DISCUSSION PAPER

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1. For earlier versions of this paper see Morais and Cruz (2009) and Morais and Cruz (2011).

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CONTENTS

ABSTRACT

This paper analyzes the main determinants of tenure choice in Brazil in formal and informal housing markets. Logit and Multinomial Logit models with several specifications are used to test the household's tenure choice behavior taking demographic, social, economic and locational factors as dependent variables. The main source of information is the 2005 National Household Survey (Pnad) microdata. The probability of ownership is higher among non-afrodescendents, man-headed households and public servants. The poor, the young, recent migrants and single women with young children have higher probabilities of renting or becoming owners in informal settlements. Wealth and life cycle variables such as age, household size and marital status are good predictors for formal ownership. Education enhances the probability of being in the formal housing markets, either as a renter or an owner.

Keywords: housing demand; tenure choice; housing policy; Brazil.

RESUMO

Este trabalho analisa os principais determinantes da escolha das condições de ocupação da moradia (*tenure choice*) no Brasil, em mercados habitacionais formais e informais. Para testar o comportamento das famílias no que diz respeito à *tenure choice* foram utilizados modelos *logit* e *multinomial logit* com diversas especificações, usando características demográficas, sociais, econômicas e locacionais como variáveis dependentes. A principal fonte de informação são os microdados da Pesquisa Nacional de Amostra por Domicílios (Pnad) 2005. O estudo mostra que a probabilidade de ser proprietário no mercado habitacional formal é maior entre os brancos, os homens chefes de domicilio e os servidores públicos. Os pobres, os jovens, os migrantes recentes e as mulheres chefe de domicílio com filhos pequenos possuem probabilidades mais elevadas de alugar ou de se tornar proprietários em assentamentos informais. A riqueza e as variáveis de ciclo de vida são bons preditores para proprietários formais. Um maior nível educacional aumenta a probabilidade de ter acesso ao mercado habitacional formal, seja como locatário ou como proprietário.

Palavras-chave: demanda habitacional; escolha das condições de ocupação da moradia; política habitacional; Brasil.

1 INTRODUCTION

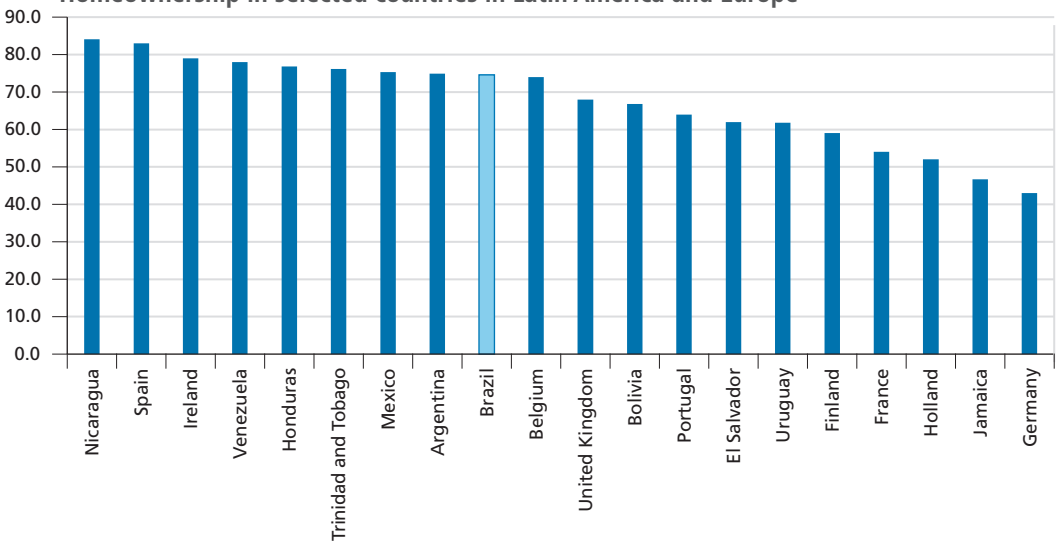
In Brazil, like in other Latin American countries, the governmental housing policies have emphasized the promotion of homeownership in formal housing markets as the best way of satisfying the housing needs of the population, assigning renting an inferior status.

In developed countries several studies boast the positive impacts of homeownership on children, neighborhood conditions and civic participation (Green and White, 1997; DiPasquale and Glaeser, 1999; Green, 2001; Haurin and Haurin, 2002, among others). There is also a huge body of literature stressing the importance of self-help housing to promote homeownership among the urban poor in Latin American cities, following a tradition launched by John Turner in the 1960s. (Turner, 1968).

Housing is both a consumer and investment good. Besides being a basic human need, housing usually corresponds to the main asset in households' portfolio all over the world. In Brazil housing account for 30% of the total stock of physical capital (Morandi, 1998). However, housing tenure conditions vary deeply across countries, irrespective of income patterns, region of the globe and levels of development. In Brazil homeownership ratio is 74,4% (IBGE, 2000), very close to Argentina (74,9%), Mexico (75,3%) and Belgium (74%) and just slightly above the numbers for the United States (66,2%), but behind Spain, where roughly 83% of households are homeowners. On the other hand, in countries with very different stages of economic development such as Germany and Jamaica homeownership ratios can be quite similar, around 45%, but far behind average homeownership ratios in Latin America countries.

Despite the efforts of housing ministries and national housing banks and other financial institutions to promote homeownership in Brazil and in the rest of the developing world, relatively little is known about the households' preferences regarding tenure choice and housing demand in these countries. Analyzing tenure conditions in developing countries we can find a multiplicity of housing solutions, that include homeownership and renting in formal housing markets, squatting and renting in informal settlements up to the occupancy of rent-free housing, ceded by relatives and employers.

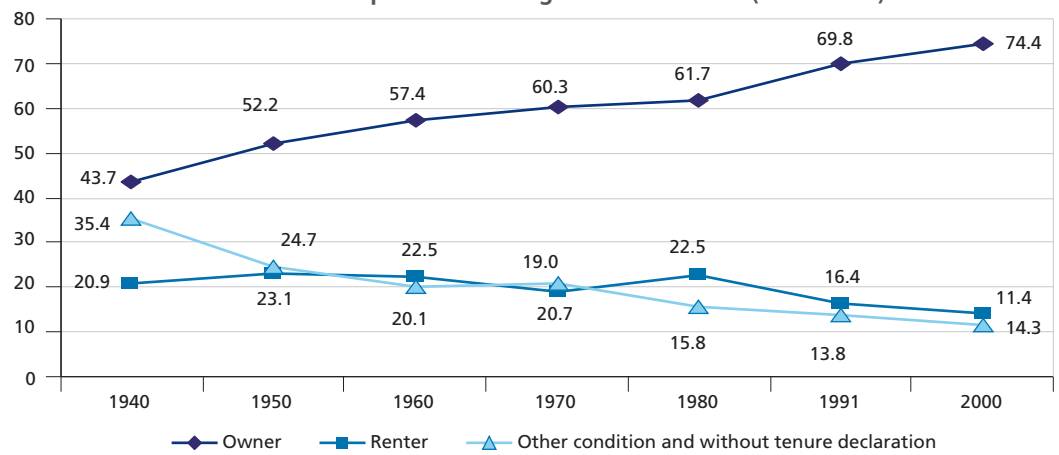
GRAPH 1
Homeownership in selected countries in Latin America and Europe



Source: Cepal; IBGE; and European Housing Statistics, 2002.

