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## WORKING PAPER SERIES

### **Housing Affordability and Tenure Choices: an Empirical Investigation**

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# HOUSING AFFORDABILITY AND TENURE CHOICES: AN EMPIRICAL INVESTIGATION

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## ABSTRACT

Several empirical studies have established that tenure choice and households mobility decisions are highly correlated (Ozyıldırım *et al.*, 2005). In the literature, there have been two methods that have used to estimate tenure choice models. The first uses a sample of recent *movers* while the second employs a sample of all households. Other approaches are mixed (Painter, 2000). This work refers on the results of an empirical analysis, developed to the urban level, by a sample of *movers* (renters and homeowners). The main goal is to test if homeownership is systematically preferred to leasing and if the *housing affordability effect* can be estimated by a *tenure choice model*. A random utility approach is used to model observed choices of renters within and between rent and property markets. The analytical results confirm, as expected, the strong trend to the homeownership for the families of renters. But, in current economic situation, the high value of the rent is systematically associated with a reduced chance of changing for the medium-income households. Monetary estimates of affordable rents are given in the last part of the paper, conditioned to the income level, the family size and the previous and actual level of affordability.

**Keywords:** housing affordability, tenure choice models, households mobility, housing policy

## Introduction

Housing affordability is an overriding issue in the present scenario of real estate markets, where the prices are risen and the social founding sector is passing through a serious crisis more or less all over Europe. However, the affordability index is not always easy to define and, above all, to measure. In general, we look to the relationship between property price (or rent) and household income. What is measured is the cost of housing for those families who do not already have their own home or who have taken out a loan in order to have one. Generally speaking and this applies more or less all over the world, it is assumed that this index should not exceed 25-30%.

Affordability indexes have received growing attention in relevant literature (Linneman, Megbolugbe, 1992). Their use dates back to the Weicher analyses (1977) on new homes in the American real estate market. Initially, in a very simple manner, the ratio between the price of the property and the owner's income was taken into consideration; the result is an index that expresses the number of years of income required to cover the prepaid cost of the housing services, not taking into consideration the nature of the capital utilized (one's own, one's savings, or financing). Over time, these indicators have changed, taking into consideration effective housing costs and their temporal variations.

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For tenants, the conventional indicator is given by the ratio between rent and income or rent-to-income ratio (RIR). For homeowners, the Department of Housing and Urban Development (HUD) in the United States utilizes an index that is the ratio of median household income to the income required to qualify for a conventional mortgage on the median of the house value (Quigley & Raphael, 2004). Nonetheless, this does not reveal anything, whether concerning the qualitative level of the home or concerning the total number of properties occupied or owned by the family (Nelson, 1994). Several authors have, in fact, noted the weakness of this index in expressing the measure of the financial burden that families effectively bear and in defining the contours of the housing problem (Bogdon, Can, 1997; Hancock, 1993). In this respect, the possibility of being able to access the so-called inalienable non-housing consumptions such as health, education, care for children and the elderly, takes on a certain importance; notwithstanding the RIR, housing costs are configured as equitable if these types of consumptions remain unaltered. This consequently is a residual type of approach that takes into consideration a true and proper poverty scale (Stone, 1993).

A fundamental role in outlining the affordability threshold is in any case carried out by the capital market and by its temporal evolution. Measuring the impact that interest and inflation rates have on the demand for tenure housing is crucial in defining accessibility standard thresholds. Recent facts prove this. Family indebtedness with respect to financing entities has grown significantly in recent years, in the United States as in Europe, accompanied by a considerable increase in prices and by a change in the structural conditions for credit. Increased integration of financial markets and mortgage loans, accompanied by heavy competition, has laid the groundwork for increased flexibility in selecting the loan profile (fixed, variable or mixed rate, duration, amortization plan), involving an increased number of families, in addition to a higher number of operators, within the market. This was a substantial and epochal change. The loan-to-value-ratio (LVR), given by the ration between the amount of the loan and the selling price, tended to increase in recent years in Europe, including Italy, with some outstanding cases, such as Norway and Holland, marked by particular tax reductions (Brounen *et al.*, 2006). On the other hand, the capital market has always been considered as a fundamental driver of the dynamics of property values.

