	.188	2.575	.011

	Region Affiliation	.049	.053	.068	.924	.357
2	**(Constant)**	**.944**	**.960**		**.983**	**.327**
	Gender	-.205	.181	-.089	-1.134	.258
	Age	-.111	.103	-.089	-1.080	.282
	Marital Status	.094	.110	.068	.856	.393
	Size of Family	.126	.088	.114	1.434	.153
	Occupation/Profession	-.008	.043	-.014	-.179	.858
	Education Level	-.101	.067	-.118	-1.508	.133
	Income of Household	-.024	.035	-.054	-.689	.492
	Household Composition	.042	.093	.036	.457	.648
	Household Expenditure					
Level	.174	.072	.203	2.412	.017	
	Experience with Housing Market	.111	.094	.094	1.177	.241
	Expertise in Real Estate Matters	.219	.087	.188	2.528	.012
	Region Affiliation	.036	.054	.051	.670	.504
	Moral Hazards by Sellers and Property Agents	.009	.039	.018	.230	.819
	Adverse Selection	-.041	.032	-.102	-1.298	.196
	Heuristics	.039	.028	.114	1.426	.156
	Biased Beliefs	-.012	.028	-.034	-.419	.675
	Anchoring Bias	.015	.027	.041	.533	.595

Significance level= 0.05

a. Dependent Variable: Choice of Location of House

From the results in Table 2c above, the study found that only household expenditure levels and expertise in real estate matters had a significant influence on choice of location of apartment amongst households. With the model overall being not statistically significant, the regression function is hereby not formulated.

7.1.3 Asymmetric Information on Demographics-Source of financing relationship (H_3)

The regression output for the above hypothesis is captured in Table 3a to Table 3c. In Table 3a below, the regression function is modeled by taking the household demographics as the predictor variable (in model 1), household demographics and asymmetric information are captured as predictor variables in model 2 with demographics being the control variable while source of financing is the outcome (dependent variable).

Table 3a: Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	Durbin-Watson				
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.283[a]	.080	.018	.760	.080	1.301	12	180	.221	
2	.322[b]	.104	.017	.761	.024	.939	5	175	.457	2.254

Significance level= 0.05

a. Predictors: (Constant) and Demographics.

b. Predictors: (Constant), Demographics and Asymmetric Information.

c. Dependent Variable: Source of financing

From the results in Table 3a above, the study finds that there is a moderating effect of asymmetric information considering the quantum change in R^2 (R^2 change=0.024) with the inclusion of asymmetric information as a moderating variable in model 2. However, the change was not statistically significant (p=0.457). Hence, *there is no enough evidence to reject the null hypothesis (H_3)* that asymmetric information does not have a significant moderating effect on the relationship between household demographics and source of financing. Table 3b below indicates the significance of the model overall.

Table 3b: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	9.028	12	.752	1.301	.221[b]
	Residual	104.091	180	.578		
	Total	113.119	192			
2	Regression	11.748	17	.691	1.193	.274[c]
	Residual	101.371	175	.579		
	Total	113.119	192			

Significance level= 0.05

a. Dependent Variable: Source of financing

b. Predictors: (Constant) and Demographics.

c. Predictors: (Constant), Demographics and Asymmetric Information.

Results in Table 3b above indicate that Model 2 overall is not statistically significant since p>0.05 (p=0.274, F= 1.193). Similarly, the study finds that the decline in F-value (from 1.301 in model 1 to 1.193 in model 2) indicates a reduction in the predictive power of the model when asymmetric information is factored into the model as a moderating variable. The results for regression coefficients for demographic characteristics and asymmetric information are captures in Table 3c below.

Table 3c: Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.		
	B	Std. Error	Beta			
1	(Constant)	1.312	.440		2.983	.003
	Gender	.176	.120	.109	1.465	.145
	Age	-.013	.072	-.015	-.185	.853
	Marital Status	.188	.076	.192	2.474	.014
	Size of Family	-.058	.062	-.074	-.926	.356
	Occupation/Profession	.055	.031	.141	1.790	.075
	Education Level	-.016	.047	-.027	-.339	.735
	Income of Household	.019	.025	.062	.788	.432
	Household Composition	-.015	.064	-.018	-.238	.812
	Level of Household Expenditure	.001	.051	.002	.022	.982
	Experience with Housing Market	.016	.064	.020	.252	.801
	Expertise in Real Estate Matters	.064	.061	.078	1.049	.296
	Region Affiliation	.007	.038	.013	.178	.859
2	**(Constant)**	**1.742**	**.685**		**2.541**	**.012**
	Gender	.233	.129	.144	1.805	.073
	Age	-.034	.073	-.040	-.469	.640
	Marital Status	.206	.079	.211	2.615	.010
	Size of Family	-.046	.063	-.060	-.736	.463
	Occupation/Profession	.061	.031	.157	1.977	.050
	Education Level	-.022	.048	-.036	-.455	.650
	Income of Household	.017	.025	.055	.685	.494
	Household Composition	-.006	.066	-.007	-.085	.932
	Level of Household Expenditure	-.008	.052	-.014	-.162	.871
	Experience with Housing Market	.004	.067	.005	.066	.947
	Expertise in Real Estate Matters	.050	.062	.061	.809	.419
	Region Affiliation	-.007	.038	-.014	-.181	.856
	Moral Hazards by Sellers and Property Agents	.029	.028	.083	1.042	.299
	Adverse Selection	-.040	.023	-.139	-1.748	.082
	Heuristics	-.007	.020	-.028	-.346	.730
	Biased Beliefs	-.013	.020	-.053	-.652	.515
	Anchoring Bias	-.004	.020	-.014	-.181	.856

Significance level= 0.05

a. Dependent Variable: Source of financing.

