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Housing in consumer's theory

Jacek Łaszek¹, December 2013.

Abstract

This article aims to deepen the knowledge on consumer choices from the microeconomic perspective so as to better understand the behaviour of home buyers and its impact on the housing market. First, we provide an analysis of housing understood as a consumer and investment good. We then discuss its market value and cost. This analysis helps to better understand the housing choices of consumers. Finally, we take a detailed look at the choice of housing as a heterogeneous good. Taking into account the conclusions derived from the above points, we demonstrate the complex choice of the housing demand structure in the form of savings and consumption.

Key words: housing demand; heterogeneous goods, housing consumption and investment;

JEL classification: D01, D83, D91, R21;

1. Introduction

The residential sector, as a socially important one, has been of interest to economists already for decades. The 20th century, with increasing stock of residential property, related home construction and mortgage debt, apart from purely consumer and social function, saw growing role of the housing sector as a driver of economic growth and stability of the financial sector. This was reflected in the massive abundance of studies dealing with the subject, especially after the recent real estate crisis. These studies, addressing various aspects of the sector's impact on the economy, and vice versa, generally adopt quite simplistic assumptions about microeconomic nature of housing and related consumer and investment choices of households (see Allen and Carletti, 2011). Meanwhile, as the recent experience and traditional economics teach us, macroeconomic models based on insufficient microeconomic assumptions, generally fail to adequately reflect the surrounding reality. The housing market, considered both locally and as an aggregate at the macroeconomic level, is an imperfect market, subject to cycles and crashes (a rapid collapse in prices driven by a massive default on mortgage loans). This is due to balancing market mechanisms (long delayed response of supply, demand shocks impossible to be offset, accumulating ten-

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sion, over-regulation and temptation to act on speculation), as well as the conditions of its functioning (strong and nationally differentiated impact of the government's policy and related common over-regulation as well as multiplicity of market participants). The literature points to numerous cases of particular vulnerability to manipulation and speculation, low transparency due to difficulty of data access, strong political orientation, related to the type of needs, often affecting the financial system that requires extensive regulation, and therefore is often subjected to incompetent and pro-cyclical interventions (see Case., and Shiller, 2003, Herring and Wachter, 1999).

These characteristics, widely discussed in the sector's literature, are, to some extent, the result of housing characteristics which make housing different from most other consumer goods (see Yang, 2006). This article focuses on those differences that have an impact on consumer choices without going into the mechanism of market functioning, arbitrage between its elements and mechanism of business cycles (see Wheaton, 1999).

This article aims to deepen the knowledge on consumer choices from the microeconomic perspective so as to better understand the behaviour of home buyers and its impact on the housing market. Chapter 2 presents basic aspects of consumer analysis in the housing market. Chapter 3 provides an analysis of housing understood as consumer and investment goods. We then discuss its market value and cost. This analysis helps to better understand housing choices of consumers. Then, we take a detailed look at the choice of housing as a heterogeneous good. Taking into account conclusions derived from the above points, we demonstrate the complex choice of the housing demand structure in the form of savings and consumption. Conclusions are presented in Chapter 4.

2. Basic areas of consumer analysis in the housing market

The basic problem which we face while analysing housing as a consumer good is its duality leading to its heterogeneity both as a durable consumer good or a capital good generating consumer services and, at the same time, an investment good, bringing income and appraised by the market. In the case of OOH housing, both choices are correlated, because what we see in the market as housing demand is the sum of investment and consumer demand.

Housing is a durable consumer good, or alternatively interpreted, productive capital generating a stream of services to meet consumer needs. As a result, there is a market of housing services and capital markets (housing stock), where market prices of services and capital goods are shaped. The financial market is involved in allocating the capital, as a result of which financial assets are created on the basis of housing capital. In the case of OOH housing, we have to do with capital and different services generated to meet home owner's needs, which means that housing is perceived as a durable consumer good with specific attributes.