But an important aspect of the problem, perhaps not researched to the extent that it should have been, pertains to the relation that has always existed between tenure choices, household mobility and affordability index. Several empirical studies have established that tenure choice and mobility decisions are highly correlated. In the literature, there have been two methods that have used to estimate tenure choice models. The first uses a sample of recent *movers* while the second employs a sample of all households. The rationale behind the first group is that the decisions of recent *movers* are more likely to reflect the equilibrium conditions in the housing market (Painter, 2000). *In this direction, this work indicates the results of an empirical analysis, conducted on an urban scale with a sampling of movers, with the goal of testing whether, in moving, homeownership is systematically preferred to one that is rented and whether, in behavior observed, the effect of affordability can be evaluated in orienting family choices, in addition to income.*

This work is organized as follows. The first section delineates the current housing market in Italy by means of certain indicators, taken from these contexts: percentage of homeowners, role played by credit, price and interest rate trends and the volume of property transactions burdened by mortgages during the last cycle. The second and third sections cover the results of the empirical estimates for the principal indexes for housing affordability, investigated on the scale of a large city (Turin). The fourth and fifth sections highlight the results of applying a simplified type of tenure choice model, the purpose of which is also a forecast and an orientation for policies. The last section wraps up the conclusions.

## 1. Tenure Choices, Housing Affordability and the Last Real Estate Cycle in Italy

The growing desire to own one's home and the increase in prices relating to the last real estate cycle appear as rather uniform factors in the various countries, not just in Europe. Nonetheless, there are significant differences, on a domestic level, when reference is made to the individual markets in the mid/long-term. With respect to other European countries, for example, Italy has always been noted for a very high percentage of tenure homeownership. In 2006, 73.3% of the residing families and 74.7% of the individuals lived in their own homes; an additional 9.1% of the families and 8.7% of the individuals benefited from usufruct or free housing; the remaining 17.7% of the families and 16.6% of the individuals were tenants.

Table 1 reconstructs the variations in tenure in the last six years. For example, with respect to 2004, the portion of renters was reduced by nearly one percentage point, while the portion of homeowners increased (by 0.4 points, the equivalent of 650,000 families and 800,000 individuals) and beneficiaries for other reasons (0.5 points). ISTAT (Central Institute for Statistics - *Istituto Centrale di Statistica*) reports how homeowner families burdened with a mortgage increased from 9.6 to 10.1% of the total (the equivalent of 6.4 million individuals) in 2006 as compared to 2004. Access to owning a home is evidently conditioned by the ability to spend and by the age of the members comprising the family; in 2006 a total of 24.5% of families in the spending class up to 2,000€ per month rented their homes (Table 2), which is also the most numerous. In this class, moreover, only 5.4% of the families had mortgages in their names; at the opposite end, the spending class in excess of 4,000€ is that with the highest number of homeowners (exceeding 80%) and mortgage-holders (more than 18%).

Table 1 - Italy – Housing Tenure % – 2001-2006 – Source: *ISTAT*

Italy (%)	2001	2002	2003	2004	2005	2006
Rent	19,6	18,7	18,5	18,6	18,8	17,7
Ownership	72,2	72,8	72,8	72,9	72	73,3
Usufruct	2,4	2,4	2,4	2,3	2,2	9,1
Free use	6,4	6,1	6,2	6,2	7	
Households N.	22167241	11247869	22250526	22790639	23261386	23567000

Table 2 – Italy – Housing Tenure by Age and Class of Expenditure – Source: *ISTAT*

	Year 2006 (thousand and % in brackets)	Households	Individuals	Free use	Rent	Homeownership (Total)	Homeownership with loan
Age	>35 anni	2146	4756	354 (16,5)	702 (32,7)	1091 (50,8)	405 (18,9)
	35-64 anni	13337	38903	1171 (8,8)	2424 (18,2)	9743 (73)	1829 (13,7)
	>65	8083	14712	610 (7,5)	1036 (12,8)	6438 (79,6)	146 (1,8)
Expenditure	<2000 Euro	11591	23280	1164 (10)	2838 (24,5)	7589 (65,5)	622 (5,4)
	2000 - 3000 Euro	6058	16857	512 (8,5)	783 (12,9)	4763 (78,6)	761 (12,6)
	3000 - 4000 Euro	2848	8619	239 (8,4)	265 (9,3)	2344 (82,3)	437 (15,4)
	>4000 euro	3070	9616	219 (7,1)	276 (9)	2574 (83,8)	559 (18,2)
Total		23567	58371	2135 (9,1)	4162 (17,7)	17271 (73,3)	2379 (10,1)

The growing numbers of mortgage-holding families and the number of homeowners was accompanied, in Italy as in the rest of Europe, by the growth trend for volume, prices and fluctuation of interest rates, at least until 2005. It should in fact be remembered that two main sources of uncertainty face homeowners: interest rates and income risks. Both factors can lead to unsustainable choices, especially when the choice of a varying interest rate with respect to the European inter-banking rate is preferred (Chart 1).

