



Explaining households' economic hardship - an interplay of demography and housing system

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Table of Contents

Table of Contents	2
Abstract.....	3
1. Conceptual framework: household wealth, income, demography and economic hardship..	4
2. Demography and housing in the two-level model.....	6
2.1. The core factors of the model: demography, household income and household wealth	6
2.2. Intermediary factors: housing policy, family relations, and income benefit programs.....	9
2.2.1. Housing policy.....	9
2.2.2. Family support.....	10
2.2.3. Local government benefit programs	11
3. Household economic hardship explained in the two-level model.....	12
3.1. Subjective and objective hardship in relation to main factors of the household's finance model	12
3.2. Explaining economic hardship: multidimensional logit model	15
4. Conclusions	18
Annex: Definitions of the variables.....	19
Bibliography.....	21

Abstract

The paper examines the relations between household wealth and demography by analysing the factors influencing household economic hardship. A two-level model was constructed in order to conceptualize the relation between housing and demography in the framework of household finance. In the core (first level) model, there is a well-defined relation among the demographic characteristics of households (age, size of the household, lifecycle, etc.), households' income and households' wealth. At the second level, intermediary factors were defined which influenced the core relations substantially: 1. role of housing policy (tenure, mobility, mortgage); 2. role of family transfers; and 3. role of income safety net programs.

The life-cycle theory offers a logical framework for the models. The theory says that each individual will go through various life stages, with different income levels and housing needs, which constitute the core part of our model. Using the Hungarian Household Budget Survey, 2006 the paper concludes that while at household level household income and household wealth decreases with age which corresponds with the life-cycle theory, elderly households are not worse off measured by indicators of per capita income and per capita household wealth.

We adapted the permanent income hypothesis to our research problem, and stated that households try to achieve equilibrium between their resources and their needs in the long run, which can be examined in the framework of our two-level model. If the equilibrium is distorted, the household has to face hardship in paying housing costs, which means that households have a deficit in their budget, and the balance between revenues and expenditures has been destroyed. Two indicators (objective and subjective hardship) were introduced based on the survey data. Using a multidimensional logit analysis we tested the null hypothesis that households are able to adjust their finance to the changing situation in the framework of our model, which means that hardship to pay housing cost does not depend on the factors of our model. According to the results, the factors of our model proved to be relevant in explaining the risk of the hardship, which means that for a group of households defined by demographic, economic and housing policy variables the "permanent income" hypothesis has to be rejected.

Key words: demography, hardship, affordability, life cycle theory

1. Conceptual framework: household wealth, income, demography and economic hardship

Ageing is one of the most important challenges of modern societies. In our research we were interested in the relation between the process of ageing (more generally demography) and housing (housing market, housing consumption, housing wealth etc.) in the framework of households' financial strategy. Households in their financial decisions try to balance between their basic needs which are influenced by age, life cycle and size of the family and their expenditure and saving capabilities determined by income and wealth. Households' living standard and consumption level are determined by core social and economic factors such as income, demography and wealth.

The life-cycle theory offers a logical framework for our approach. The theory says that each individual will go through various life stages, with different income levels and housing needs, which constitute the core part of our model. According to the permanent income hypothesis (Friedman, 1957) households' consumption is determined not by current income but by their longer term income expectation. We can reformulate our research question in the following way: households try to achieve equilibrium between their resources and their needs, but their behaviour is influenced, beyond the core factors, by intermediary factors as well.

We used a two-level model to conceptualize the relation between housing and demography in the framework of households' finance (see Figure 1). In the core model, there is a well-defined relation among the demographic characteristics of households (age, size of the household, lifecycle, etc.), households' income and households' wealth. However, the core relations are influenced and modified by intermediary factors: family relations (intergenerational transfer, help from and to other family members, and income benefit programs). These intermediary factors are closely connected to some of the main public policy issues of welfare societies:

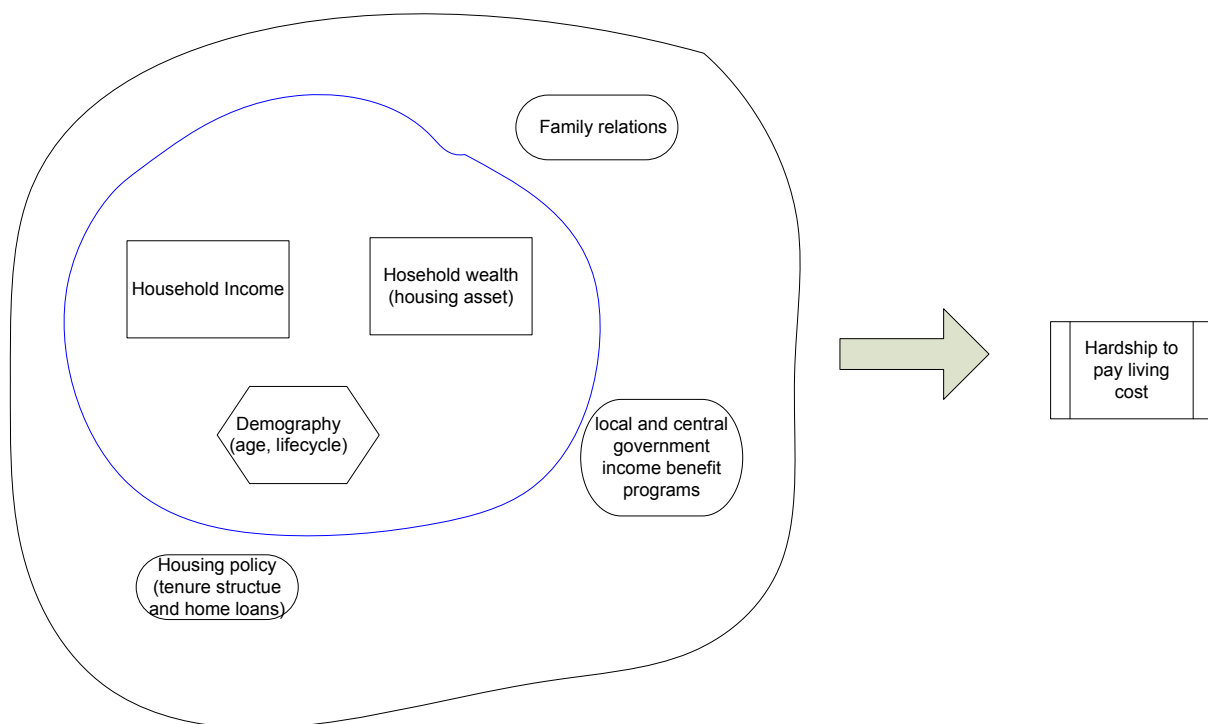
1. **housing policy**, especially tenure structure (housing assets as a means for saving and accumulation), housing mobility and housing finance (mortgage) influence household behaviour;
2. **family policy** which influences the role of traditional family relations in income adjustment (financial help received or given);
3. **income safety net programs** at central and local levels can modify the relations between demography, income and assets as well;

With ageing, changes to the "core" elements occur (change in household composition and household income), which influences the ability to afford living costs. Households face objective or subjective hardship on a regular basis, when their income cannot cover the cost of their "expected living standard". Thus, housing assets might be included in the financial strategies of households, i.e. to counteract the hardship related to affordability, or in the opposite case, change the consumption patterns to maximize future intergenerational transfers.