From Table 3c above, the study found that only marital status had a significant effect on decisions on source of financing amongst the households. With the model overall being not statistically significant (p=0.274), the regression function is hereby not formulated.

7.1.4 Asymmetric information on Demographics-Size of Apartment House relationship (H_4)

Table 4a- 4c capture the regression output for the above hypothesis. In Table 4a below, the regression function is modeled by taking the household demographics as the predictor variable (in model 1) then household demographics and asymmetric information are entered as predictor variables in model 2 with demographic characteristics being the control variable; size of house is the outcome /dependent variable.

Table 4a: Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	Durbin-Watson				
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.314[a]	.098	.038	.733	.098	1.635	12	180	.085	
2	.377[b]	.142	.059	.725	.044	1.795	5	175	.116	1.607

Significance level= 0.05

a. Predictors: (Constant), Demographics.

b. Predictors: (Constant), Demographics and Asymmetric Information.

c. Dependent Variable: Size of Apartment House

The results in Table 4a above indicate that there is a moderating effect of asymmetric information on the relationship between demographic characteristics and size of apartment house due to the quantum change in R^2 (R^2 change= 0.044) though the moderation is not statistically significant (p=0.116). Hence, *there is no enough evidence to reject the null hypothesis (H_4)* that asymmetric information does not have a significant moderating effect on the relationship between household demographics and size of apartment house. Table 4b below presents results on the overall significance of the model.

Table 4b: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	10.428	12	.869	1.616	.090[b]
	Residual	96.795	180	.538		
	Total	107.223	192			
2	Regression	14.953	17	.880	1.668	.053[c]
	Residual	92.270	175	.527		
	Total	107.223	192			

Significance level= 0.05

a. Predictors: (Constant) and Demographics.
b. Predictors: (Constant), Demographics and Asymmetric Information.
c. Dependent Variable: Size of Apartment House

The results in Table 4b above indicate that Model 2 overall is not statistically significant (p=0.053, F= 1.668). However, the study finds that the increase in F-value (from 1.616 in model 1 to 1.668 in model 2) indicates an improvement in the predictive ability of the model with the inclusion of asymmetric information. The results of the regression coefficients of demographics and asymmetric information are presented in Table 4c below.

Table 4c: Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.		
	B	Std. Error	Beta			
1	(Constant)	1.757	.424		4.145	.000
	Gender	.012	.116	.008	.106	.916
	Age	.037	.069	.044	.535	.594
	Marital Status	.035	.073	.037	.477	.634
	Size of Family	-.182	.060	-.241	-3.043	.003
	Occupation/Profession	.009	.029	.024	.314	.754
	Education Level	-.031	.046	-.053	-.675	.501
	Income of Household	-.001	.024	-.002	-.031	.975
	Household Composition	-.027	.062	-.034	-.444	.658
	Level of Household Expenditure	.119	.049	.203	2.453	.015
	Experience with Housing Market	-.014	.062	-.017	-.218	.828
	Expertise in Real Estate Matters	.101	.059	.127	1.721	.087
	Region Affiliation	.010	.036	.020	.268	.789
2	**(Constant)**	**.379**	**.653**		**.581**	**.562**
	Gender	.068	.123	.044	.557	.578
	Age	.053	.070	.062	.755	.451
	Marital Status	.056	.075	.059	.744	.458
	Size of Family	-.182	.060	-.241	-3.046	.003
	Occupation/Profession	.001	.029	.003	.044	.965
	Education Level	-.020	.046	-.035	-.444	.658
	Income of Household	-.003	.024	-.009	-.120	.905
	Household Composition	-.043	.063	-.053	-.680	.497
	Level of Household Expenditure	.127	.049	.217	2.588	.010
	Experience with Housing Market	-.033	.064	-.042	-.522	.602
	Expertise in Real Estate Matters	.096	.059	.121	1.633	.104
	Region Affiliation	.006	.037	.012	.155	.877
	Moral Hazards by Sellers and Property Agents	.064	.027	.186	2.372	.019
	Adverse Selection	.011	.022	.039	.496	.621
	Heuristics	.019	.019	.081	1.014	.312
	Biased Beliefs	.008	.019	.031	.390	.697
	Anchoring Bias	.009	.019	.036	.467	.641

Significance level= 0.05

a. Dependent Variable: Size of Apartment House.

From the results in Table 4c above, the study finds that only size of family, level of household expenditure and moral hazards by sellers and property agents have a significant effect on housing decision

choices on size of apartment house amongst the households. With the model overall being not statistically significant (p=0.053), the regression function is hereby not formulated.