In the 2004-2006 the trend for real estate transactions burdened by a mortgage grew and did so at a higher rate than the increase in sales. Table 3 illustrates the incidence of the NTNIP on the total of the domestic territory and in the three geographic areas that comprise the country. It is interesting to note how the level of incidence tends to diminish going from North to Center and to the South. If, in fact, more than half of the sales in the North are conducted with the help of a mortgage, in the South this incidence diminishes to approximately 36%.

Table 3 – Italy – Total number of normalized transactions (NTN) and transactions with mortgage loan (NTNIP), Years 2004-2006; Source: *Agenzia del Territorio*

	2004			2005			2006		
	NTNIP	NTN	NTNIP%	NTNIP	NTN	NTNIP%	NTNIP	NTN	NTNIP%
NORTH	214776	425010	50,5%	225679	438887	51,4%	237840	448837	53,0%
CENTER	77954	171223	45,5%	82039	178511	46,0%	84034	175293	47,0%
SOUTH	75964	217477	34,9%	85152	227333	37,5%	87094	227864	38,2%
ITALY	368694	813710	45,3%	392870	844731	46,5%	408968	851994	48,0%

The fluctuation registered in the residential sector since 2006 was affected by the structural factors linked to the real estate cycle that evidently reached its conclusion. Among these, interest rates on mortgages that increased, on an average between fixed and variable rates, from 3.5% in 2003 to 5.3% in 2007, and the levels reached by prices (Chart 2) should be taken into consideration.

Chart 1 – EURIBOR 1, 3, 6 Monthly Rate – 2001-2007;  
Source: *BCE*

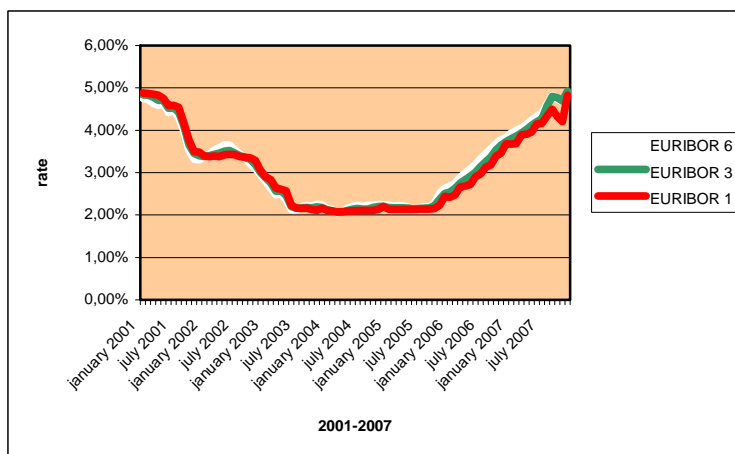
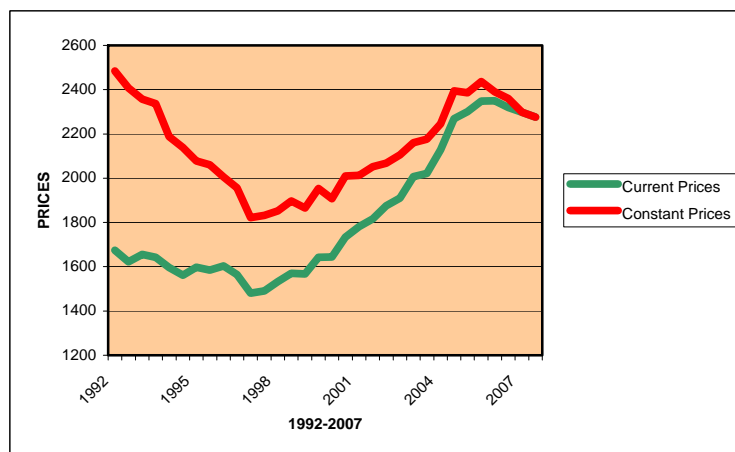


Chart 2 – Current and constant prices (€/sq. m.) of the new home in the City of Turin; Source: *Nomisma*



Briefly, the real estate cycle that just came to an end led to a situation of indebtedness for Italian families and to an ulterior restriction in the ratio between the rental market and the selling market. In summarizing the factors that, over time, led to this state of affairs we can separate them into structural and economic factors, such as:

- construction and tax policies, on a central government level, historically consolidated, that are marked by the presence of strong incentives to access as homeowners;
- the fragmentation of the property itself from a construction point of view, linked to the prevalence in Italy of condominiums or multi-family residences over single-family homes;
- commencing with 2001, the entrance of Italy in the European monetary system, which required a significant change in the reference economic model: initial high instability and high inflation rates were replaced by a scenario marked by low inflation rates and low official tax rates (now EURIBOR);
- changes in the duration of mortgages; in the 1970's families purchased their homes by taking out mortgages that lasted an average of 25-30 years while in the 1980's the duration for mortgages was lowered to 15-20 years, and were subsequently lowered even further during the 1990's and once again started to increase in the past three years;
- the search, on the part of families, for a more suitable housing standard or in any case increased attention to the presence of micro-neighborhood qualities (services, transportation, accessibility, absence of crime) and environmental qualities (quality of the air and of the landscape), elements that induced a request for improvement in housing conditions; more than anything this factor involved classes with a higher spending budget and, surely, more homeowners than tenants;
- the role and the weight of the construction industry in the Italian economic system; it should be remembered that 2006 represented another growth year in Italy, the eighth consecutive year for the sector, when the highest level of production for the past 35 years was reached.

## **2. Affordability Indexes in the City of Turin (Italy): an Empirical Investigation**

An empirical survey on tenure choices has been conducted to investigate about perceptions and motivations of movers and quantitative market data related with their affordability levels. Telephone interviews in the city of Turin allowed to build a dataset of 295 valid cases, and the affordability indicators have been derived from this data to obtain comparable measures through different tenure options.

With reference to families who rent, the indicator that we used is primarily the RIR (Rent-to-Income Ratio), while with reference to families who are homeowners, an indicator that is conceptually similar may be constructed by taking into consideration, in the temporal arc of a year, the ratio between the amount relating to the mortgage payment and the net income available in the family nucleus; this second indicator is defined as the Mortgage-to-Income Ratio (MIR). Notwithstanding the fact that the two ratios use a common measuring system, they are connected to tenures on different properties. The use of these indexes provides the opportunity, in the case of real families who decided to bear the cost of changing their housing, to verify how this can have an influence, not only on the opportunity for consumption of other goods and services and on a level of total wellbeing but also on the prospects to improve/worsen their conditions.

The RIR index for all housing rented (whether current or previous) was calculated through the point values relating to each family nucleus interviewed, while the same procedure was followed for the MIR index with respect to tenure housing.

Table 4 – Descriptive statistics of the affordability indexes (MIR and RIR)

MIR		RIR	
<b>N</b>	125	<b>N</b>	222
<b>Mean</b>	0,29	<b>Mean</b>	0,24
<b>Median</b>	0,28	<b>Median</b>	0,22
<b>Standard Dev.</b>	0,12	<b>Standard Dev.</b>	0,151
<b>Quantiles</b>		<b>Quantiles</b>	
<b>25th</b>	0,215	<b>25th</b>	0,157
<b>50th</b>	0,28	<b>50th</b>	0,225
<b>75th</b>	0,34	<b>75th</b>	0,32

With reference to the sample, spending relating to the rental fee indicates an average percentage equal to 24% of income (22% is the median) vs. an average of 29% (28% is the median).

The RIR values however are more spread out within the sample group; that is, there is more variability to the data, with a more accentuated presence of polarized situations on very high or very low levels of suffering. Even if the subject is outside the objectives of this initial work, the dispersion of the RIR indicator could be researched further in order to verify whether and to what extent it can be connected to forms of disparity or concentration in specific areas of the city and to poverty or social exclusion.

Moreover, during the interview, current homeowner families were requested to provide an estimate of the homeownership market value, reliable insofar as purchased not long ago. The gross affordability indicator or Value-to-Income Ratio (VIR) was calculated through the above data and the indications as to the annual net income of the family. In comparing the average market value estimated by the homeowner to the average net annual income (The statistics indicates sample widths and standard deviations) of the family households, a VIR value equal to 9.25 is obtained. In taking into consideration the fact that, in the observed distribution of the market values for homeownership and income, there are few exceedingly high cases that differ from the central part of the sample distribution, the VIR was also calculated as the ratio between median values, which are less affected by the dispersion at the extremities: 9.16 (220.000/24.000) is the result obtained, which as we see does not appreciably differ from that initially calculated.