Heterogeneity of housing affects choices of housing consumers, both in terms of consumption and investment. Both these decisions create the total housing demand, although in both cases the expected characteristics are different. However,

even if we look at consumer's choice between OHH and rented housing alone, the choice of OOH always involves an element of investment in the form of down payment.

In each of those two functions, housing is a heterogeneous good (see Tomczyk and Widłak, 2010), which means that its utility value is not determined by points, but as a range². Additionally, each feature differs in quality or quantity. This means that individual value of housing for consumer is the sum of its attributes weighted by consumer's preferences, similarly as in the case of the seller (purchase on the secondary market). In the case of real estate developers the issue is more complex – they have to produce housing to individual order, or based on market research. From the point of view of consumer and producer optimization this is a major problem as the bundle of attributes (qualities) is subject to optimization. We optimise its composition and quantity of quality for each attribute and the number of produced goods (more on the producer's side).

As a result, the main problem that we face when analysing consumer's and investor's choice in the housing market is a multi-dimensional character of housing and, in consequence, its choice, which is optimization of numerous variables. For analytical purposes it is better to reduce the number of dimensions of decisions taken. Household's actual optimization possibilities suggest a similar approach. Also monitoring of the housing market and households and as well as analysis of the recent literature on the functioning of the human brain³, lead to a conclusion that household's basic behaviour is optimisation limited to a few, maximum six to eight dimensions, whereas other variables are seen as auxiliary conditions or forms of itinerary procedure (consultation with wife, friends, further research, consultations, etc.). We also do not know the interaction between variables and we have no guarantee that clients' expectations will not change in time and space. As a result, it is difficult to predict which attributes of housing will affect optimization of the choice and which will only be auxiliary conditions temporarily taken into account by a household, as what we observe in the market is the final result of the entire process. This behaviour is more like a series of partial optimizations. On the other hand, the use of methods of experimental economics may be a good way to approximate the final solution. However, since the number of choices and variables is limited, we can talk about the distribution of probability of decisions, which may be a better option than relying on multi-dimensional deterministic models of optimization. Many studies have shown that theoretical models can explain consumer's behaviour, yet the prob-

² Simplifying, it can be said that in the case of homogeneous goods, the price of the good is defined by points on the supply and demand curves (e.g. kilogram of sugar). However, for heterogeneous goods there is a certain range of quality and related prices, which consumers can choose, for example, by choosing different standards of interior design will have to deal with different prices per square meter (see Rosen, 1974).

³ Kahn, Moore and Glazer (1987) argue that cognitive limitations of the human mind do not allow simultaneous processing of large sets of information, which imposes hierarchical decision-making.

lem is the number of errors. The question then arises whether the number of errors can be reduced or whether it is a structural feature of this market.

An important additional factor affecting choices is the fact that the housing market is an imperfect local market, with poor flow of information, where choices are made on an individual basis by matching housing features with buyer's preferences.

Weaknesses in the functioning of the housing market make matching the structure of supply with the structure of demand very difficult. As a result, valuation of characteristics is ambiguous and each transaction unique in nature. In contrast to homogeneous goods we do not have to do with a single point of equilibrium, but a locus of points of equilibrium. While analysing consumer choices of households we look at consumption as a stream of services. Basic consumer choices are decisions on housing consumption (how much housing versus other goods and how much housing versus savings) and the choice of the form of consumption between home ownership and home rental (see Augustyniak et al., 2013). Depending on the form of ownership, the cost of service is impacted by the effective interest rate and changes in the value of housing (OOH) or market rents. They affect the household's budget line. In the case of OOH, the interest rate affects the cost through interest charged on mortgage loan or the foregone interest (alternative cost) in case housing is debt free and the capital could be invested elsewhere. Both interest rates usually differ from each other⁴, yet, for the sake of simplicity, it can be assumed that in this case they are similar. It is also worth noting that in the short term there is no clear correlation between the rent, whose level is determined by supply and demand in the rental market, and the cost of OOH purchased with a mortgage or estimated with the use of alternative cost of own capital. In the latter case, the situation on the capital market and the OHH market is the decisive factor. Thus, while the choice between home ownership and home rental involves no difference in the level of consumption, there may be differences in the short- and long-term costs of financing this consumption and non-cost elements affecting the choice (attachment to the dwelling, social security), where the basic cost are the loan instalments of the investment asset in the case of ownership. Thus, purchase of OOH is a form of saving.