Our hypotheses are that in the process of ageing, a group of elderly households emerges, in whose case a significant gap arises between their actual income and their expected living standard; this gap can be bridged by the assets accumulated in housing equity. However, these basic relationships are modified by the intermediary factors. Households in their different life-cycle stages may get help from other family members, which helps to smooth away short term financial imbalances. Or there are welfare programs to help needy household to manage

the shortage in households' finance; hence, households in different stages of their housing career have different pressures on their household budgets, which can be offset through the benefit system. If the permanent income hypothesis is true, households are able to combine the core and intermediary elements to manage (both objective and subjective) hardship, consequently there should not be causal relation between the probability of hardship and the factors of household strategy. In other words, the risk of hardship would depend only on random variables, like unexpected family events (divorce, health problems) or losing a job etc.

‘Figure 1. Basic relations – hypotheses of the research on households’ finance



The aim of our analysis is to explore the relationships of household income, household wealth (including housing assets) and demographic situation (age, household composition) and to study the role of the intermediary factors in the relationship. .

In the *first part* of the paper we focus on the relations among the core and intermediary factors in the model. We start with the core relations among household wealth, income and demography, and go on to examine what effect the intermediary factors (housing policy, family policy, and local government income benefit policy) play on household income and wealth.

In the *second part* of the paper we will test the roles the core and the intermediary factors play in explaining the probability of hardship. Hardship means that the equilibrium of consumption and the “permanent income” is “upset”, which should not be a consequence of the factors incorporated in our model, if the basic assumption of the life cycle theory is applicable. We test this “null hypothesis” with the help of a multi-linear logit model.

We examined the data of the Hungarian Household Budget Survey, 2006 for the research. (See Appendix.)

2. Demography and housing in the two-level model

2.1. Core factors of the model: demography, household income and household wealth

First we measure the relation between household income, age group of the head of the household and household wealth. The latter is defined as a composite of „moveable” financial assets, housing assets surplus that we estimated as part of the housing value which can be mobilized in emergency and last, the estimated value of basic durable goods. The main trend – consistent with the life-cycle hypothesis (“LCH”) – is that as age increases both household income and household wealth increase, and around retirement age both household income and household wealth decrease.

Our data basically supports the LCH with some important deviations. Household income does not increase substantially from age 30 till age 54, but decreases from age 55 continuously. Household wealth follows a more regular pattern: it increases till age 54, and decreases gradually.

The below simple graphs show the core of our research problem: younger households have a relatively larger income and lower household wealth, while the older generation has a relatively larger household wealth and lower household income. A simple robust conclusion can be drawn from this figure: young households need to borrow more to enjoy a better housing condition; older households need a reverse mortgage to increase their income. It is important to emphasize that income starts to decrease from age 55, but has a less dynamic drop from age 65.

Household income and household wealth depend on the family size, thus, when “controlling” the household size we will have a different picture of the core relation. Using per capita income (we used the equivalent income and wealth definition which takes into account the family composition) and per capita household wealth, we can see the per capita income drastically decrease after the age 34. It does not reach the same level till the age of 55. Household wealth per capita has a positive slope according to the expectation, but it is much steeper than in the case of total household wealth, and is broken at the age groups 35-39 and 40-44. The increase of wealth stops at retirement years and starts to decrease, even though households in the last three age groups supposedly have decreasing family size, too.

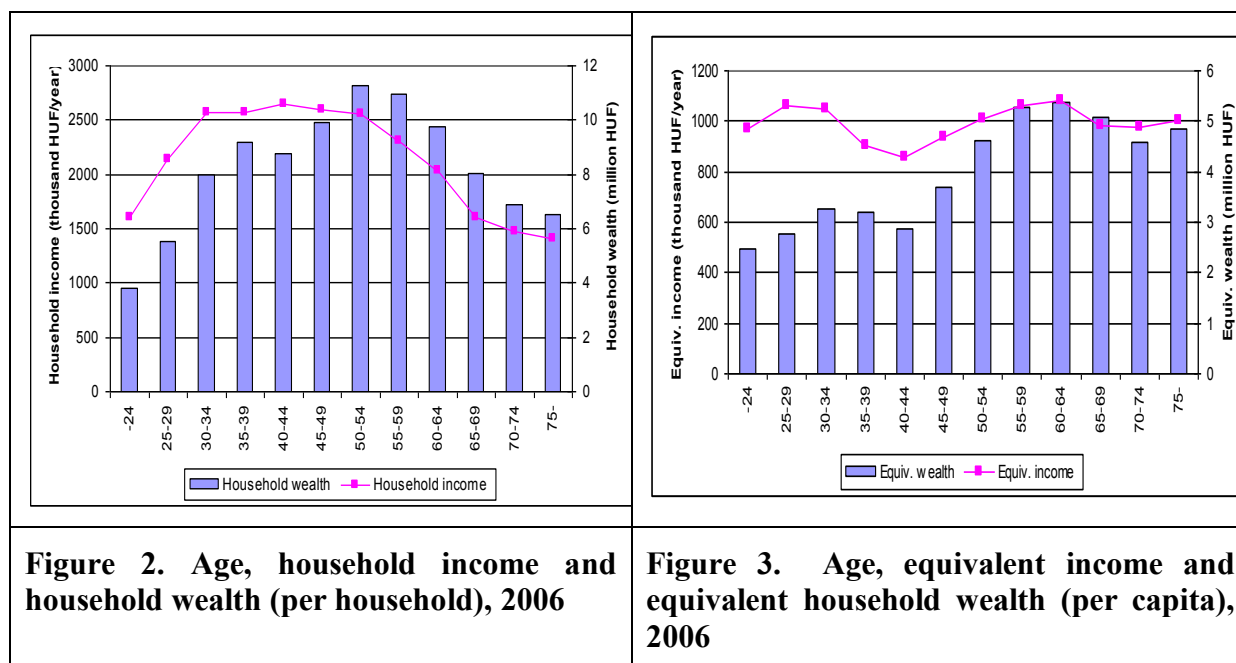


Figure 2. Age, household income and household wealth (per household), 2006

Figure 3. Age, equivalent income and equivalent household wealth (per capita), 2006