As previously indicated, this value expresses the number of years of income that would need to be accumulated in order to realize an amount equivalent to the cost of the apartment. If compared to the data (5,8) calculated for 2004 on the basis of the results of a survey conducted by the Bank of Italy on consumption in families (Table 5), this confirms an ulterior accentuation of the divergence between the real estate and the labour markets, between the real estate values and the income structures, also with respect to the Turin urban scenario.

Table 5 – Value-to-Income Ratio in Turin vs. Italy

	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Standard Dev.</b>
<b>Net yearly household income</b>	285	5750	108000	25688,78	12586,40
<b>Price</b>	153	85000	700000	237647,06	9837052
Mean value of VIR in Turin				<b>9,2</b>	
Mean value of VIR in Italy*				<b>5,8</b>	

\* Source: Banca d'Italia, 2006 and D'Alessio, Gambacorta, 2007

### **Affordability Index Variation and Household Tenure Choices**

Generally speaking, a variation in the affordability indexes reveals how the housing function (and that regarding assets for homeowners) loosens or tightens the bond with respect to other uses for income (overhead expenses and other forms of savings/investments). In the cases examined, the impact of changing dwelling in terms of variation in the affordability indicators demonstrates a clear expansion in housing spending. For the various tenure choices let us examine the quantitative variation (Table 6) and the reasons that the families provided during the interview (Tables 7, 8, 9, 10 and 11). The selection process that guides the change in dwelling assumes therefore that it is guided by a trade-off between non-housing consumption of goods and services and:

- qualities and characteristics of the property;
- micro-neighborhood qualities;
- improvements linked to personal reasons;
- other factors of a financial nature, linked to market conditions, to rentals and to property.

Evaluated in terms of percentage variation in affordability, the impact is equal to 3% for families who move from one rented dwelling to another: the reasons for the move are prevalently explained by the need for larger dwellings, together with a difficulty in bearing an excessive rental rate in the previous dwelling, while the location and personal reasons carry less importance.

Families who decide to make the change from rented housing to purchasing their own home suffer, with respect to the benefits in terms of investment and savings, a cost in terms of a reduction in the affordability level of 6.4%. The change from rented housing to becoming homeowners, according to the statements made by the families interviewed, is motivated in this case as well by an excessive pressure due to the rental, which made it economically advantageous to change over to homeownership, facilitated as it was by favorable interest rates. Among the dominant reasons, the formation of a new family nucleus and the consequent need for a larger dwelling should also be considered.

For family groups who change from homeownership to rented housing (7.1% of the survey), giving up the benefits linked to ownership is compensated by a large portion of available residual income (12.8%). Among other considerations, the need to change dwellings is linked to logistics, such as commuting time home/work, which is a prime factor.

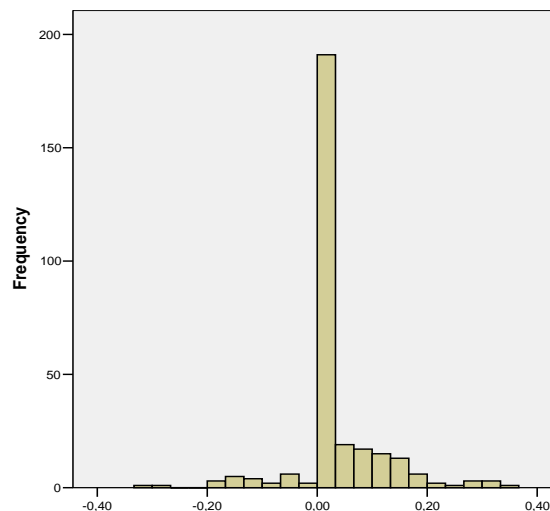
For homeowner families who transfer from one dwelling to another, the impact of the change of dwelling demonstrates a reduction in family income available for spending and investments equal 6.3%, and this group takes the primary motive back to the unsuitability of the size of the previous home.



Table 6 – Descriptive statistics of the affordability indexes by tenure choices

N=295			MIR	RIR	MIR	RIR
			Previous	Previous	Actual	Actual
	N	%	N Mean (St. Dev.)	N Mean (St. Dev.)	N Mean (St. Dev.)	N Mean (St. Dev.)
Rent – Rent	66	22,4		57		59
				<b>0,263</b>		<b>0,293</b>
				-0,142		-0,113
Rent – Ownership	77	26,1		70		55
				<b>0,238</b>		<b>0,302</b>
				-0,148		-0,113
Ownership – Rent	21	7,1		2		19
				<b>0,435</b>		<b>0,307</b>
				-0,145		-0,151
Ownership - Ownership	131	44,4		21		47
				<b>0,236</b>		<b>0,297</b>
				-0,118		-0,125

Chart 3 – Bar chart of the affordability variation. Negative values occur when housing becomes more affordable. Positive values are related with a decrease of welfare levels.