Graph 2 gives us an idea of the change in tenure conditions occurred over a period of sixty years in Brazil, when ownership rates increased over 30 percentage points, followed by a decrease in rental housing and other tenure arrangements.[1]

GRAPH 2
Brazil – tenure condition of private dwellings urban and rural (1940-2000)



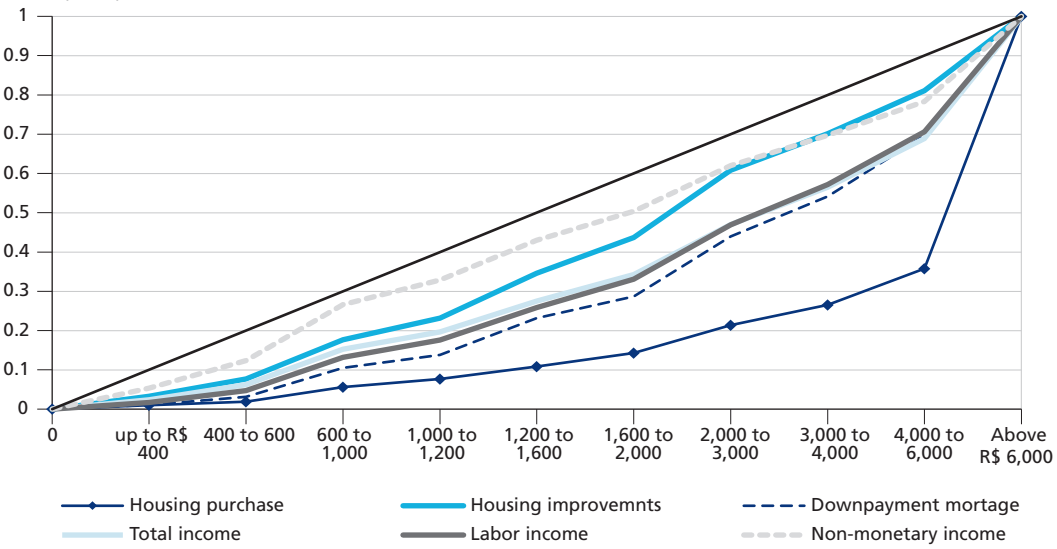
Source: IBGE; Statistical Yearbooks based on Demographic Census (1940-2000).

1. Include rent-free arrangements in dwellings ceded by entrepreneur or kin, dwelling without tenure declaration and tenure conditions other than owner or renter, like invasions.

Some studies on housing demand suggest that the poor have a multi-step housing career through different housing sub-markets (street dwellers, tenant and owner in informal markets, tenant and owner in formal markets). The empirical studies show that the tenure choice depends on the household's life cycle, income, wealth, availability of credit, governmental tax policy and inflationary expectations, among others. A more flexible, informal and dispersed labor market will tend to rise the demand for rental housing *vis a vis* homeownership. Several researchers have shown that the low capacity of payment of the poor diminishes their choices in the housing market and restricts their access to formal rental and owner-occupied markets, leading to the increase of informal settlements such as tenements, encroachments, slums and illegal subdivisions. For instance, in Brazil, expenses with finish housing purchases and mortgage downpayments are even more unequally distributed among Brazilian households than labor income. However, expenses with improvement in housing conditions are very well distributed among all income classes. This fact may reflect the effort of the poor populations that devote their savings to improving their housing conditions. This characteristic of the consumer spending in housing in Brazil shows the opportunity for the implementation of housing microfinance programs for the progressive reforming, upgrading and expansion of the existing units. Notwithstanding, the high rate of ownership among all income classes in Brazil may reflect this effort of the low income population to improve their housing conditions progressively, while richer households may prefer to move to new and better housing, instead of reforming or upgrading existing ones. The fact that down payment expenses are more unequal than total income distribution might be an indicator of credit constraint in Brazilian housing markets, showing that the poor households cannot finance their housing equity through the official credit system in the same proportion of their income share.

In this sense, this study tries to elaborate on the following issues: *i*) what are the driving forces behind the housing tenure choice of households?; *ii*) what are the tenure options faced by households either in developed or developing countries?; *iii*) do poor households have tenure choice or squatting and precarious rental and sharing arrangements in informal settlements are the only options open to them to meet their housing needs?; and *iv*) what kind of housing policies should be promoted by the government in order to meet housing demand?

GRAPH 3
Selected household expenditures per income bracket
(In R$)



Elaborated by the authors.
Obs: based on IBGE 2003 National Budget Survey (POF).

Specifically, this paper intends to analyze the main determinants of tenure choice in Brazil in formal and informal housing markets using micro-econometric techniques. The main explanatory variables to modeling the household tenure choice will take into account the demographic, social and economic factors such as household life cycle, income level, wealth and labor market status, among others. The main source of information is the Brazilian Census Bureau (IBGE) 2005 National Household Survey (Pnad) microdata. The article also analyzes the tenure conditions and the various degrees of tenure security of the Brazilian households as well as to what extent the informality in the housing market is correlated with informality in the labor market, complementing a previous study by Morais, Cruz and Oliveira (2003).

By modeling the tenure choice behavior of the Brazilian households the paper could contribute with several insights over the consumers preferences in the housing market, allowing for a better matching between housing supply and demand, showing the obstacles faced by the poor to access adequate housing, and helping the government in the design of housing policies better adapted to the household demand and the income level, and, therefore more effectively meeting the different housing needs of the Brazilian population.

Besides this introductory section, this paper presents a survey of the literature on tenure choice both in developed and developing countries. Section III describes the data and the variables used in the empirical formulation. Section IV shows the empirical estimations and the main conclusions derived from the models. Section V presents the final comments and the policy implications of the study as well as suggestions for future research.

2 SURVEY OF THE LITERATURE ON TENURE CHOICE[2]

There is a vast literature on tenure choice, dealing primarily with the United States and other OECD countries. In this section we intend to make only a summary of this literature, with a special focus on housing tenure of vulnerable groups and developing countries.

In developed countries studies housing tenure is usually classified into renting or owning in formal housing markets. Any kind of informality is desconsidered. However, as Malpezzi and Mayo (1987) and Englund et al. (2005) pointed out, this own-rent dichotomy is just a simplification for analytical purposes. In fact, housing tenure can be seen as a *continuum* of property rights over land and structure, even in developed countries, and actual tenure rights may be influenced by zoning and other urban legislation, rental agreements, length of stay, private and costumary laws, among others.

One of the earliest works on tenure choice is Kain and Quigley (1972), that measure the effects of spatial segregation and racial discrimination on black and white home ownership differences, using a sample of households in St. Louis, Missouri. Their study shows that blacks pay more than whites for housing of equivalent quality and that blacks, single females, larger families and women-headed households are less likely to own. Their results are reinforced by McDonald (1979) and Roistacher and Goodman (1976) that also find lower homeownership rates among blacks.

Li (1977), using a logit model to explain tenure choice in Boston and Baltimore demonstrate that income, family size, age and race of the household head are the

2. This section draws on a product prepared by Pianto (2004), our former consultant.

primary determinants of homeownership. Rosen (1979), King (1980), Henderson and Ioannides (1983) and Goodman (1988) stress the importance of the user cost of owning versus renting, the tax laws and portfolio considerations of housing as both and investment and consumption good to explain tenure choice. Blackley and Follain (1983) conclude that the net effect of higher expected inflation is a decrease in the cost of housing, leading to a higher ownership rates and higher investment in housing. Linneman and Wachter (1989) conclude that even in well-developed capital markets, the presence of borrowing constraints adversely affects the homeownership propensities. On the other hand, Deaton (1992), analyzing household savings for least developed countries, Neri, Carvalho and Nascimento (2000) studying life cycle and households financial motivations in Brazil, state that individuals with liquidity and borrowing constraints can accumulate housing and real estate assets as a buffer-stock against uncertainty. A similar result for the United States was already shown by Birnbaum and Weston (1974), who found that at the same level of income and wealthy blacks invest more in housing than whites, due to a smaller set of investment opportunities in face of racial discrimination.

Iwarere and Williams (1991), examining data from Washington D.C., show that permanent income, housing prices, wealth, and demographic variables exert the most dominant forces on the housing tenure. Many of the relative cost ideas are refuted by Jones (1994), who finds that socio-demographic variables and wealth are extremely important in explaining tenure choice decisions. Ioannides (1987), using data for 1970-1981, also concludes that wealth and homeownership are positively correlated, with wealth resulting in higher mobility for renters and lower mobility for owners. The negative impacts of housing equity on residential mobility and labor market outcomes are also explored in Henley (1998).

Bourassa (1995) models tenure choice for the metropolitan areas (MAs) of Sidney and Melbourne in Australia, taking permanent and transitory income, demographic characteristics and the relative cost of renting versus owning as explanatory variables. Di Salvo and Ermisch (1997), using panel data, study the effect of variables such as lifetime earnings prospects, family background, a person's own spells of unemployment, the regional unemployment rate, and regional relative house prices on the timing and pattern of first entry into a major tenure (owner-occupied or social housing). They find that being a young parent or the child of parents in social housing increases the chances of being in social housing.