Although age is a good demographic indicator, for our analysis we defined a life cycle variable that can have a better explanatory power in our approach. We identified five groups (stages) in the life cycle using two variables:

- Age of the head of household (age of the person whose income is the highest among households members);
- Number of children (dependent children below the age of 25)

Table 1. Main characteristics of life cycle groups

	Dwelling size (sqm)	Household income (thousand HUF/year)	Household wealth (million HUF)	Equiv. income per capita (thousand HUF/year)	Equiv. wealth per capita (million HUF)	Proportion to total households in Hungary
(A) -34 years, without child	58	2207	6,2	1423	4,1	6,5%
(B) -39 years, with child	79	2543	8,4	767	2,6	15,6%
(C) 40-59 years, with child	89	2811	10,5	824	3,2	19,3%
(D) 40-69 years, without child	81	2404	10,9	1115	5,2	25,1%
(E) 55-, retired, without child	70	1376	6,9	1013	5,1	28,8%
Total households in Hungary	77	2191	8,9	992	4,2	

According to age there is an overlap between group D and group E. Households with only retired members between 55 and 69 belong to group D together with all households with age over 69 and without children.

The five life cycle groups cover 95.2% of the sample (4.8% is “other”).

(A) Age group -34, without children

This group represents the youngest households, for example, singles or couples who are active and live without children. We assume that these households are about to begin their

housing career. At the same time they earn the most per capita. They have the lowest level of household wealth, partly because they reside in a relatively low value house, which is related to the fact that most of the tenants come from this group. Moreover, their group average dwelling size is smaller than the average of the total sample: 58 sqm as opposed to 77 sqm. This group represents 6.5% of total households in Hungary.

(B) Age group -39, with children

The group is rather similar to the group mentioned above in terms of age, but young and active parents already with children are included here. At the level of households they are in a better situation, but per capita income and household wealth (reaching almost only half of the country average) is the lowest here. Due to the number of household members, this can mean a bottom in the life cycle. Their dwelling size is average (79 sqm). In this group 15.6% of total households are represented.

(C) Age group 40-59, with children

This group represents families with middle-aged heads of household who are employed, and still have dependent children under 25. They have the highest household income, but the per capita income is still low enough. They have high household wealth (partly explained by the fact that they live in houses with the highest value), but the per capita value is also below average. The size of their flats is 89 sqm (this is the highest). This group represents 19.3% of total Hungarian households.

(D) Age group 40-69, without children

Mainly active middle-aged and older heads of household compose this group, whose children grew up and/or moved out. This life cycle group can be characterized above the average household income, household wealth and per capita values, too. Their flats are relatively large, 81 sqm. Considering these aspects they are in the safest situation, at the height of their household career. This group represents 25.1% of total Hungarian households.

(E) Age group above 55, retired without children

This group represents households mainly after retirement. That's why the total household income in their case is the lowest and below the national average; their per capita income is just above the average. They live in flats, which have also a slightly under average value and size (70 sqm), but at the same time their per capita household wealth is relatively high compared to that of other groups, because – we are assuming – in this group old couples and widowers are overrepresented. This group represents 28.8% of all Hungarian households.

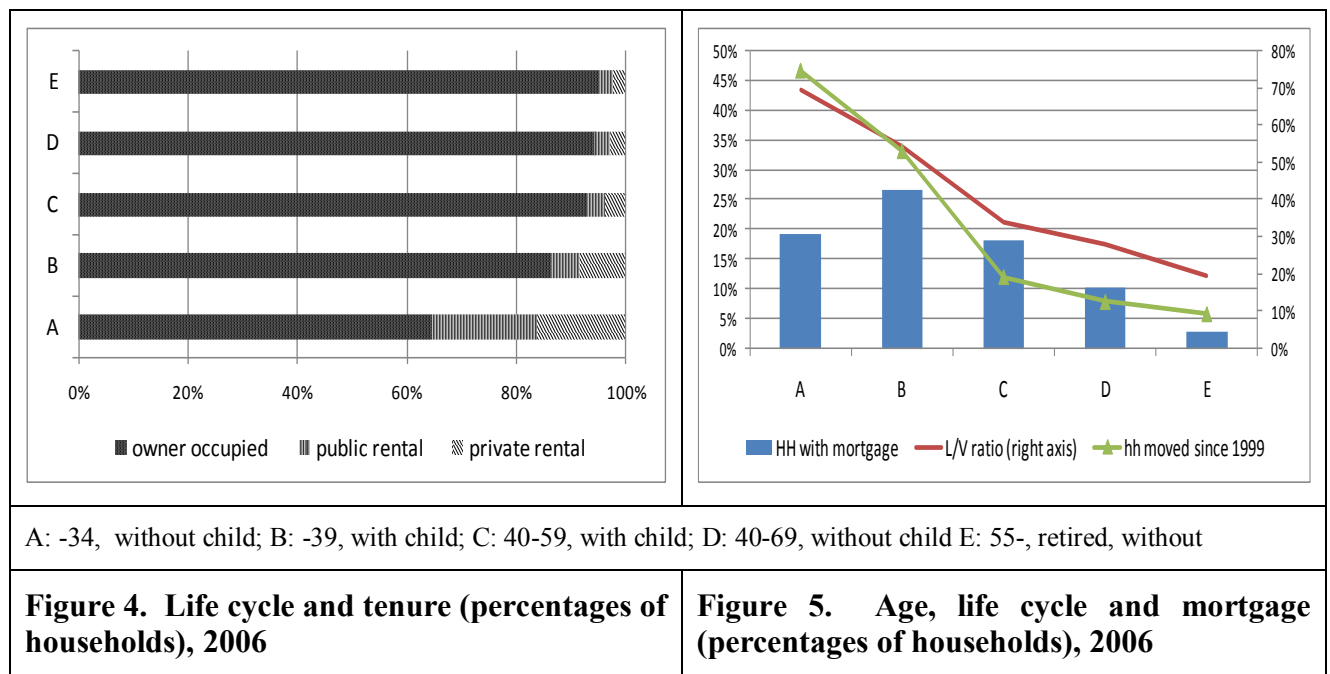
Opting for using the life cycle variable instead of the age variable does not change the full picture, but underlines our earlier conclusions. The youngest households in life cycle group "A" have relatively high income in comparison to household assets. They have the highest income per capita, and their average per capita household wealth is higher than that of the group representing households with children (life cycle group "B" and "C"). Groups "B" and "C" have the lowest income and household wealth per capita mainly due to their household size. Later we will come back to this and explain the issue of "cash poor and asset rich" households. At household level, group "D" and "E" tend to have relatively lower income. However, if we measure the income and household wealth per capita, the relations are not so explicit.