In synthesis, with respect to the cases in the survey, the reasons linked to renting are substantially marginal, while, among the factors linked to the characteristics of the property, the need for a larger dwelling emerges quite distinctly. Personal reasons stand out for the number of preferences, primarily the reasons linked to the creation of new families and the transfers undertaken in order to be closer to the place of work. On the contrary, the characteristics of the site, in terms of environmental quality or public services, are not indicated as necessities based on which the change in residence was determined. Among the financial factors the cases of families who make the change from rentals to homeownership stand out: excessively high rent and having calculated that it was more economical to be a homeowner were the two most frequent reasons. Table 8 illustrates the calculation of the average values of the affordability indicators conducted only on those who adopted the latter two reasons: it is clear that families able to make the change to homeownership to avoid excessive spending linked to a rental fee show RIR median values of less

than 20%. It could be that families who benefited from a reduced rental fee were facilitated in implementing savings methods required to access the homeownership market.

Table 7 – Home changes: Frequencies of the economic determinants by tenure choices

Economic determinants	Rent - Rent	Rent - Ownership	Ownership Rent	Ownership - ownership
	N	N	N	N
I assessed that there was convenience in the change from rent to ownership	1	40		
The prices were rising so I anticipated the purchase	2	6		
The mortgage rates were favourable		12		
The expenses were too high	3	2	1	
The rent was too high	15	29		
<b>Total</b>	<b>21</b>	<b>89</b>	<b>1</b>	<b>0</b>

Table 8 – Affordability indexes for the *movers* from rent to the ownership by economic determinants

		RIR previous dwelling	MIR actual dwelling
		N Mean [Median] (St. Dev.)	N Mean [Median] (St. Dev.)
		38	33
<b>Rent - Ownership</b>	<b>I considered that ownership was more affordable than rent</b>	0,209	0,302
		[0,183]	[0,294]
		-0,133	-0,121
	<b>The rent was too high</b>	28	22
		0,224	0,296
		[0,196]	[0,295]
		-0,12	-0,088

Table 9 – Home changes: Frequencies of the property determinants by tenure choices

Property determinants	Rent - rent	Rent - Ownership	Ownership - Rent	Ownership - Ownership
	N	N	N	N
<b>It was not large enough</b>	18	23	2	
<b>It was too large</b>	8	4		
<b>There is not light enough</b>	3	3		
<b>It has a bad exposure</b>	4	5		
<b>There is an inadequate heating</b>	1	1		
<b>There is not the lift</b>	3	3		
<b>The building was in bad conditions</b>	2	7	2	
<b>Total</b>	<b>39</b>	<b>46</b>	<b>4</b>	<b>0</b>

Table 10 – Home changes: Frequencies of the micro-neighborhood determinants by tenure choices

Micro-neighborhoods determinants	Rent - Rent	Rent - Ownership	Ownership - Rent	Ownership - Ownership
	N	N	N	N
There was a lack of public transport services	3	3	1	12
There was a lack of parking areas	1	5		5
There was a lack of shopping centers	2	3		5
It was too noisy	3	9	1	5
There were not schools	1	1		1
There were not green areas	1	4	1	1
There were not hospitals and health services	1	1		5
There was crime	1	3		5
There was air pollution	3	4	1	3
<b>Total</b>	16	33	4	42

Table 11 – Home changes: Frequencies of the personal determinants by tenure choices

Personal determinants	Rent - Rent	Rent - Ownership	Ownership - Rent	Ownership - Ownership
	N	N	N	N
Wedding - Cohabitation	10	14	5	
Inheritance		3		
To get closer to the workplace	17	12	12	
To live close to relatives or friends	8	5	3	
I had bad relationships with neighborhood	3	1		
Separation	7	2	2	
<b>Total</b>	45	37	22	0

#### 4. Household Mobility and Housing Affordability: a Tenure Choice Model

Reaching homeownership is a generally important objective and shared by families. Several results of empirical studies in the context of social research emphasize the benefits deriving from ownership, whether on an individual or a family level, and whether on a community or a social level (Rohe *et al.*, 2001).

The descriptive analysis of the survey conducted in Turin demonstrates that the profile of the motivations in this context is differentiated among the various tenures, but substantially, those interviewed perceived that orientation towards ownership was primarily dictated by financial reasons, given by a level of affordability for the rental that had become difficult to bear.