Rothenberg et al. (1992), King (1980) and Ermisch et al. (1996) suggest that tenure choice and housing demand are simultaneously determined. Gibb (2000), claims that tenure choice may also be simultaneously determined by housing location, not just demand, using a nested multinomial logit in which the choice of renting or owning becomes conditional on other choices such as location. However, it is possible that for some low-income people the only choice is renting or sharing and location is therefore limited by tenure, whereas for high-income people the choice of location may be dominant limiting tenure choice. Elder and Zumpano (1991) examine locational effects on tenure choice and housing demand in several US metropolitan areas. They find that, for homeowners, housing demand and location are jointly determined, while tenure choice is independent of demand and location. However, this result does not hold for renters, suggesting, again, that they have more limited choices.

Coulson (1999) find that being an immigrant has a substantial negative effect on homeownership but that this effect dissipates over time. Painter, Gabriel and Myers (2001) assess the determinants of housing tenure choice among racial and ethnic groups in Los Angeles metropolitan area indicating that endowment differences in income, education and immigrant status largely explain the homeownership gap between latinos and whites.

Although in developed economies the available tenures are typically renting or owning, there is a need for further distinction of tenure status in developing countries. In the formal market of developing countries the choice continues to be between owning or renting. However, in these countries, there are several informal tenure arrangements that include: home ownership through squatting or the purchase of illegal subdivisions; renting a bed, room, house or piece of land or share with kin or relatives (Wadhva, 1988; Gilbert, 1983; DeWandeler et al. 1992; Cocatto, 1996).

Throughout the literature, housing sub-markets or tenure options are defined according to various indicators. (Payne, 1988) defines informal settlements as "spontaneous, unplanned or unregulated sub-markets, which commonly attract the general label of self-help housing, slums, or squatters". Lim (1987) uses legality of land occupancy, legality of the physical characteristics and type of occupancy. Struyk et al. (1990) considers how the housing was produced, its quality, whether it is rented or owned, and the security of occupancy when defining his housing segments.

The literature stresses that those who live in informal tenures are typically poor and that their tenure choice is frequently reduced to selp-help construction or renting in a clandestine subdivision or even rent-free or sharing arrangements (Durand-Lasserve, 1986; Gilbert, 1993; Necochea, 1987; Cocatto, 1996). Coulomb (1988) wonders whether the poor even have a choice or are forced into rental accommodation because there is no other alternative open to them. Edwards (1990) claims that available tenure choice is an increasing function of income and that people with lower incomes have fewer alternatives. However, this author found no direct correlation between tenure choice and social class or income groups because households with the same level of income choose different forms of tenure and *vice versa* (Edwards, 1982). Green (1988, p. 251), states that "although choices can only be made within the constraints which determine what is available, where and at what price, even the most disadvantaged section of the population usually has more than one alternative to choose from". Van Lindert and Van Westen (1991), analysing housing shelter strategies in low income groups in Bamako (Mali) and La Paz (Bolivia) argue that both the "choice" and "constraint" arguments can apply to different social categories within the same income bracket. In Bamako, some households without financial constraints to secure homeownership chose to continue renting. In La Paz, many of *conventillo* inhabitants prefer to remain in this centrally located rental accommodation than to become owners in the city periphery.

For Cocatto (1996) and Wadhva (1988) location and affordability are the strongest factors influencing housing preferences. Mehta and Mehta (1989) relate housing preferences to households stage in life cycle. Early on, households base their preferences on their previous housing background and their housing needs. In the second phase, affordability and awareness of housing opportunities play a dominant role. The third and final stage is a process of housing adjustment as ones goals and needs change. This suggests the use of models where age is interacted with the main determinants of tenure choice to adjust for the different stages in life cycle.

Daniere (1992) examines the determinants of tenure choice in Cairo and Manila and extended tenure options to include squatting as a third choice, besides owing and renting. The author indicates that family size, education, income and mobility are powerful forces explaining tenure choice. The findings also suggest that squatters may have more in common with owners than renters. Grootaert and Dubois (1988) used a maximum likelihood probit to analyze tenure choice between owing or renting in Ivory Cost cities, concluding that stage in the life-cycle and mobility are the two prime determinants of tenancy status. Similarly, Arimah (1997), based on a logit model for Ibadan, Nigeria, concludes that income, investment motivation for ownership,

number of children, house head gender, life cycle-variables, duration of stay in the city and access to land on the basis of ethnic qualification are the main determinants of housing tenure. Huang and Clark (2002), using a multilevel modeling technique, demonstrate that tenure choice in China is affected by socioeconomic characteristics, market mechanisms and institutional factors, with the relationship among the state, work units and households still playing important roles in tenure decisions.

Jacobs and Savedoff (1999) use data from two cities in Panama to evaluate the determinants of tenure choice in the context of two models. In the first model households choose between owing or renting, while the second model classifies households as buyers (finish housing), renters or builders (progressive housing). Their results show that life cycle variables influence the decision between owning or renting, whereas choosing between buying a complete housing unit or progressive building it, depends on income and assets levels. Similar conclusions are reached by Koizumi and McCann (2006), also studying housing tenure in Panama. These authors develop a series of log-linear models in which the rent-buy models are extended to include plot purchasing for future building as a third tenure possibility. They conclude that the extended models perform better in identifying which household characteristics are associated with a particular tenure option. Their results suggest that the age of household head and the number of economic dependents are the key factors to explain choice between renting or buying a dwelling. On the other hand, education and income levels explain whether the household purchases a plot to build or a complete dwelling unit.

Most information about informal housing sub-markets comes from case studies. Major cities have been analyzed, such as Ahmedabad (Mehta, et al. 1989; Whadva, 1988), Bangkok (Marcussen, 1990; Sheng, 1992), Bogotá (Edwards, 1982), Karachi (Schoorl; Vand der Linden; Yap, 1983), Mexico (Gilbert, 1993; Ward, 1982), and Nairobi (Amis, 1984). Following a legacy left behing by Turner (1968), the literature agrees on the important role played by informal land sub-markets in the supply of ownership alternatives for the poor. However, Miraftab (1997), analyzing census data from the MA of Guadalajara, Mexico, observes that the poor cannot be aggregated into a homogeneous group based on income only and that homeownership in informal settlements will not benefit at all, arguing in favor of broadening the scope of housing policies to include renting and sharing as important shelter options for the poor. Coccato (1996), based on research conducted in three informal barrios of Resistencia in Argentina, also finds that rentals and sharing increase the number of choices for those who cannot buy, and for those who are in search of job opportunities. Meanwhile, renting also provides a means of income generation, or financing for poor owners.

Finally, homeownership may not be be a priority for many people, besides reducing mobility. Amis (1984), states that the conventional view that the squatter builds his own house doesn't hold any longer in Nairobi, where the provision of low-income shelter is supplied by a private rental sector, albeit illegal, operating in "squatting" areas.

Gilbert (1993, 160) writes that Latin American governments "encourage owner-occupation, sacrificing other forms of housing tenure on the altar of the favored option", which limits the shelter opportunities available, causing reduced standards of living for the poor. For this author, to ignore rental housing is simply irresponsible and renting must be recognized as both a respectable and a necessary housing option. Even so, most government policies are still at early stages regarding rental housing in most developing countries (Coccato, 1996). The World Bank (1993, 15) stated that "diversity of the supply is the key for a successful housing sector". Similarly, Hansen and Justin (1988) Gilbert (1989), Van Lindert and Van Westen (1991) and Rakodi (1992,) advocate that housing policies must be aimed at all sub-markets and a wide variety of housing options should be available to every family.

Clearly the determination of tenure choice in developing countries is not a simple problem. While studies on tenure choice in the developed world only deal with formal owning and renting, in the developing world, informal subdivisions, squatting, and rentals of informal properties play a major role in providing housing for the poor. Hence, any study of tenure choice in Brazil must allow for these different categories of tenure as must any future policy considerations which aim to satisfy the housing needs of the Brazilian population.