In the OOH model, decisions become more complex, as apart from the decision on the quantity of housing consumption, there is another choice to be made "how much housing as savings" associated with the nature of housing investment and property market. On the other hand, investment (savings) may be considered as a combination of two choices, namely "how much housing, taking into account changes in its value" (which we identify with the short-term, speculative element) and, "how much housing taking into account maintenance of its real value, or/and regular rental income" (which we can identify with the long-term precautionary aspect). Both investment choices are reflected in the market in the form of additional housing demand, yet, in the former case, housing will be sold when it reaches the

⁴ In the case of Poland, they are different, but they can also be the same in the case of the so-called personal loan, provided by the home owner to the home buyer without bank's assistance.

assumed price. In the latter case, however, housing will be kept as an asset and leased to generate current income. As a result, housing demand is a combination, in specific proportions, of two choices, "how much housing as consumption" and "how much housing as savings".

Yet, the problem of choosing between "housing as consumption" and "housing as investment" is more complex. The aim of the speculative housing investment also may have a housing aspect. Indeed, such situations are observed in the market ("I will buy additional housing units with a mortgage to sell them and earn for my own home"). The basic analytical problem consists in the fact that demand for housing observed in the market has no attributes and it is difficult to break it down into the discussed categories (see analysis by Henderson and Ioannides, 1983 and Ioannides and Rosenthal, 1994).

Housing as a heterogeneous good is a combination of its characteristics, which decide whether housing needs will be met and make up the market and individual appraisal of its value. Consequently, the choice of housing is always the choice of its characteristics. Consequently, this decision affects other consumer choices. Looking conversely, every change in prices in other markets affects housing choices, demand for housing characteristics and their market appraisal.

As a result of durable character of housing and performance of services in the horizon beyond the household's lifetime, we have to take into account a different behaviour of households that already have housing, and those who intend to buy it. Moreover, households already in possession of housing will be in another point of utility function and will differently appraise the value of additional living space. Changes in the value of housing will also cause changes in household's assets, thus changing their point of equilibrium, including the one concerning housing consumption and choice of home attributes.

The durable character of housing, understood as possession of a housing asset or generally, the current level of housing consumption, will also significantly impact consumer choices at the macroeconomic level. Although each individual consumer may sell his small apartment and possibly buy a new, as large as possible one, at the macroeconomic level this is not so simple. The rise in households' income and related increase in demand for a higher quality housing can only be realized if larger housing stock is produced. At the same time, unlike other consumer goods, where a significant increase in consumption of a particular good may rise significantly in a relatively short period, in this case this increase is spread over the years. As a result, the consumer does not move along the utility curve by choosing subsequent housing baskets, but moves along the chord, appraising subsequent housing units separately. This has a significant impact on the valuation of housing consumption, which has the form of additional units rather than packages as in the case of perishable goods. Moreover, when analysing housing consumption, we should bear in mind that unlike with other goods, most people, especially in our climatic conditions, have already satisfied their housing needs in one way or another, so the choice is made not from the very beginning, i.e. from the point of living in the street to the point of pos-

sessing a home. We can clearly distinguish the category of the so-called first-time buyer, namely, for example, young couples renting an apartment or living with their parents, for whom independent living is a very strong need (Reed and Mills, 2007). Yet, a lot of households already have their own housing (according to Eurostat) and possibly consider getting a bigger one. When compared to the choice of perishable goods this is the situation where, for example, we wonder whether to buy a pear or an apple, having already eaten one pear, and not having an empty stomach.