2.2. Intermediary factors: housing policy, family relations, and income benefit programs

There are very different mechanisms how intermediary factors, such as housing policy, family relations, and income benefit programs can affect the basic relationships. We use the Hungarian Household Budget Survey, 2006 (see Appendix) to operationalize the basic factors in our model.

2.2.1. Housing policy

The housing system through its explicit and implicit housing subsidies can modify the basic relations. In Hungary, housing privatisation (give-away transfer of state owned housing stock) and a distorted, owner-occupation biased tax regime “residualized” the rental sector. As a result, public or private tenants are either very poor (mostly in the public sector) or very young families. Above the age of 35, less than 10% of households are tenants in the public or private sector, and above 45 less than 5%.



The low level of rental housing in Hungary is explained by the privatization (1990-1998) and prevailing considerable financial incentives to become homeowner (tax exemption, grants and subsidies (see Hegedüs-Teller, 2006, and Hegedüs-Somogyi, 2005), which causes that “it is cheaper to buy than to rent”. Therefore only households unable to enter the owner-occupied sector chose the rental option. However, the young generation (below 45) did not enjoy the advantages of housing privatization, which means that they were more or less forced to move into the owner occupied sector. Other research has shown that there is a demand for private and public rental which the market would satisfy provided the legal and financial environment gave incentive to landlords for investing into the sector and operate it (MRI,2008).

The mobility of households decreases with age. The same conclusion can be drawn for life cycle groups. Among the elderly, the adjustment of housing consumption to age and life cycle situation by moving seems a relatively rare option. A decreased moving activity (in terms of changing flats) can be observed after the age of 45. After 45 app. 10-15% of households moved in the period 1999-2006. Of course, this does not mean that housing conditions do not change in a later period of life cycle. When the children move out from the family home and

set up their independent lives it creates a major change for older people who basically do not move.

13% of households have mortgages and the average loan to value ratio is 26%, which means that in the total housing sector the mortgage/asset ratio is 3%. Thus the data do not support concerns about “over borrowing” and hence rapidly increasing a risk of home-ownership by large loan to value ratio loans for hundreds of thousands of households, though mortgages are allocated unevenly among different social and demographic groups.

We should note here that the household survey underestimated the total outstanding mortgage because it does not account for loans for a second home. From 2000, because of the high interest rate subsidies many households took mortgages for a second urban home used for renting or kept it empty in order to maximize the state grants. According to macro data, the total value of the outstanding mortgage increased from 200 billion HUF (1998) to 3000 billion HUF (2007), which is 13% of the GDP.

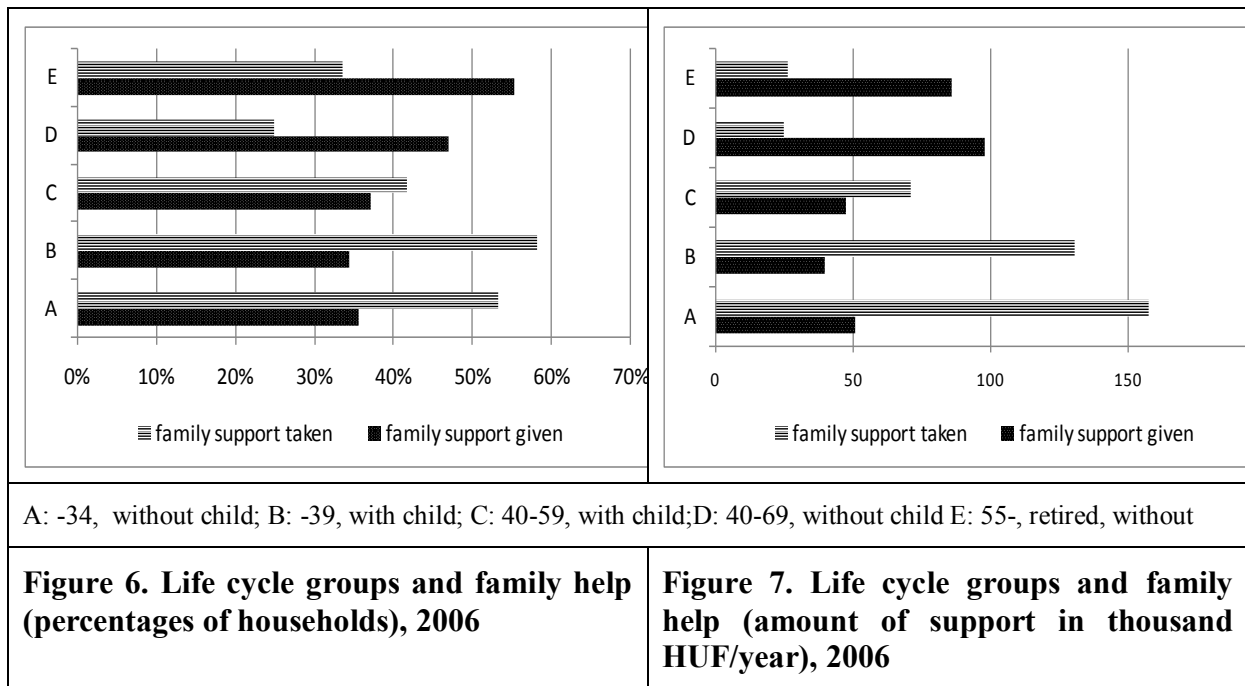
Age groups 25-45 are the most active on the housing market: every fifth household has a loan, and the average loan to value ratio is 30-35%. Above age 45, the share of households having mortgage is decreasing, partly because they already paid back the loan, and partly because the mortgages became accessible only after 2000 in Hungary, and their housing transactions had been completed by then (Hegedüs-Somogyi, 2005). Similarly, the loan to value ratio of those having recently obtained a loan is higher than in older age groups (the loan to value ratio decreases with time, and the more recent loan products have a higher loan to value ratio).