3 THE DATA AND METHODOLOGY

The data used in this paper comes from the Brazilian Census Bureau (IBGE) 2005 National Household Survey (Pnad). Pnad is an annual survey that contains information both on dwellings[3] and individual[4] characteristics of randomly selected households in rural, non-metropolitan urban, and ten major metropolitan areas (MAs).

3. Type of dwelling, construction materials, tenure, rent, access to urban services (water, sewage, garbage), access to durable goods, type of sector and type of area.
4. Position in the household, race, gender, migration, education, employment, income, fertility, among others.

To analyze housing tenure choice in Brazil we have selected our sample based on an extended concept of urban areas,[5] that includes the three types of urban sectors as classified by IBGE (urbanized urban areas, non-urbanized urban areas and isolated urban areas) plus the areas classified as rural of urban extension, that correspond roughly to the urban fringe and are highly interconnected and share several attributes with urbanized areas. Considering the above concept of urban areas and weightening microdata to be representative of the country as a whole, our sample covers 44,949,283 households.

Conditioned to the availability of the Pnad variables we have used information on the dwelling mode of occupancy,[6] land property rights[7] and sector type[8] to define the tenure categories. Informality in the housing markets can be captured either by lack of well-defined property rights (squatters) or by non-compliance with building codes and other urban regulation (slums). The best proxy for slums and other similar informal settlements are the sectors classified by IBGE as substandard areas, that encompass a group of fifty dwelling units or more, undisputed and recently squattered, without authorization, privately or publicly owned, laid out in a scattered and dense manner and lacking essential public infrastructure services, also known regionally as *favelas*, *mocambos* and *alagados*.

Based on the above variables defined four different tenure status were defined: *i*) formal owners: he owns the house, owns the land and the dwelling unit is not located in a substandard area; *ii*) formal renter: rents or rent-free outside substandard area; *iii*) informal owners: owns the house but not the land or has other tenure condition such as encroachment (squatters), owns in a substandard area (slum dweller) or both; and *iv*) informal renter: rents in a substandard area.

Table 1 shows the absolute frequencies and percentages for housing tenure conditions. Formal owner is the most frequent tenure status (almost 30 million), while informal settlers account for only 7% of our sample. Ceded rent-free and other tenure conditions such as encroachment encompass 8.4% of total cases.

5. In Brazil, the concept or urban and rural areas is purely administrative, and doesn´t take into account socioeconomic or environmental characterisitcs such as total population, demographic density, sector of employment, trade flows etc. In this sense, every municipality in Brazil has urban and rural areas and the urban perimeter is established by a municipal law.
6. In Pnad the categories for mode of occupancy are: owned still payed, owned with mortgage, rented, ceded rent-free by entrepreneur, ceded rent-free by relatives and other tenure conditions such as encroachments.
7. For the owners occupying dwelling units Pnad's questionnaire asks if the respondent owns the land and the construction or just the construction. For renters and other tenure conditions there is no information on property rights of any kind, not even about rental or other contracts.
8. Regular sectors, substandard sectors, indigenous areas and boat areas.

TABLE 1
Tenure conditions in Brazilian urban areas (2005)

Tenure condition		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Formal owner	2,999,3897	66.7	7.9	7.9
	Formal renter	8,067,093	17.9	19.6	92.5
	Informal owner	2,907,590	6.5	7.1	99.5
	Informal renter	191,112	0.4	0.5	100.0
	Total	41,159,692	91.6	100.0	
Missing	System	3,789,591	8.4		
Total		**44,949,283**	**100.0**		

Source: The authors relied on 2005 IBGE Pnad microdata.
Obs: it includes rent-free and other tenure conditions.

One of the main criticisms one can make to our database is that it underestimates housing informality as compared to many case studies for three main reasons: *i*) it only takes into account slums with more than fifty dwelling units; *ii*) it relies only on self-declaration of the respondents and does not gather information on the existence of land title of other *de facto* evidence of tenure security or any kind of selling or rental contracts; *iii*) IBGE takes recent upgraded and regularized slums out of the concept of substandard areas, even if local governments keep on considering those areas as slums and housing standards and income levels are far behind the overall neighborhoods.

Based on the literature review, the authors have classified the determinants of tenure choice into four main blocks of variables: *i*) life cycle and household characteristics; *ii*) wealth and permanent income, *iii*) social vulnerability and credit constraint and *iv*) location variables.

In the *life cycle and household characteristics* block the authors have used the following independent variables: age of the household head in years, household size and marital status. The *wealth and permanent income* category include: *per capita* income, household income, years of schooling of household head and a wealth proxy. *Social vulnerability and credit constraints* are proxied by: gender of the household head (women with children under fourteen), migrant: recent (up to four years living in the present municipality), middle (from four years up to nine years) and long-term migrant (more than nine years), economic dependency (contribution of the household head to total income (head of household income/total household income) and labor market status- formal employee (with access to social security system), employer and

public servant versus informal employees, domestic servants, self-employed and unemployed. The *location variables* used are the following: metropolitan areas,[9] type of municipality: (large cities[10] *versus* small cities) and macro-regions (North, Northeast, Southeast, South and Midwest).

In Pnad there is no explicit variable for wealth, so the authors have constructed a proxy for household wealth based on housing conditions characteristics and access to durable goods. We have assumed that the absence of proper housing conditions implies a reduction of 1 point in our proxy of wealth for each desirable attribute that is missing. To measure the degree of housing adequacy we relied on the definition of adequate housing that UN-Habitat uses to Monitor Target 11 of the Millennium Development Goals, which must meet the following conditions: safe drinking water (piped water from public network inside the dwelling), proper sewage (public sewage network or septic tank), electricity, structural durability: permanent walls (masonry or processed wood) and permanent ceiling (tile, concrete or processed wood) and sufficient living space (not overcrowded, with less than three people per dormitory).

Access to durable goods increases 1 point each for goods like fridge, freezer, television, washing machine, computer or internet and 1.5 in the case of fridge with two doors. Another variable that we have considered in our wealth proxy is number of bathrooms per person as a proxy for size of the housing unit, because rich families usually have more than one bathroom in the dwelling unit. If the household falls in the lowest quartile, we have increased its wealth by 1 point, as the house may be relatively larger and the household relatively wealthier, decreasing 0.5 point per each quartile. So, 2nd quartile gets 0.5 point, the 3rd quartile minus 0.5 and 4th quartile minus 1. This variable varies from 7 to 11.5 points, with an average was 5.35, very close to the median 5.4 and a standard deviation of 3.13.

Our sample comprises married couples in 63.5% of the cases and 53.8% of the household heads were non-african descendents (white and Asian). Migrants account for 47.9% of the entire sample: 7.2 % with less than four years in the municipality,

9. Includes the municipalities of Belém, Fortaleza, Recife, Salvador, Belo Horizonte, Rio de Janeiro, São Paulo, Curitiba, Porto Alegre and Brasília (Federal District-DF).
10. Large cities are proxied by what IBGE calls self-representative municipalities *(municípios autorrepresentativos*), that encompass municipalities that, due to their population or economic importance are always included in Pnad samples.

5.8% with four years up to nine years, and 34.9% living for more than ten years in the same city. Public servants, a proxy for stable condition in the labor market, account for 5.2% of the total number of household heads.

It should be stressed that this paper presents only a cross-section analysis of tenure choice. However, it might be very important to include dynamic aspects of housing tenure, like the household's portofolio allocation decision and the user cost of owing versus renting. For instance, Brazil has experienced periods of extremely high inflation, instability in the labor market, and in such a scenario the purchase of a housing unit might become a hedge against those external shocks. In this sense, housing may be perceived by household seekers as a riskless asset or a less riskier asset that current bank equities, a hypothesis also raised by Neri, Carvalho and Nascimento (2000).

Table 2 shows some descriptive statistics of the continuous variables used in the regressions. As can be seen, the average age of the household head is 45.8 years, while they have an average of 6.95 years of schooling. Average total household income is R$ 1,654.00 and average household size is 3.6 members, implying an average *per capita* income of about R$ 991.16. The variable on economic dependency shows that the income earned by the household head accounts for almost 65% of the household total income.