The model of Aoki, Proudman and Vlieghe (2002) well illustrates choices of consumer who, already in possession of housing, buys or sells subsequent units. In the case described in this article, consumer is owner of housing and can increase it or decrease it in subsequent periods. Consumer's intention is to maximize the utility over his lifetime ($\max U(C, H)$) by trying to balance between the level of housing consumption (H_t) and consumption of other goods (C_t) in various periods. In order to compare utility of housing and utility of other goods, we take into account the imputed rent calculated as the value of housing $p_t H_t$ multiplied by coefficient k , reflecting the rent to price ratio (see Bajari et al., 2013). Moreover, $\beta < 1$ is a parameter that takes into account decreasing utilities in the time function. Periods of consumer's lifetime are marked with t indexes:

$$\max U(C, H) = \sum_{t=0}^{\infty} \beta^t (\theta C t^\mu + (1 - \theta)(k p_t H_t)^\mu)^{\frac{1}{\mu}}$$

In the analysis, budget constraints were introduced for the two subsequent periods (b_t, b_{t+1}):

$$\begin{cases} b_t = c_t + r_t p_t H_t + S_t \\ b_{t+1} + (1 + r_t) S_t = c_{t+1} + r_{t+1} p_{t+1} H_{t+1} \end{cases}$$

$$b_{t+1} + (1 + r_t)(b_t - c_t - r_t p_t H_t) - c_{t+1} - r_{t+1} p_{t+1} H_{t+1} = 0$$

Thus, the Lagrange equation was obtained,

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t (\theta C t^\mu + (1 - \theta)(k p_t H_t)^\mu)^{\frac{1}{\mu}} + \lambda (b_{t+1} + (1 + r_t)(b_t - c_t - r_t p_t H_t) - c_{t+1} - r_{t+1} p_{t+1} H_{t+1})$$

Optimal solutions show the correlation between the quantity of housing and consumption in two different periods (inter-temporal choice):

$$H_t = [r_t p_t (1 + r_t) p_{t+1}^\mu H_{t+1}^{\mu-1} \frac{\beta}{r_{t+1} p_{t+1} p_t^\mu}]^{1/(\mu-1)}$$

$$C_t = [(1 + r_t) C_{t+1}^{\mu-1} \beta]^{1/(\mu-1)}$$

and the correlation between the quantity of housing and consumption in the first period and the second period (intra-temporal choice):

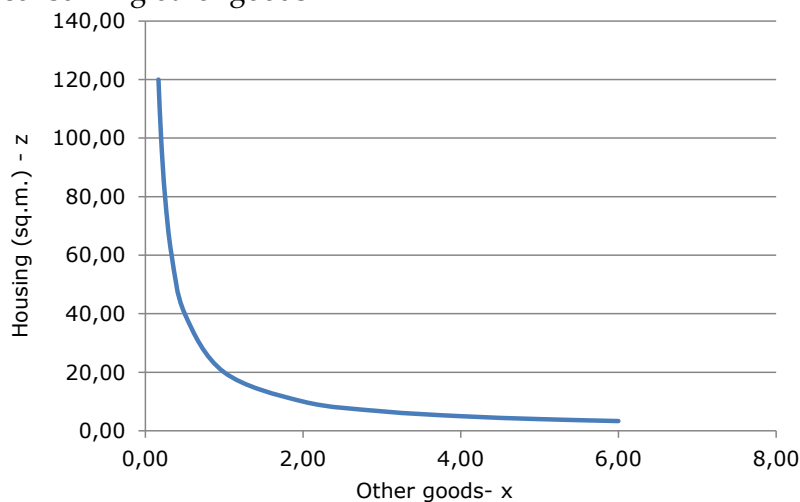
$$H_t = [\frac{r_t p_t \theta C_t^{\mu-1}}{(1 - \theta)(k p_t)^\mu}]^{1/(\mu-1)}$$

$$H_{t+1} = \left[\frac{r_{t+1} p_{t+1} \theta C_{t+1}^{\mu-1}}{(1-\theta)(k p_{t+1})^\mu} \right]^{1/(\mu-1)}$$

Purchase of additional units of goods, when one is already in possession of the stock of goods, is particularly important in the case of residential property, where, on the one hand, income is variable and, on the other hand, the stock relatively rigid. With rapidly changing income, housing becomes a relatively rare good and its prices rise. In case the trend is reversed, when during the crisis income falls, this is often accompanied by price bubble burst and a surplus of unsold housing put on the market.