These trends are consistent with the “life cycle” theory and they are supported by the data also if organized according to life cycle groups. **To sum up: housing regimes have an effect on the core relation of demography, household wealth and household income.**

2.2.2. Family support

While the unit of the analysis is typically the household, from various qualitative surveys we know that households are not separate units, but they help each other on the basis of localities and family relations, and even their housing strategies are inter-correlated (Hegedüs-Teller, 2006c). Family support has strong demographic elements. To put it simply: younger families tend to receive more than what they give, and older families tend to give more than what they receive.

According to our survey, 38% of households receive some kind of family help, 44% give help to others. There is a clear trend both according to age groups and life cycle groups. In the two younger life-cycle groups (“A” and “B”) half of the families receive help, but just more than one third of them provide support to others. In the two older life cycle groups (“D” and “E”), almost half of the households provide support to others, and one-quarter or one-third of the families receive help.

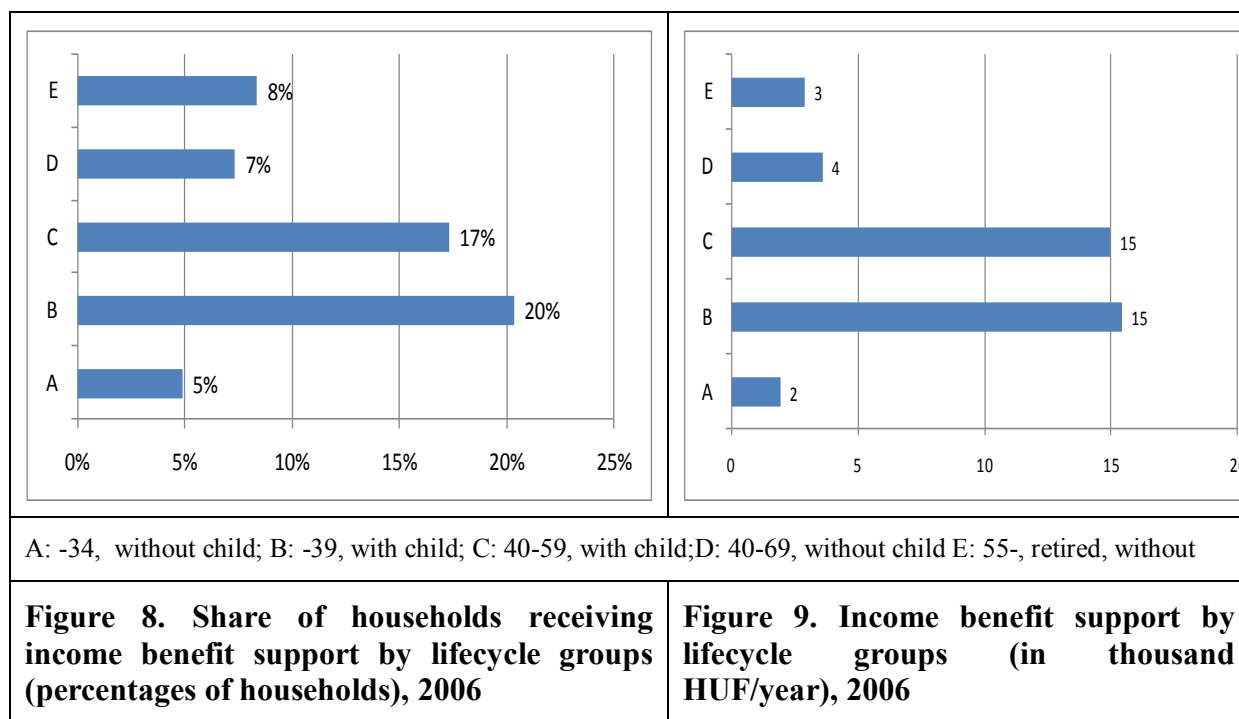


Our research question is how family support modifies the core relations between housing wealth, demography and income. We have found that the main trend is that older generations transfer their surplus income/assets to the younger generation, in spite of the fact that older households have lower income than younger households (Medgyesi, 2002). Thus, it is very interesting to examine what role housing assets the older generation has accumulated would play in household strategies.

2.2.3. Local government benefit programs

Household strategies are influenced by the welfare programs of the government such as pension schemes, health care system, education support etc. to a large extent. The HBS contains data on local income benefit programs (housing allowance, discretionary grants, support for low-income households with children managed by the local government or by the church, NGO-s, etc.). According to our hypotheses such programs can help households with low income to overcome hardship caused by the gap between the households' incomes and expenditures, and modify their attitudes toward housing assets. Thus, households experiencing hardship are not forced to release equity to cover their household budget deficit provided local income benefit programs fill the gap.

Based on the data, 12% of the households receive benefits from local programs. Access to local support follows a special demographic pattern: younger families with children and, to some degree, older individuals are over represented among beneficiaries of local income programs. Intuitively we can say that they are well targeted, as these groups have lower (per capita) income. However, it is important to note that the income data include the benefit programs, that is, the programs do not substantially compensate for market inequalities.



The average size of the benefits is 3-4% of the net income, and its distribution according to age and lifecycle group shows that relatively young families, households with children (group “B” and “C”) have the highest chance to receive the support and they receive the highest amount as well.

It is a question how efficiently local benefit programs can modify core relations, that is, help low-income households efficiently. We will come back to this question later.

3. Household economic hardship explained in the two-level model

Our approach is just one among many dealing with effects of economic hardship. Hardship means that households have a deficit in their budget; the balance between revenues and expenditures has been destroyed. Households have to adjust their behaviour to the new situation, decrease their consumption or increase their revenues. If they are not able or do not intend to they have problems with paying housing costs. We know that hardship can be explained by unemployment, divorce, health problems much better than by income, household wealth, etc. It is not a problem because our aim is not to find the best model describing the probability of economic hardship, but to test whether factors of our model have an effect on hardship. If yes, it means that the sociological null hypothesis that households’ consumption is determined by the long term income expectation (including family relations, housing subsidies and income benefit programs) has to be rejected. Consequently households with certain social, economic and demographic characteristics are not able to balance their incomes and expenditures. First we will go through different factors and evaluate their role explaining the probability of hardship, and set up a logistic regression model which includes factors of our model simultaneously.