TABLE 2
Descriptive statistic of the continuous variables used in the regression

Statistics	Age (years)	Household Size (person per household)	Economic dependency (head income/total inc.)	Schooling (years)	Household income (R$)	Household per capita income (R$/person)	Wealth
Mean	45.83	3.62	0.65	6.96	1654.07	572.31	5.36
Median	43.75	3.41	0.67	6.86	991.16	300.70	5.40
Standard-deviation	15.90	1.91	0.33	4.60	2431.28	1000.87	3.13

Elaborated by the authors.
Obs: based on 2005 IBGE Pnad microdata.

4 EMPIRICAL MODEL AND RESULTS

In this section we present the main results of the study and the Logit and Multinomial Logit Models with different specifications used to study the determinants of the tenure choice in Brazil, taking demographic, social, economic and locational factors as dependent variables.

The Multinomial Logit Model (MLM) is used to classify discrete or categorical variables with more than two states. The MLM is an extension of the Logit Model, and assumes that individuals have the following perceived utility function: $u_{i,j} = \beta_{0,j} + \beta_{1j} x_i + \varepsilon_{ij}$

where *i* accounts for the individual and *j* for the category, *xi* is the covariate and ε_{ij} is the unobserved error variable.[11]

The individual will choose the category *J* that gives the highest utility. In order words:

$$u_{i,J} = Max(u_{i,1}, u_{i,2} ..., u_{i,J})$$

The usual assumption is that ε_{ij} has a type I extreme distribution. If this holds it can be shown that the probability of a given category has a Multinomial Logit. Another assumption in the Standard Multinomial Logit is the so-called independence of irrelevant alternatives (IIA). Formally, one says that IIA holds when the ε_{ij} is independent among categories. Intuitively, if a new alternative is introduced to the individual, the IIA hypothesis says that the individual will not change the odds of the previous category. In other words, it is assumed that the proportionality among category is maintained constant. This assumption can be quite restrictive.

In the present study, we apply the MLM to the case of the housing tenure decisions of Brazilian households. The dependent variable includes the housing tenure both in formal and informal sectors. Informal housing is a widespread phenomena in Brazil and other developing countries. However, there is no consensus on how to define and identify this informal sector. As stated in the previous section we have used information on the dwelling mode of occupancy, on property rights over land and structure and on the neighborhood constructive patterns to define four tenure categories in the complete model: formal ownership, formal renting, informal ownership and informal renting.

We begin the analysis by presenting the traditional dichotomic model of housing tenure choice, that is, owner or renter, with no more detailing concerning housing formality or not. Table 3 below presents the coefficients of the Logit model, where the dependent variable is a dichotomous qualitative dummy, equal to 1 for owners and

11. Of course in this case, it is assumed that there are more than two categories, so *j*>2.

0 for renters. As a minimum value to classify an individual as a homeowner, we have adopted Franses and Paap (2001) suggestion, taking the participation of owners in the sample (70%) as the cut-off value for predictions of that category, instead of the usual 50%. We can see that this model presents a reasonable adjustment, with a correct forecast for 70.6% of the cases: 75.7% for owners and 56.1% for renters.

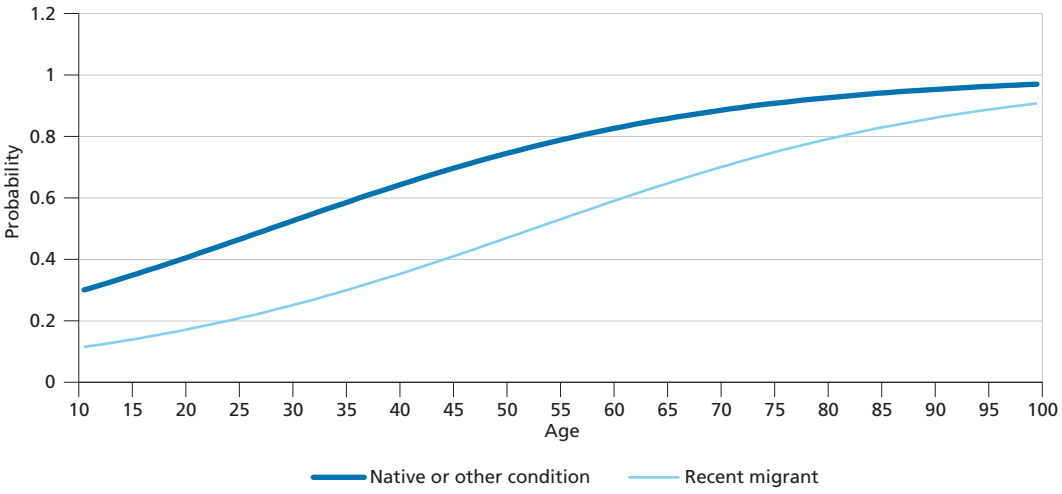
TABLE 3
Logit model for tenure choice in Brazil

Explanatory variables		Estimate B	Standard error	Wald	Df	Sig.	Exp(B)
Step 1 Owner	Race	-,048	,001	3566,550	1	,000	,953
	Migrant up to 4 years	-1,194	,001	786709,032	1	,000	,303
	Migrant _4 to 9 years	-,366	,001	61364,956	1	,000	,693
	Migrant 9 years or more	,153	,001	31487,865	1	,000	1,165
	Public_servant	,127	,002	5613,953	1	,000	1,135
	Formal_worker	-,028	,001	990,790	1	,000	,972
	Employer	,035	,002	339,744	1	,000	1,036
	Age	,033	,000	1050012,218	1	,000	1,034
	Married couples	,252	,001	68109,936	1	,000	1,287
	household_size	,185	,000	277257,627	1	,000	1,203
	Economic dependency	-,193	,001	19645,605	1	,000	,824
	Schooling	-,032	,000	76253,474	1	,000	,969
	Wealth	,114	,000	352410,851	1	,000	1,120
	Metropolitan Areas	-,074	,001	6637,725	1	,000	,928
	Large cities	-,165	,001	27600,961	1	,000	,848
	North	,680	,002	146573,796	1	,000	1,974
	Midwest	-,122	,001	7792,772	1	,000	,885
	Per capita income	,000	,000	238,122	1	,000	1,000
	Household income	,000	,000	380,653	1	,000	1,000
	Women with children under 14	-,052	,002	697,323	1	,000	,950
	Constant	-1,325	,003	245869,466	1	,000	,266

Elaborated by the authors.
Obs: Number of response levels= 2; owner=1; Renter or rent-free=0.

The life cycle variables such as age, marital status and household size show a good adjustment and the expected signs. The age variable presents a positive coefficient, reflecting the effects of life cycle, where an increase in age increases the probability of homeownership. Notice that the longer the time of residence in the municipality the higher the probability of homeownership, with the negative impact of being a migrant dissipation over time. Graph 4 shows the positive effects of age and negative effects of recent migration (less than 4 years in municipality) over the probability of homeownership.

GRAPH 4
Impacts of age and migration on homeownership

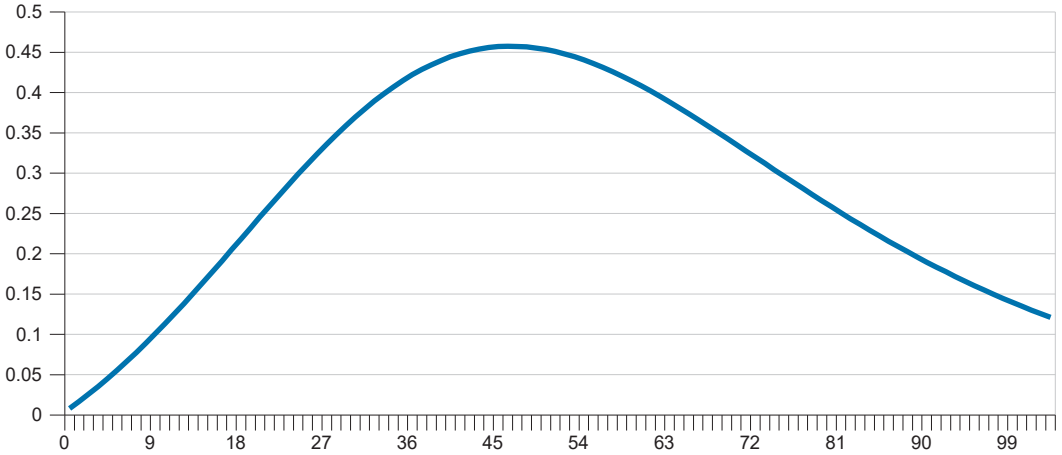


Elaborated by the authors.