VIII. Summary of Findings

The study findings are captured hereunder in view of each of the four hypotheses. In view of hypothesis H_1, the study found that there was indeed a moderating effect associated with asymmetric information on demographics- choice of neighbourhood due to the quantum change in R^2 (R^2 change =0.011) though the moderation was not statistically significant (p=0.797). However, model 2 overall was found to be statistically significant (p=0.005). In testing hypothesis H_2, the study found that there was a moderating effect of asymmetric information on demographics- choice of location of apartment house relationship due to the quantum change in R^2 (R^2 change =0.016) though the moderation was found not statistically significant (p=0.679). Model 2 overall was found not to be statistically significant either (p=0.066). In view of hypothesis H_3, the study found that there was indeed a moderating effect of asymmetric information on the relationship between demographics and source of financing due to the quantum change in R^2 (R^2 change =0.024). However, the moderation was not statistically significant (p=0.457). Model 2 overall was found not to be statistically significant either (p=0.274). Finally, tests for hypothesis H_4 found a moderating effect associated with asymmetric information on demographics- size of apartment house relationship due to the quantum change in R^2 (R^2 change =0.044). However, the moderation was not statistically significant (p=0.116). Model 2 overall was not statistically significant either (p=0.053).

IX. Discussion

The determination of the moderating effect of asymmetric information on demographics-housing decisions confirmed that in deed there was moderation though the moderation was not statistically significant in explaining any of the four real estate investment decisions. The study found that asymmetric information did not have a statistically significant effect on demographics-choice of neighbourhood relationship: this finding is supported by empirical evidence by Turnbull and Sirmans (1993), Watkins (1998) and Case and Shiller (1989). However, the finding contradicts the US empirical evidence of Garmaise and Moskowitz (2004) from 7 states in the US who found mixed and weak evidence of asymmetric information. The finding that anchoring bias did not explain choice of neighbourhood is in contradiction of the findings of Northcraft and Neale (1987). The study did not either find a statistically significant moderating effect of asymmetric information on the relationship between demographics-choice of location of apartment house. This finding contradicts Phipps (1988), Lambson *et al.* (2004) and Imwati (2010) all who found that heuristics and anchoring bias to be having a significant effect on residential housing location choices respectively.

The moderating effect of asymmetric information on demographics-source of financing relationship was found not to be statistically significant. However, marital status of the owner of the house was found to be the only factor having a significant effect on source of financing decisions. This finding contradicts Igawa and Kanatas (1990) who found that moral hazards had a significant influence on mortgage financing decisions. The findings of FinmarkTrust (2010) that income had a significant effect on source of financing (in Nigeria) are equally not supported by this study.

The study further found that asymmetric information overall did not have a significant moderating effect on demographics-size of house relationship. However, the study found that moral hazards by property sellers and property agents had a significant effect on size of house. The finding of lack of moderation of asymmetric information in the demographics-size of apartment house relationship is supported empirically by Turnbull and Sirmans (1993), Myer *et al.* (1992), Garmaise and Moskowitz (2004) and Watkins (1998) who did not find a strong presence of asymmetric information in real estate markets. However, the findings of this study on demographics-size of house relationship contradict empirical evidence by Northcraft and Neale (1987) who found that anchoring bias and heuristics had a significant effect on the size of residential dwellings.

X. Implications of the Study and Areas for Further Research

Since the moderating effect of asymmetric information on demographics and all the four housing decision choices was not statistically significant (at a significance level of 0.05), there may not be severe asymmetric information problems in the apartment housing market in Nairobi County, Kenya: this suggests high levels of efficiency to the extent of the scope of this study. Weak evidence of asymmetric information in similar apartment housing studies has been documented in developed housing markets by Turnbull and Sirmans (1993), Watkins (1998) and Myers et al. (1992).

In view of the study findings, the study recommends certain areas for further study. Firstly, a study should seek to determine the extent to which apartment housing market in Nairobi County is efficient to the extent of the scope of this study. Secondly, a longitudinal study should be undertaken (in view of the scope of the study) to capture the time element associated with changes in household demographics that arise due to

passage of time- such changes are bound to cause changes in decision choices. Thirdly, a study should be carried out to determine why marital status is the only factor that has a statistically significant influence on source of financing decisions when asymmetric information is factored in as a moderator factor in the demographics-source of financing relationship. Lastly, a similar study should be carried out in view of utilizing purely the entire household's demographic characteristics as opposed to the home buyer's demographics.

XI. Limitations of the Study

The study encountered some limitations which are noteworthy. A descriptive cross-sectional design of this nature could not capture the time effect associated with changes in household demographics which in turn affect household residential decision choices. The researchers encountered challenges in accessing some apartments due to their location and restrictions imposed by security guards manning some of the apartments. The study discussions were limited by lack of similar studies from other counties in Kenya to corroborate the study findings. In addition, despite the unit of analysis being the household, most of the demographics were those of the home owner who was also the respondent- the home owner may not always form a good representative of a household especially where the household comprises of several members. Hence, these limitations form a good basis for further empirical investigations to address the same.

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