Through an econometric model, an attempt will now be made to corroborate the theory that certain economic factors regularly influence the choice between renting or homeownership. Let us assume that, in a rational choice framework, the revealed preferences of each household reflect a

random utility maximization behavior. The RUM approach can be conveniently employed to model variations in the welfare level of movers.

With respect to the sub-group of families who initially were renters and who chose between rental and ownership, various financial factors pertaining to the level of wellbeing of the family that opts for the tenure choice can be indicated. The dichotomous choice between rent and ownership is modeled with a Logit specification accounting for the probability to access homeownership as a function of specified observable variables. These explanatory factors include:

- the net household income;
- the household size;
- the initial level of affordability, in the previous home, measured by RIR;
- the level of affordability of the actual home.

Other unobservable sources of heterogeneity, that affects household's preferences in the tenure choice behaviour are specified as the usual stochastic error term. The model adopt a micro level perspective end does not account for issues dealing with the macroeconomic context: for example the trend of the inflation rate of current consumption goods and the growth rate of wages are assumed to be strictly exogenous, and anyway not significantly differentiated across our observations. Other empirical studies in this field of research employ more complex structures to model the discrete choice process: examples of multinomial Logit application can be found in Nested Logit and Heteroskedastik Extreme Value Models (Skaburskis, 1999; Yates, Mackay, 2006). This study is based on a more parsimonious binary design, as the goal is to check specifically how the trade-off between rent and ownership is determined by initial and final levels of affordability. Hence, the probability, for a family  $i$  to shift from the rent to the homeownership ( $prop$ ) can be expressed in the general form [1]:

$$P(i|prop) = f(I_i, N_i, AI_0, AI_1, c) = \frac{1}{1 + e^{\beta_1 IP_i + \beta_2 AI_{i0} + \beta_3 AI_{i1} + c}} \quad [1]$$

Where:

- |        |  |
|--------|--|
| $I_i$  | = Net yearly household income $i$ ,  |
| $N_i$  | = Household components number $i$ ;  |
| $AI_0$ | = Affordability level of previous home, expressed by RIR;  |
| $AI_1$ | = Affordability level of actual home, expressed by RIR for the renters, or by MIR for the homeoners; |
| $P$    | = Tenure choice;   |
| $c$    | = Constant term.   |

The information relating to the net income  $I_i$  and to the size  $N_i$  of the family nucleus is summarized in a weighted per capita income indicator according to the method suggested by Atkinson and Bourguignon (2000); that is an income per component is calculated that takes into consideration the size of the family nucleus. This variable appears in the model as  $IP_i$ , and is calculated as  $\frac{I_i}{\sqrt{N_i}}$ ; the square root is needed to keep track of the scale economies that are determined by increasing the number of the household components.

## 5. Econometric Results

The estimate of the binary choice model (Greene, 2002) conducted with the maximum likelihood estimator provides the results indicated in Table 12. The analysis was conducted on 143 observations, from which 34 cases that had missing values were subtracted.

Table 12 – Estimates of the Logit Model

N=109	$\beta$	Standard Error	Sig.	LR test
$IP_i$	$6,4828 \cdot 10^{-5}$	$3,3599 \cdot 10^{-5}$	0.054	Yes
$AI_0$	-5.133	2.152	0.017	Yes
$AI_1$	6.589	2.613	0.012	Yes
C	-1.985	1.134	0.08	Yes

We computed the probabilities of each household to gain the homeownership according to the deterministic component of utility. These predictions are compared with the observed outcome: in 68.8% of the cases we have correct predictions, which is a reasonably good result for this stylized model.

Table 13 – Home changes: observed vs. predicted choices

		Predicted choices		
		Rent	Ownership	
Observed choices	Rent	42	15	73,7
	Ownership	19	33	63,5
%				<b>68,8</b>

These results do not completely reflect initial expectations. High levels of rent are claimed to be a reason to shift to the homeownership, according to the statements of interviewed households, but this incentive to buy it is more likely to work selectively for high income families (that is low values of  $AI_0$ )

A growth of  $AI_0$  reduces the probability for a family to become homeowner, and it can reflect a general trade-off between the level of current consumption and the propensity to face a long-term investment or saving required to buy a new home for the family.

If the relation defined by the model holds, we can properly assess the initial level of affordability of rent that makes viable the shift to the property market.