Graph 5 illustrates the quasi-elasticity of age over the probability of becoming a homeowner. The quasi-elasticity can be calculated as:

$$\frac{\partial \Pr[\text{Ower}|X_i]}{\partial Age} Age = \Pr[\text{Ower}|X_i](1 - \Pr[\text{Ower}|X_i])\beta_1 Age$$

GRAPH 5
Quasi – elasticity of age on the probability of homeownership

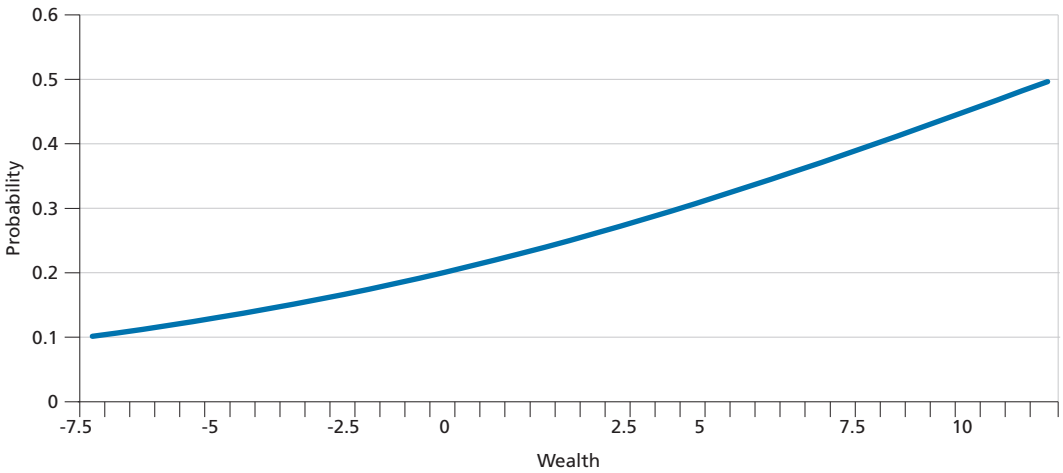


Elaborated by the authors.

The interpretation of this quasi-elasticity is quite simple. The quasi-elasticity indicates the sensitivity of the probability of homeownership to a percentage increase in the age of the household head, keeping other factors constant. Notice that, this value reaches a maximum around fifty years and from that moment on the impact of age over the probability of homeownership, despite positive, decreases.

Marital status and household size positively affect the homeownership probability. Married couples and family size increase by 1,287 and 1,203 the probability of becoming a homeowner. This results shows that point life cycle variables are quite important to explain household's housing tenure choices. Wealth has a positive impact over homeownership, increasing by 1,12 the probability of becoming a homeowner. Graph 6 presents the impact of wealth on the probability of homeownership, showing that this probability reaches 50% for the highest wealth levels.

GRAPH 6
Impact of wealth on homeownership probability



Elaborated by the authors.

Wealth quasi-elasticity also shows the positive effect of wealth over the probability of becoming a homeowner. Notice that, such an effect is not observed by Henderson and Ioannides (1983), who conclude that wealth is neutral in respect to tenure choice. Fu (1991) shows, however, that this result is due to some inconsistencies in the derivation of the Henderson and Ioannides (1983) theoretical model, and that wealth could have a positive impact over homeownership if the quasi-elasticity of investment motive

for housing demand were higher than the quasi-elasticity of consumption motive. The above results demonstrate that in the Brazilian case we can observe such an impact.

Nevertheless, current income, despite having statistical significance, is not as relevant from an economic point of view, as is wealth to explain tenure choice in Brazil. The odds-ratio tells us how much the probability of homeownership increases (decreases) due to variations in independent variables. For household total income and per capita income, the odds-ratio is almost 1, showing that these two variables have no relevant impact over the probability of homeownership.

Education, on the other hand, presents a negative sign, what is contra-intuitive. *Ceteris paribus*, the probability of homeownership for heads of households with no schooling is 20.9%, whereas this probability is 14.9% for heads with fifteen years of schooling. Here, it can be highlighted the need for a better refining of the concept of homeownership. When we qualify information over housing informality, education has a positive impact over the probability of becoming an owner in formal housing markets.

Concerning vulnerability in the labor markets, we can observe that public servants and employers have a positive sign over the probability of becoming a homeowner. Quite surprisingly, for formal employees this effect is negative. Women-headed households with children under fouteen will have a negative impact over the probability of homeownership. Another contra-intuitive result is the fact that non-afrodescendents head of households will have a smaller homeownership probability when compared with blacks and mulattos, by a factor of 0.953. Again, this result is due to a non proper discrimination between formal and informal owners, and shows the need for a better distinction between housing sub-markets.

Finally, location variables are significant and present the expected signs: living in metropolitan regions or large cities (self-representative municipalities), decreases the probability of homeownership, probably due to higher land and property prices in larger municipalities. A regional dummy for North region shows that the probability of homeownership increases in less developed regions. Conversely, in the Midwest, the most dynamic region of the country, homeownership presents a negative sign. This phenomenon can, again, be explained by movements in land and property prices.

In the next two Multinomial Logit Models we try to identify the impacts of housing informality on the tenure choice of Brazilian households. As we have discussed above, this two models help us to clarify some contra-intuitive results over expected signs of the dependent variables like race and education over the probability of home-ownership. In the first Multinomial Logit Model we allow a tricothomous dependent variable, where we make a clear distinction between formal ownership, formal renting and informal settlements (either squatters or slum dwellers). The definition of formal owner and rental markets takes into account property rights over house and land, as well as attributes of the neighborhood (substandard sector or not). We can notice from table 4 that life cycle variables such as age of household head, married couples and household size increase the probability of becoming a homeowner either formal or informal, as compared to rental markets (the omitted category).

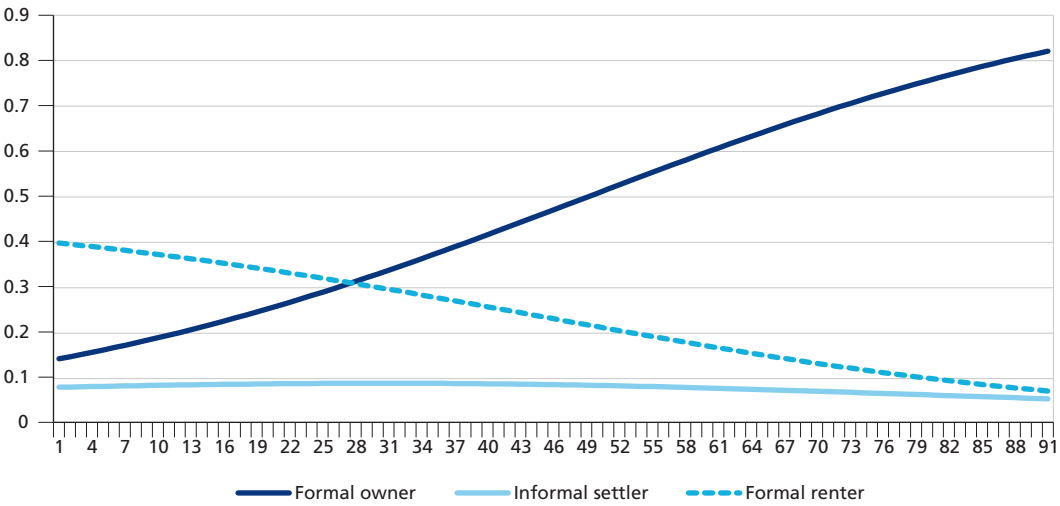
Graph 8 presents the impact of age in tenure choice decisions in the tricothomus model, showing that an increase in the age of the household head increases the probability of owning and decreases the probability of renting in formal housing markets. However, the impact of this life cycle variable is smaller to explain the probabilities of living in a informal settlement.[12]

It is interesting to see the impact of wealth over homeownership, increasing the probability of owing and renting in formal housing markets, but with a negative correlation with housing informality. This results show that the poor households have fewer opportunities in the housing market and must rely mainly on informal settlements to satisfy their needs, confirming the results well establish in the literature (Gilbert, 1993; Cocatto, 1996; among others). Again, like in the previous model, income variables, albeit representative, are not good predictors of tenure choice.