This problem can be easily presented in graphical and tabular format using the simplest indifference curve (Figure 1, Table 1). We analyse two goods, where z means housing consumption and x means consumption of other goods.

Figure 1 Household indifference curve when choosing housing and consuming other goods



All combinations of good x and z on the curve are equally preferred and with the assumed budget b , consumer appraises the good z , depending on its quantity, and denotes average prices of subsequent bundles of goods as p_z . p_z , whereas p_z'' is the price consumer can pay for additional housing units.

When income of the society and that of individual consumers increases, demand for housing, which is almost proportional to income, will rise too. Housing becomes a relatively rare good and its price accepted by consumers, fitting within their budget and meeting their preferences, will grow. However, as already mentioned, in the case of housing, the mechanism is modified. If you already own 20 square meters of housing, and want to have 30 square meters, then you do not buy 30 square meters, paying 333 PLN per one square meter (which is of course included in the monthly stream of expenses), but only buy 10 square meters paying PLN 333 per one square meter to add to the already possessed 20 square meters of housing, for which you paid PLN 500 per square meter. Thus, you do not buy goods in packages, but move along the utility curve. As a result, your prices are average prices of

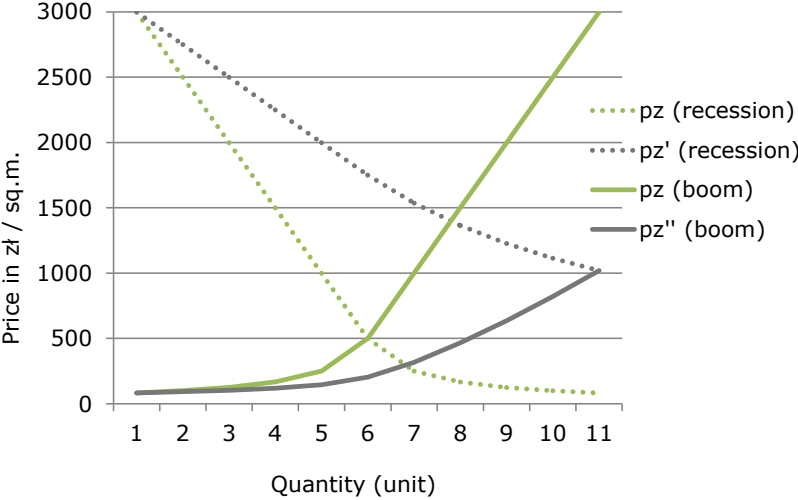
such a combination. Dependence of home prices housing on the quantity of housing consumption is presented in Table 1.

Table 1 Home prices and household income

$x*z=n; n=$	20				t. kons	Increase	decrease					
budget $b=$	20000	x	z	px	pz	pz'	pz''	pz-pz'/pz	pz	pz''	z	pz-pz''/pz
quantity $x=$	6.00	6.00	3.33	1666.67	3000.00	3000.00	1020.45	0%	83.33	83.33	120.00	66%
	5.00	5.00	4.00	2000.00	2500.00	2750.00	822.50	-10%	100.00	91.67	100.00	67%
	4.00	4.00	5.00	2500.00	2000.00	2500.00	636.11	-25%	125.00	102.78	80.00	68%
	3.00	3.00	6.67	3333.33	1500.00	2250.00	465.63	-50%	166.67	118.75	60.00	69%
	2.00	2.00	10.00	5000.00	1000.00	2000.00	317.86	-100%	250.00	145.00	40.00	68%
	1.00	1.00	20.00	10000.00	500.00	1750.00	204.17	-250%	500.00	204.17	20.00	59%
	0.50	0.50	40.00	20000.00	250.00	1535.71	145.00	-514%	1000.00	317.86	10.00	42%
	0.33	0.33	60.00	30000.00	166.67	1364.58	118.75	-719%	1500.00	465.63	6.67	29%
	0.25	0.25	80.00	40000.00	125.00	1226.85	102.78	-881%	2000.00	636.11	5.00	18%
	0.20	0.20	100.00	50000.00	100.00	1114.17	91.67	-1014%	2500.00	822.50	4.00	8%
	0.17	0.17	120.00	60000.00	83.33	1020.45	83.33	-1125%	3000.00	1020.45	3.33	0%