3.1. Subjective and objective hardship in relation to main factors of the household’s finance model

The HBS 2006 included several questions related to household economic hardship. We defined two variables that describe the economic position of households. The first expresses

the household's perception of its ability to cover monthly housing expenses (referred to as subjective hardship indicator). The second hardship variable reflects the fact that a household was not able to pay certain expenditures that an average household is expected to (objective hardship). Each respondent was asked whether there were any bills (six "service" areas were listed: rent, mortgage payment, condominium management fee, utility charge, consumer loan repayment and other loans) that could not be paid in the past 12 months. These two variables are used as proxies to see whether "insufficient income" affects the consumption patterns throughout the lifecycle groups. This allows drawing conclusions on what roles household wealth (including housing equity) may play for the different groups.

It is important to note the limitation of usability of these indicators. Households can simply forget to pay monthly bills (lack of discipline) or they pay their bills despite the fact that they cannot afford basic needs like food, clothes etc. (too much discipline). Thus the objective indicator expresses a certain attitude, behaviour of the household, as well. The problem we are studying is dynamic in its nature, and hence can be analyzed in a cross-sectional dataset only with compromises and limitations.

According to our findings, 23% of households can be categorized as having either subjective or objective economic hardship. The subjective and objective hardship indicators are correlating (Pearson correlation coefficient 0.3), but only 6% of households have both types of hardship at the same time. This inconsistency has a sociological meaning, that is, there are households who pay their bills in time (no objective hardship), but think that it is "very hard" for them to pay the living cost (8%), and there are cases where households do not pay their bills, but they consider the payment for their living cost as not "very hard" (just hard or better).

We can assume that households' economic hardship can be explained very well by household (per capita) income. Household wealth, however, has an effect in the long run, because there is a possibility for temporary divergence between household income and household wealth ("income poor and asset rich", "income rich and asset poor"). The per capita household income and per capita household wealth are "well" correlated (0.312 Pearson correlation coefficient), which is shown in the next tables. (In the lowest per capita household wealth deciles we find both private and public tenants, whose income is higher than that of the households in the higher household wealth deciles.)

As expected, household income is the most important determinant of households' economic hardship. In the lowest income deciles, the probability to have hardship is larger than 25%, whereas in the highest income deciles it is less than 8%.

Our question is whether household wealth in itself will have an effect on hardship risk. In our view, not necessarily, because we can argue that household wealth is a function of income and it does not represent an independent effect. We can see that the correlation between probability of hardship and household wealth is much weaker than the correlation between probability of hardship and household income.

However, we can argue that wealth effects prevail relative to income, meaning that household wealth is important if it is "too much" or "too low" compared to income. To compare the income and wealth position of households, we created three groups according to the (in)consistency of household income and household wealth. We defined these groups according to distance between the position based on per capita income and per capita household wealth. The first group (where income and household wealth are consistent) represents 42.8% of households. 28.4% of households have relatively higher income than household wealth ("relative cash rich asset poor"), and 28.8% of households have relatively higher household wealth than household income ("relative cash poor asset rich"). This

grouping has an effect on the probability of economic hardship: the “cash poor and asset rich” have a much higher risk of having hardship than the average household.

Table 2. Indicator of objective and subjective hardship with the basic variables in the model

Equiv. Income (Percentiles)	Objective hardship		Subjective hardship		N
	Mean	Std. Dev	Mean	Std. Dev	
1	0,44	0,50	0,37	0,49	924
2	0,25	0,44	0,22	0,42	832
3	0,16	0,39	0,19	0,39	813
4	0,13	0,35	0,15	0,36	800
5	0,12	0,34	0,11	0,32	800
6	0,11	0,33	0,11	0,31	785
7	0,08	0,27	0,09	0,28	804
8	0,08	0,28	0,09	0,28	786
9	0,07	0,25	0,05	0,21	804
10	0,05	0,21	0,02	0,14	853
Equiv. Wealth (Percentiles)					
1	0,45	0,50	0,39	0,49	854
2	0,24	0,43	0,20	0,40	862
3	0,17	0,40	0,15	0,36	829
4	0,13	0,36	0,13	0,35	819
5	0,10	0,31	0,08	0,29	811
6	0,09	0,29	0,11	0,31	814
7	0,11	0,31	0,12	0,31	798
8	0,11	0,31	0,09	0,27	791
9	0,06	0,25	0,08	0,27	839
10	0,05	0,22	0,06	0,23	784
Life cycle groups					
A: -34, without child	0,14	0,34	0,12	0,31	492
B: -39, with child	0,22	0,41	0,14	0,35	1478
C: 40-59, with child	0,24	0,43	0,17	0,37	1880
D: 40-69, without child	0,14	0,35	0,13	0,34	2299
E: 55-, retired, without child	0,06	0,26	0,14	0,35	1734
Tenure					
owner occupied	0,15	0,36	0,13	0,34	7492
public rental	0,23	0,42	0,21	0,41	314
private rental	0,33	0,47	0,30	0,46	356
Special group					
Receiving family support	0,22	0,41	0,17	0,38	3516
Cash poor - asset rich	0,25	0,44	0,24	0,44	2610
Moved households since 1999	0,20	0,40	0,15	0,36	1993
Family has mortgage	0,20	0,40	0,14	0,35	1223
Average	0,15	0,36	0,14	0,35	8201

Studying the hardship of different life cycle groups we can recognize certain patterns:

1. objective hardship is the highest among very young (-24 years) and middle aged groups (age 40-49); and in lifecycle groups with adults and children living together (group “B” and “C”);

2. the subjective hardship indicator does not vary much among age groups (the age group under 24 represents the highest value, but it is only 2% of the population in the survey);
3. the subjective hardship indicator is lower than the objective hardship indicator except for the group with oldest household heads without dependent children.

To sum up: in the case of 23% of households we could observe subjective and/or objective hardship. Among younger families, objective hardship surpasses the subjective; in the case of the oldest families subjective hardship surpasses the objective one. In other words, we can conclude that payment discipline of older households is higher than that of younger families, which finding is very much consistent with everyday experiences.

It is especially interesting how the attitude towards subjective hardship changes with age. In the case of per capita income deciles, the age group 50-65 has the most precise perception of its income situation matching it with its ability to cover costs. If household wealth deciles are taken as basis for comparison, even though the oldest age group has the “highest” household wealth per capita, its subjective hardship is far above the objective opportunities of covering the housing costs.