As is expected, an employment in the public sector increases the probability of becoming a homeowner in formal housing markets and has a negative impact on the probability of becoming an informal dweller. Vulnerability variables such a gender and race present the expected signs: being a afro-descendent and a single mother with young children increases the probability of living in a informal settlements.

12. Of course in this case, it is assumed that there are more than two categories, so $j>2$.
of becoming a slum dweller in Brazil. See: Morais, Cruz and Oliveira (2003).

GRAPH 8
Effect of age of household over tenure choice in formal and informal housing markets



Elaborated by the authors.

For location variables, living in a metropolitan area or in a big city decreases the probability of formal homeownership and increases the probability of becoming an informal dweller, showing that housing informality is a typical effect of the increasing concentration of the population in the major metropolitan areas and other urban agglomerations, corroborating Morais, Cruz and Oliveira (2003) results. The regression also shows that higher educational levels increase the probability of renting in formal housing markets.

TABLE 4
Multinomial logit model tenure choice 1

Multinomial Logit tenure 1		Estimate B	Std. error	Wald	df	Sig.	Exp(B)
1- Formal owner	Intercept	-1,427	,003	198874,415	1	,000	
	Non afro-descendents	,014	,001	212,798	1	,000	1,014
	Migrant up to 4 years	-1,394	,001	893677,905	1	,000	,248
	Migrant 4 to 9 years	-,477	,002	82757,436	1	,000	,620
	Migrant 9 years or more	,166	,001	26132,041	1	,000	1,180
	Public Servant	,111	,002	3327,792	1	,000	1,117
	Formal Worker	-,027	,001	668,309	1	,000	,973
	Employer	-,093	,002	1997,630	1	,000	,911
	Age of household head	,039	,000	1037578,611	1	,000	1,040
	Married couples	,333	,001	88463,221	1	,000	1,395

(Continues)

(Continued)

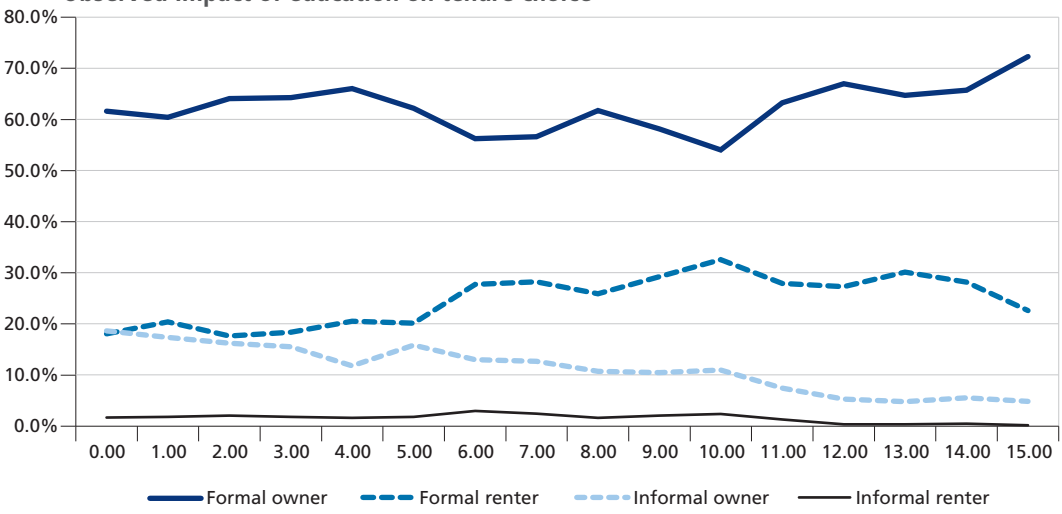
Multinomial Logit tenure 1		Estimate B	Std. error	Wald	df	Sig.	Exp(B)
1- Formal owner	Household size	,178	,000	189263,478	1	,000	1,195
	Economic dependency	-,128	,002	6249,067	1	,000	,880
	Schooling	-,034	,000	68349,850	1	,000	,966
	Wealth	,116	,000	264339,430	1	,000	1,123
	Metropolitan area	-,186	,001	29476,729	1	,000	,830
	Large municipalities	-,283	,001	60911,998	1	,000	,753
	North	,885	,002	161080,706	1	,000	2,424
	Midwest	,094	,002	3242,215	1	,000	1,099
	South	,273	,001	43613,771	1	,000	1,314
	Per capita income	,000	,000	489,963	1	,000	1,000
	Household ncome	,000	,000	698,426	1	,000	1,000
	Northeast	,338	,001	76354,813	1	,000	1,402
	Women with children under 14	-,062	,002	777,269	1	,000	,939
3- Informal dweller	Intercept	-1,923	,005	133085,483	1	,000	
	Non afro-descendents	-,288	,002	34122,506	1	,000	,749
	Migrant up to 4 years	-1,408	,003	199393,089	1	,000	,245
	Migrant 4 to 9 years	-,595	,003	37546,345	1	,000	,552
	Migrant 9 years or more	,040	,002	613,370	1	,000	1,041
	Public servant	-,118	,004	965,334	1	,000	,888
	Formal worker	,006	,002	12,055	1	,001	1,006
	Employer	-,342	,004	5824,712	1	,000	,710
	Age of household head	,014	,000	50417,195	1	,000	1,014
	Married couples	,273	,002	22527,695	1	,000	1,313
	Household size	,084	,001	16916,993	1	,000	1,088
	Economic dependency	-,157	,003	3830,120	1	,000	,855
	Schooling	-,079	,000	133532,549	1	,000	,924
	Wealth	-,044	,000	13477,226	1	,000	,957
	Metropolitan area	1,800	,002	777486,783	1	,000	6,050
	Large municipalities	,923	,002	164480,356	1	,000	2,517
	North	1,108	,003	136085,895	1	,000	3,027
	Midwest	-1,001	,004	61898,694	1	,000	,367
	South	,236	,002	10798,778	1	,000	1,266
	Per capita income	,000	,000	338,244	1	,000	1,000
	Household income	,000	,000	2455,421	1	,000	1,000
	Northeast	,032	,002	260,341	1	,000	1,032
	Women with children under 14	,118	,004	1046,016	1	,000	1,125

Elaborated by the authors.
Obs.: Number of response levels=3; formal owner=1, formal renter=2; informal dweller=3. The reference category is: 2 (formal renter).

The results of a more detailed Multinomial Logit model, where we distinguish between four categories of tenure choice and qualify informal settlers into informal owners and informal renters are shown in table 5. We can notice that the main results or the previous Multinomial Logit model were kept, like the high importance of life cycle variables and small impact of current income to explain formal homeownership. An interesting conclusion we can derive from this model is that renters in informal settlements are among the poorest segments of the Brazilian population, even when compared to informal owners. It should be highlight that non-afrodescendents have higher probability of having access to formal housing market either through ownership or renting. An increased level of education positively affects the probability of renting and owning in formal housing markets, whereas low levels of education foster an entrance of the households into informal housing markets.

GRAPH 9

Observed Impact of education on tenure choice



Elaborated by the authors.

We should highlight that the size of the informal rental market is very small, corresponding to less than 1% of our total sample. In this case, maybe the application of a regression for rare events according to King and Zeng (2001), will increase the explanatory power of our model. However, to analyze the occurrence of rare events is far beyond the scope of this paper.