This mechanism alters household choices. In the "catch-up" for housing consumption, the household pays more than it would should it purchase the target level of housing at the beginning, providing real estate developers with a specific premium. This mechanism also works the other way round. When there is too much housing, for example, after the crisis, the gradual sale of housing on the market means that prices effectively paid to real estate developers are much lower and grow slower. What real estate developers have gained during the boom may be forced to give away during the recession. This phenomenon is additionally explained by accelerating prices during the housing boom and developers' problems with getting out of the recession (see Figure 2).

Figure 2 Changes in home prices during the boom and during the recession



Average prices paid by consumers in this market for the achieved level of consumption are significantly higher than prices they would have paid for other goods. Amidst growing demand, the housing market provides real estate developers with an additional premium, which may explain the generally higher profitability of home construction and low profitability of home rental (see NBP, 2013). This correlation also works the other way round – in the case of decline in housing consumption, namely shift from high to lower housing saturation, prices rise relatively slower than suggested by the logic of consumer theory or a relative scarcity of goods. This may partly explain the violence of collapse in housing prices amidst bursting price bubbles as the reduction in consumption only slightly translates into growing scarcity of housing and the ensuing rise in its value.

A thorough analysis reflecting the realities of the housing market should also take into account two types of home purchase financing (fixed and floating interest rates) resulting in different behaviour in the case of interest rate fluctuations and various restrictions imposed on the home rental market (mostly, the average length of the contract and the possibility to raise the rent during the term of the contract) as well as the OOH market (subsidies, rises in cadastral tax rates). As a result, the market departs from equilibrium, tension accumulates and there is arbitrage between the OOH and the rental market.

Analysing household's behaviour in the housing market we have to consider the social context. Thus, we have to take into account the household development phase both from the point of view of the so-called housing cycle (changing housing needs over the household's lifetime), as well as the life cycle (consumption to assets ratio in accordance with the permanent consumption theory).

In the American, intergenerational housing model, frequently encountered in the literature⁵, older pensioner households in the possession of housing and savings sell their homes to young households on credit – credit repayment (interest) constitutes an additional income for these households, supplementing their pension benefits. However, investments in mortgage debt securities may also be made by other households and constitute an instrument of saving for future home (down-payment) or non-housing purposes. Therefore, the complete sector's model of household's housing behaviour, especially for countries with a developed housing market and highly indebted housing sector, should also include an analysis of household over time, and as an investor in mortgage debt securities (as an additional choice between consumption or savings with a bank as a financial intermediary).

Mortgage loans, and especially underlying securities (bonds, shares of mortgage banks, shares in real estate funds) may provide a better alternative to direct housing investment and limit direct individual demand for housing units treated as investment or savings. Thus, it may be assumed that increasing credit supply and

⁵ Bajari et al. (2010) present a life cycle model. In each period, households choose between consumption of housing and consumption of other goods and make decisions whether to borrow or save.

equity-type financing by funds, will, on the one hand, increase demand for housing as consumption, yet, on the other hand, as supplementary goods may curb investment demand for housing.