The possibility to have family support in a broader sense, meaning any kind of financial etc. assistance from family members in case of hardship shows very different patterns for the various age groups. Interestingly, the age around retirement seems to be a cutting point: if there is available support, the perception of objective hardship diminishes, whereas it is obvious that those elderly receive support who are in need (objective hardship). If there is no support available for the elderly, the subjective hardship is higher than the objective. In their cases this trend starts only with the retirement age, meaning that there is a serious change in affordability opportunities with retirement.

As a consequence of the distortions caused by the housing policy (extreme privatization and the unequal tax and subsidy programs toward different tenure forms) the share of the rental sector is around 9% (50% public rental, 50% private rental). Tenure has an important effect on the probability of economic hardship. Objective hardship is higher than the subjective one in both rental groups. The private rental sector produces the highest risk for families.

Also, households with mortgage and/or those who recently moved have a higher probability to face objective economic hardship. The difference between objective and subjective hardship is higher among recent movers - though they struggle with unpaid bills, they feel that their situation is more acceptable.

3.2. *Explaining economic hardship: multidimensional logit model*

In our model both the core factors and the intermediary factors are inter-correlated, thus a two variable crosstable approach has a limited value. One way of evaluating the relative roles of the various factors is to use a multidimensional log linear regression model. We want to explain the odds of hardships (both objective and subjective) with core and intermediary variables.

Generally speaking the goal of our logistic regression model is to find a well-fitting (yet sociologically reasonable) model to describe the relationship between the odds of hardship variable (dependent variable) and independent (explanatory) variables (defined by the factor of the two-level model). The estimation made with logistic regression chooses parameters that

maximize the likelihood of observing the sample values, in contrast to the ordinary regression model which minimizes the sum of squared errors.

Logistic regression generates the coefficients (and their standard errors and significance levels) of a formula to predict a logit transformation of the probability of presence of the characteristic of interest:

$$\text{logit}(p) = b_0 + b_1 \cdot X_1 + b_2 \cdot X_2 + \dots + b_k \cdot X_k$$

where p is the probability of subjective/objective hardship, and X_i is the household characteristics described in our study as core and intermediary factors.

The logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}} ; \text{ and } \text{logit}(p) = \ln \left[\frac{p}{1-p} \right].$$

Table 3. Logistic regression model explaining objective and subjective hardship indicators

	Objective Hardship		Subjective Hardship		
	B	S.E.	B	S.E.	
Core factors					
Household income					
Per capita equivalent income (in 100.000 HUF/year)	E_income	-0,13	0,02	-0,19	0,02
Household wealth					
Per capita equivalent household wealth (in million HUF)	E_hhwealth	-0,08	0,01	-0,06	0,01
Income and wealth					
Cash poor - asset rich	cashp	0,37	0,09	0,49	0,10
Demography					
Life cycle types					
	Lcycle				
-34, without child	Lcycle1	0,63	0,18	-0,45	0,19
-39, with child	Lcycle2	0,24	0,13	-1,36	0,12
40-59, with child	Lcycle3	0,77	0,12	-0,75	0,11
40-69, without child	Lcycle4	0,80	0,12	-0,21	0,10
55-, retired, without child	contrast				
Intermediary factors					
Housing policy					
Tenure structure	Owner	-0,63	0,11	-0,71	0,11
Mortgage (yes or no)	Loan	0,42	0,09	0,40	0,10
Local government benefit program					
Grants	LG_grant	0,81	0,08	0,60	0,09
Family relations					
Receiving assistance	R-support	0,67	0,07	0,55	0,08
Giving assistance	G-support	-0,42	0,07	-0,79	0,08
Constant		-0,76	0,21	0,87	0,22
N		8974			
Valid cases		7883 (87,84%)			
-2 Log likelihood		5883,56		5468,41	
Cox & Snell R Square		0,13		0,12	
Nagelkerke R Square		0,22		0,22	
Cases correctly predicted		85%		86%	

The results show that all factors of our model set up in the conceptual framework explaining households' financial behaviour have an important effect on the probability of households having economic hardship. Consequently, our null hypothesis should be rejected. What are the sociological conclusions we can draw based on logit model?

Factors in our households' financial model have a systematic effect on objective and subjective hardship; they disturb the balance between resources and needs of the household.

The “permanent income” hypothesis is not valid with respect to social groups determined by our factors.

1. Not surprisingly, the coefficients of household income and household wealth variables in the model predicting the probability both *objective and subjective hardship* are negative. However, this means the permanent income hypothesis for the poor is not true: their consumption cannot be determined by the “long term income”.
2. There is a discrepancy between models explaining subjective and objective hardship with respect to the life cycle variable. The eldest group (which is the contrast variable) behaves differently regarding objective and subjective hardship. They feel (subjective hardship) that they are in a worse situation than younger households, but they pay their bill in time (objective hardship).
3. Tenants have much more problems paying their living cost than owners without mortgage. This is a clear sign of the rezidualization in the housing market, where the public housing sector is dominated by poor households.
4. Borrowers are more at risk of being in hardship which means that moving on the housing market typically puts extra burden on households, and it is not compensated by other factors.
5. Households receiving local government grants (housing allowance and other income benefits) are much more at risk that they cannot pay bills in time and they think that it is very hard for them to pay their every day cost. Consequently, local government benefit programs are not able to compensate those in needy situation.
6. Households receiving help from others have a higher chance to get into trouble paying the cost, but the two kinds of hardship have the same probability.
7. The variable of the “cash poor asset rich” households was included in the logit analyses, and it became a very powerful factor explaining both subjective and objective hardship. This means that households who have relatively lower income than we can predict are more at risk than households without this discrepancy between the income and wealth. Consequently this kind of discrepancy between income and wealth leads to higher probability of being in hardship. Moreover they feel that they are in trouble more (subjective hardship) than they actually are (objective hardship). This variable behaves similarly to the life cycle variable.

4. Conclusions

We examined the relations between household wealth and demography through analysing the factors influencing household economic hardship. The relation between demography, household income and wealth fitted the basic hypotheses of the life cycle theory.

However, relations among the factors were blurred if we moved from the household level variables to the per capita equivalent income and per capita equivalent household wealth. While at household level the household income and household wealth decreases with age (according to the life cycle theory), elderly households are not worse off when controlled for per capita income and per capita housing wealth.