TABLE 5
Multinomial logit model tenure choice 2

Multinomial Tenure 2		B	Std. Error	Wald	df	Sig.	Exp(B)
1- Formal owner	Intercept	1,505	,016	8900,632	1	,000	
	Non afro-descendents	,144	,004	1235,305	1	,000	1,155
	Migrant up to 4 years	-,709	,007	11835,808	1	,000	,492
	Migrant 4 to 9 years	,324	,009	1339,718	1	,000	1,383
	Migrant 9 years or more	,448	,005	8736,345	1	,000	1,566
	Public servant	,417	,014	914,808	1	,000	1,517
	Formal worker	-,142	,004	1100,387	1	,000	,868
	Employer	,416	,018	547,516	1	,000	1,516
	Age of household head	,052	,000	84126,819	1	,000	1,053
	Married couples	,028	,005	27,555	1	,000	1,028
	Household size	,333	,002	25149,739	1	,000	1,395
	Economic dependency	,018	,007	7,471	1	,006	1,018
	Schooling	,034	,001	3290,057	1	,000	1,034
	Wealth	,290	,001	72927,735	1	,000	1,337
	Metropolitan area	-3,435	,009	139454,009	1	,000	,032
	Large municipalities	-2,486	,010	65389,153	1	,000	,083
	North	-,172	,007	644,633	1	,000	,842
	Midwest	1,816	,016	13658,545	1	,000	6,147
	South	1,295	,010	16149,922	1	,000	3,650
	Per capita income	,000	,000	85,042	1	,000	1,000
	Household income	,000	,000	1250,093	1	,000	1,000
	Northeast	,437	,005	7709,338	1	,000	1,547
	Women with children under 14	-,402	,008	2424,775	1	,000	,669
2 - Formal Renter	Intercept	3,332	,016	43404,330	1	,000	
	Non afro-descendents	,145	,004	1233,178	1	,000	1,155
	Migrant up to 4 years	,511	,006	6223,051	1	,000	1,668
	Migrant 4 to 9 years	,714	,009	6474,881	1	,000	2,042
	Migrant 9 years or more	,315	,005	4253,140	1	,000	1,370
	Public Servant	,304	,014	483,184	1	,000	1,355
	Formal worker	-,141	,004	1077,780	1	,000	,868
	Employer	,391	,018	480,510	1	,000	1,478
	Age of household head	,016	,000	8334,092	1	,000	1,017
	Married couples	-,232	,005	1926,072	1	,000	,793
	Household size	,136	,002	4180,424	1	,000	1,146
	Economic dependency	,207	,007	962,299	1	,000	1,230
	Schooling	,062	,001	11237,583	1	,000	1,064
	Wealth	,154	,001	20414,722	1	,000	1,167

(Continues)

(Continued)

Multinomial Tenure 2		B	Std. Error	Wald	df	Sig.	Exp(B)
	Metropolitan area	-3,281	,009	126966,085	1	,000	,038
	Large municipalities	-2,260	,010	53903,521	1	,000	,104
	North	-1,042	,007	23032,978	1	,000	,353
	Midwest	1,727	,016	12330,004	1	,000	5,621
2 - Formal Renter	South	1,018	,010	9960,891	1	,000	2,769
	Per capita income	,000	,000	96,421	1	,000	1,000
	Household income	,000	,000	1201,623	1	,000	1,000
	Northeast	,048	,005	93,504	1	,000	1,050
	Women with children under 14	-,326	,008	1590,367	1	,000	,722
	Intercept	,703	,016	1824,367	1	,000	
	Non afro-descendents	-,159	,004	1388,468	1	,000	,853
	Migrant up to 4 years	-,848	,007	14001,368	1	,000	,428
	Migrant 4 to 9 years	,248	,009	729,922	1	,000	1,282
	Migrant 9 years or more	,346	,005	4902,084	1	,000	1,413
	Public servant	,223	,014	248,047	1	,000	1,250
	Formal worker	-,103	,004	534,476	1	,000	,902
	Employer	,192	,018	111,657	1	,000	1,212
	Age of household head	,030	,000	25670,563	1	,000	1,030
	Married couples	-,042	,005	58,795	1	,000	,959
	Household size	,259	,002	14615,976	1	,000	1,296
3- Informal Owner	Economic dependency	-,017	,007	5,772	1	,016	,984
	Schooling	-,014	,001	512,515	1	,000	,986
	Wealth	,145	,001	17110,301	1	,000	1,156
	Metropolitan area	-1,563	,009	27922,085	1	,000	,210
	Large municipalities	-1,371	,010	19102,882	1	,000	,254
	North	,038	,007	29,652	1	,000	1,039
	Midwest	,776	,016	2365,225	1	,000	2,174
	South	1,344	,010	16893,464	1	,000	3,833
	Per capita income	,000	,000	64,625	1	,000	1,000
	Household income	,000	,000	839,450	1	,000	1,000
	Northeast	,164	,005	1002,282	1	,000	1,178
	Women with children under 14	-,270	,009	972,134	1	,000	,764

Elaborated by the authors.
Obs. The reference category is: 4 (informal renter). Number of response levels=4; formal owner=1, formal renter=2; informal ownerr=3; informal renter=4.

5 CONCLUSIONS AND POLICY IMPLICATIONS

This study sought to analyze the tenure choice behavior of Brazilian households, based upon IBGE 2005 Pnad microdata in order to derive some conclusions for policy making.

The main results show that wealth is a good predictor for formal ownership and that current income, albeit statistically significant has very limited impact on tenure choice decisions. Life cycle variables such as age of the household head, marital status and household size increase the probability of formal homeownership. Considering this results, policy makers in Brazil, who have always design housing policy according to current income levels, might create some kind of housing program or incentive that takes explicitly into account households point in the life cycle, such as incentives to first homeownership or subsidies to rental housing for young people, for instance.

More vulnerable households such as the poor, the afro-descendents or single women with children under fourteen years old have a higher probability to be in the informal sector, showing that they have limited tenure choice. The inclusion of information on informality in the analysis improves the quality of the forecasts and changes the sign of the impact of afro-descendents in homeownership.

The effect of education on tenure choice is significant, but the sign of the impact depends on the specification of the dependent variable. Education enhances the probability of being in the formal housing sector, either as a renter or an owner. Recent migration (less than 4 years in the municipality) has a negative impact on homeownership, but this negative impact of migration dissipates over time.

Generally, the forecast performance of the extended Multinomial Logit models, that include informal tenure arrangements in the dependent variable, was superior to the simple Logit dichotomous owner versus rent model in identifying the main determinants of tenure choice in Brazil. Even if the models perform quite well to explain tenure behavior in the formal sector, in the informal predictions are quite poor. One possible explanation for this fact can be the existence of local characteristics that might be affecting tenure choice in specific places and that our dummies for fixed effects are not able to account for. In general, if we restrict our sample to metropolitan area the predictive power of the models for the informal sector increases. Also, some corrections to the rare event bias may be performed (For instance, King and Zeng, 2001).

One possible sequence of this study could be try to estimate separate models for each metropolitan area or even estimate tenure choice at intra-city level, taking into account the location as well as tenure choice of households, based on methodologies developed by Gibb (2000) or Elder and Zumpano (1991). The assumption of independence of irrelevant alternatives might be quite restrictive in some cases, so maybe we can perform a formal test or use the Nested Logit Model to avoid this hypothesis (see for instance, Franses and Paap, 2000).

Vulnerability and credit constraints variables need further detailing and refining because they show different effects being measured by the same set of variables. An unexpected result is the fact that formal employees present a negative probability of becoming homeowners. Specifically, we need more information on informal property rights and tenure security in order to improve the quality of our forecasts, because informality is not well capture in Pnad. It would be interesting if IBGE could include in Pnad questions about perceived and *de facto* tenure security, such as the existence of legal title or formal purchase and rental contracts.

Another interesting study that can be developed is the dynamic analyses of tenure choice based on the pseudo panels constructed from the 1992-2005 Pnad series, so that we can take into account the effect of inflation on tenure choice and on the user cost of owing versus renting. The effects of tenure insecurity over tenancy decisions can also be better captured on a dynamic framework, as perceived tenure security increases over time, if land remains unclaimed for a long time. The impacts of precarious insertion in the labor market over cohabitation and late stayers and the economic obstacles to the formation of new households can also be object of interesting studies in the future.

To conclude, one general recommendation of the paper is that policy makers should not focus exclusively on owner-occupied housing as the best housing solution, but that a wider range of housing options with different modalities, prices, qualities and locations should be available to Brazilian households, from which they can choose the solutions that fits better their housing needs. In this sense, rental housing can offer good housing solutions for young people in search of employment opportunities and newly arrived migrants, with the importance of rental markets to alleviate housing shortage increasing in urban agglomerations and fast growing urban areas.

Furthermore, policy makers should give more attention to variables such as wealth and income distribution, household composition and life cycle variables when designing housing policies and programs, if they want to promote economic efficient and social inclusion in the Brazilian housing markets.

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