We need to define a final level of affordability of MIR as a threshold. In terms of effect of the mortgage payments on income, 30% is generally considered a high value (which in effect is exceeded by current conditions, since it corresponds to the average of the survey). Consequently, the level of affordability from which the family should start calculations in order to have a probability of buying at least equal to that of moving to rented housing (that is a probability equal to 0.5) can be calculated.

Thus, the model for estimating the values within which families who rent conserve a real opportunity to decide for homeownership can be utilized. The median value of affordability of the property rented that corresponds to a probability of accessing ownership at least equal to 0.5 should be calculated by [2]:

$$P(i|prop) \geq 0,5 \text{ se } AI_0 \leq -\frac{(\pi - (\beta_1 \cdot IP_i) + (\beta_3 \cdot 0,3))}{\beta_2} \quad [2]$$

The method utilized follows an approach suggested by Hanemann in a different context, in which the binary models are applied in the search for estimates of consumer surplus (Hanemann,

1984). Consequently, starting from specific income values and from the number of the family members, an evaluation can be made of the initial RIR values, corresponding to which the family is more likely to make the change to homeownership; these then should exceed, or at least be equal to, those relating to moving to another rented home.

According to the results indicated in Table 14, families composed of two persons, with a monthly family income of 2000€, fall within this area of relative difficulty if the RIR value of the previous home exceeds 20.85%, that is the rental fee for the initial property exceeds 417€ For a family of three, with a net monthly income of 3000€ this threshold hovers at 25%, for a rental fee calculated at 767€ It is clear that, even if the model stylizes a situation in which the market condition is a given (and it relates to 2005), the thought of buying a home depends collectively, both at the onset and at the end, on affordability. It is therefore the difference between the two levels that is important, and the values that we simulated are based on the assumption that the final level should not exceed the value of 30%.

Table 14 – RIR and rent fee defining the conditions above which there is a smooth transition to the homeownership (the probability of access is equal to 0, 5) by different configurations of incomes and household size

Income (€)	Household size	MIR of the actual home	RIR of the previous home	Rent (€)
1200	singles	0,30	0,17	212
1200	2		0,12	149
2000	2		0,2	417
2000	3		0,17	339
2500	2		0,26	652
2500	3		0,21	532
2500	4		0,18	460
3000	2		0,31	940
3000	3		0,25	767
3000	4		0,22	663
5000	2		0,52	2619
5000	3		0,42	2137
5000	5		0,33	1653

## Synthesis and Conclusions

The first part of our work introduced certain subjects linked to the question of housing affordability and indicated certain indicators able to establish, through quantitative metrics, the ratio between large economics related to financial, property and labour markets (income). The analysis of the choices and the effects in terms of decision-making in housing policies are a prime example of how these indexes are applied as support instruments for decision-making and evaluations.

The real estate market cycle that just came to an end demonstrated how Italian families came to be so heavily indebted and an ulterior restriction in the ratio between the rental market and the buying/selling market, while the empirical analysis on an urban scale corroborated the theory according to which, even on a local level, the overwhelming choice was for homeownership, at the expense of the same conditions of effective solvency in the medium-long term period.

The tendency to improve housing conditions and the search for micro-neighborhood and environmental qualities, supported by a favorable financial conjunction and by a broader offer, especially in the field of new constructions, in fact for various reasons supported this demand behavior. But if this appears true in general, for the sample of movers coming from a rented home, the analysis of revealed preferences with the Logit model leads to the conclusion that *the tenure*

*change from rent to homeownership is strongly dependent on the final and the initial conditions in terms of housing affordability.*

In other hands, the *perception* that homeownership is economically more convenient is very diffused among many movers. But there is a reduced possibility to come to the ownership for the families with an excessive level of rent. Individual, commuting-time and micro-neighborhoods variables do not appear as the main drivers of the tenure choice behaviour, as indicated in the qualitative/quantitative analysis contained in the third paragraph. Economic issues, according to our results, are most relevant, especially if recent trends in market values for rents, marked by a strong growth factor, are taken into consideration.

Based on the estimates produced on the basis of the Logit model in the third and last part of the work, the results of the simulations were discussed. Briefly, they demonstrate that, for final levels of affordability equal to the current average levels (approximately 30%), it is primarily the medium-low income families (up to 2500€ for a nucleus of 3 members) who suffer the most with a lower accessibility to homeownership. From the point of view of policy implications therefore *the need to move the focus of the policies from purely social emergency situations to lesser forms of social poverty of a lesser degree but more widespread that regard broader levels of the population is clear. Moreover, the need to reconsider the role of the rent market in relation to urban mobility factors, of filtering-up and of safeguarding spending power for families is also clear.*

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