Intermediary factors influenced the core relations of the demography and housing substantially. We tested three types of factors: 1. role of housing policy (tenure, mobility, mortgage); 3. role of family transfers and 3. role of income safety net programs. These factors are interrelated with the core model through life cycle variables, but there is no one-direction

causal relation between them. The real nature of these relations can further be studied through further qualitative research, for example, to what extent family transfers are a consequence of low/high household income (poor households are helped), or whether the level of household wealth is a consequence of family help. Demographic factors seem to be particularly relevant in housing policy: tenure, housing mobility and mortgage are age dependent.

We analysed the effects of the core and the intermediary variables on the risk of economic hardship both in pairs of variables and through a logistic regression model. Each factor proved to be relevant for hardship, although the “behaviour” of some of the factors was different with respect to subjective and objective hardship (lifecycle and “cash poor asset rich”).

We have shown that the factors of our model proved to be relevant in explaining the risk of hardship. This means that for a group of households defined by demographic, economic and housing policy variables the “permanent income” hypothesis has to be rejected, and the basic life cycle model has to be modified accordingly to understand the consumption and household wealth patterns of the Hungarian households in 2006.

Annex: Definitions of the variables

We used Household Budget Survey (HBS), conducted by Central Statistical Office in 2006, which includes 8974 households. It contains detailed information on household structure, demographic characteristics, detailed housing income and expenditure, mortgage cost and the size of the loan (not information on wealth). A hedonic price model was constructed using survey data based on the respondent evaluation of his/her flat. Beyond the housing budget data, the data set includes poverty related question: arrears, hardship to pay energy cost, etc.

Here we give definitions of the used variables:

- Life cycle groups (four groups – See the text on page 7.)

We defined five groups (stages) in the life cycle using two variables: age of the head of household, and number of children (that is dependent children below the age of 25). According to age there is an overlapping between groups.

- Per capita household equivalent income (100 thousand HUF/year)

First we had to clean the data of household net income (yearly), because there were negative values too (in the case of those employed in agriculture, it is possible that a great investment is higher than the annual income), that is why we replace these negative values with the mean of the lowest income decile (672.856 HUF). The whole household income was divided by the sum of consumption units in the household. Various household members had different weights: one adult means 1, two adults mean 1.9, every following adult means 0.8; one parent with child (under 18 years) is 1.2; one and two children 0.8 and from the third children every children mean 0.7.

- Per capita household equivalent wealth (million HUF)

This is a complex variable which includes 3 types of wealth: financial, housing and durables.

Durables are weighted sum of 10 consumption goods: microwave oven, washing machine, fridge, freezer, dishwasher, air conditioner, satellite-antenna, TV, camcorder and car (we have data on duration of using, but now we do not deal the loss of value related to amortization).

This weighted sum was multiplied accordingly to achieve the total estimated Hungarian macro wealth level of durable consumer goods, which was of 4 thousand billion HUF by our calculation in 2006.

The house price was calculated on the basis of these questions: “How much do you think your flat/house is worth on the market? How much can you get for it on the market?”. Households’ housing assets were estimated using a hedonic regression model. In the housing wealth variable only a part of this value was incorporated. We had a hypothesis that housing wealth can be divided into two parts: there is a minimum socially expected (normative) part and there is an additional “surplus” part. We calculated a normative which is depending on settlement type, the number of the household members and on dwelling size. Then we extracted this normative house consumption from the estimated house value, the result is then the “surplus housing wealth”, which is a kind of savings (in case of negative values it was replaced with zero). By our estimation the total Hungarian savings in housing asset is 21.5 thousand billion HUF in 2006.

Financial wealth was calculated as a function of income, housing wealth and durables: first we standardized them and aggregated them into a score. Then we differentiated these values between three types of households groups based on the answers to questions related to household savings. There was a group which had the least (supposed) savings, because they cannot cover an unpredicted expenditure and they cannot go for a one-week long holiday at least once a year. The third group had the most (supposed) savings, because they answered “Easily” to the question “How easily can you afford the living cost of your household?”. Households between these groups formed the middle part. Then we modified the wealth values of these three groups because we defined 3 different group averages. The total amount of Hungarian financial wealth in 2006 was 7.7 thousand billion HUF by our estimations.

The whole household wealth was divided by the sum of consumption units in the household. Various household members had different weights: one adult means 1, two adults mean 1.9, every following adult means 0.8; one parent with child (under 18 years) is 1.2; one and two children 0.8 and from the third children every children mean 0.7.

- Cash poor – asset rich (0/1)

We estimated the income of the households on the basis of household wealth, region and settlement type (using a regression analysis) and if a household earned an income (per capita) less than the 80% of the predicted value, they belong to the “cash poor asset rich” group.

- Family support – receiving or giving (0/1)

We added together the amount of the following variables: child-, parent-, and wife alimony; cash support; flat, holiday house, site, parcel; car; other high value consumer durables; support for everyday life; both for given and taken side.

- Local government benefits/grants (0/1)

We add together the amount of the following variables: regular childcare support; housing allowance; other income support, subsidy (church, local government).

- Owner (0/1)

We reduced the 6 categories of tenure to three: owner occupied is sum of the owners and relatives of the owners; public rental is sum of renters who do not pay market price and users of service flats, private rental is sum of renters who pay market price and owner occupied flat’s courtesy users.

- Mortgage (0/1)

Based on the question: Do you have mortgage?

- Objective hardship (0/1)

The variable of objective hardship is an aggregation of the following questions: whether there were any rent, mortgage payment, condominium maintenance fee, utility charge, consumer loan repayment and other loans bills that could not be paid in the past 12 months. If the household could not pay one or more bills = 1; else =0.

- Subjective hardship (0/1)

We aggregated the answers of this question: “How easily can you afford the living cost of your household?” The answer with big difficulty = 1; others (with difficulty, easily, very easily) =0.

Table 4. Basic descriptive statistics of the main variables in the models

	Cases	Mean	Std. Deviation
Equiv. income (100 thousand HUF/year)	8974	9,92	5,65
Equiv. wealth (million HUF)	8213	4,22	5,7
Cash poor - asset rich	8974	0,29	0,45
Owner	8974	0,91	0,29
Mortgage	8974	0,13	0,33
Local government benefit	8974	0,12	0,32
Receive support	8974	0,38	0,49
Give support	8974	0,44	0,50
Objective hardship	8201	0,15	0,36
Subjective hardship	8201	0,14	0,35

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