3. Housing as a good. Housing consumption, its market appraisal and cost. Housing choice.

Housing is a durable consumer good, whose consumption is counted in tens of years, and often goes beyond the time horizon of a household's lifetime. Consequently, there is a serious doubt whether housing should indeed be regarded as a durable consumer good, or rather as a capital good generating housing services. This would be consistent with the method of recording housing investment in GDP accounts, both in the SNA and the MPS method, as capital investment or productive investment. When interpreting "capital and services" our attention is drawn to a very high share of capital in relation to labour in housing services. Consequently, the housing market where the household functions, is a market of services or space for rent, and a market of buildings or housing units. This duality is widely analysed in the literature on commercial real estate. In the case of housing, these are markets of services and consumption and tangible capital assets. The consequence of this situation is altered consumer behaviour. Changes in home prices differently affect households in possession of housing (wealth effect), and differently households not being home owners (price and income effects). This aspect has, however, another dimension. In the case of non-durable consumer goods every choice is a choice "from the very beginning" because a good is consumed entirely within a specified period of time. As far as housing is concerned, we have to do with a similar situation in the case of rental housing, or the consumer services market, where we can extend the existing contract or not. In the case of OOH the situation is different, because in parallel with consumption we are in possession of a capital good. As a result, the already possessed tangible capital and the related, existing stream of housing services, generated by owner occupied housing, modifies consumer's choice (see Chapter 1). Below we show factors affecting the market price of services and goods that determine consumer decision-making.

3.1. Market appraisal and cost of housing

Housing generates services that are sold on the market and generate rental income. In the case of OOH instead of rents we have to do with imputed rents, namely the amount saved by home owners resulting from the fact that they do not have to pay rent, and amount is taken from the home rental market⁶.

On the other side of the account there are costs of gaining this income. The full cost of the provided housing services will include current incurred material costs

⁶ In Switzerland in 2010, the home rental market accounted for approx. 56% of the housing stock. In this country, in order to calculate the income tax, imputed rents are included in income, which reduces the society's desire to own housing (see Bourassa et al., 2010).

(repairs, home maintenance expenses), fees and taxes, cost of capital (understood as the percentage of the value of housing and land rent and municipal rent in the case of housing located outside of agricultural areas, when we lease the land or simply the cost of purchase multiplied by interest rate, in case we bought the land) as well as capital gains, if any, resulting from the appreciation of housing. In simple terms, this formula as an (annual, quarterly) stream can be written as:

$$TCH = (K_b + K_z) * r + K_e + K_r + K_f + A,$$

where:

TCH –total cost of housing

K_b - cost of construction

K_z - cost of land

r – rate of return without risk

K_e - operating expenses

K_r - repair expenses

K_f - financial costs (e.g. insurance, taxes)

A - appreciation

If housing is financed with a mortgage, then, in lieu of cost of capital there is interest on mortgage and lost interest on our down-payment. The difference between the cost and the income, is the profit generated during a given period. From this perspective, we considered housing as flows of services (income) and costs generated by it. To get back to the capital stock account these streams should be discounted.

Should we treat housing as a capital good, used during time $t_0 - t$, for whose construction traditional factors of production were used (capital, labour, land), then its market value, calculated in the simplest way, in the property market per time t_0 is the discounted sum of rendered services, namely rents, less the costs of services, plus a residual value, if any, at which we sell housing after time t .

$$W_{t_0} = \sum_{t=0}^{T-1} \frac{R_{Nt}}{(1+r_d)^t} + \frac{R_{ZT}}{(1+r_d)^T},$$

where:

R_N - value of rent

r_d - rediscount rate assumed to be fixed over time,

R_{ZT} -residual value

Consequently, housing becomes a tangible asset generating regular income in the form of dividends and income from capital gains and may become the basis for the issuance of financial assets whose value is the sum of the risk-adjusted discounted income. In the long term, the rent depends on the correlation between supply and demand for housing stock, namely traditional, fundamental factors affecting demand (income, demographic situation, migration) and supply of the stock (historical housing stock - losses – change of the intended use + construction). Similar reasoning may be applied to OOH.

Comparison of the full value of provided services to their market value gives an answer to the question about the extraordinary rate of return on housing investment,

achieved on average over the analysed period and the economic rationale behind the provision of housing services.

$$IRR = r$$

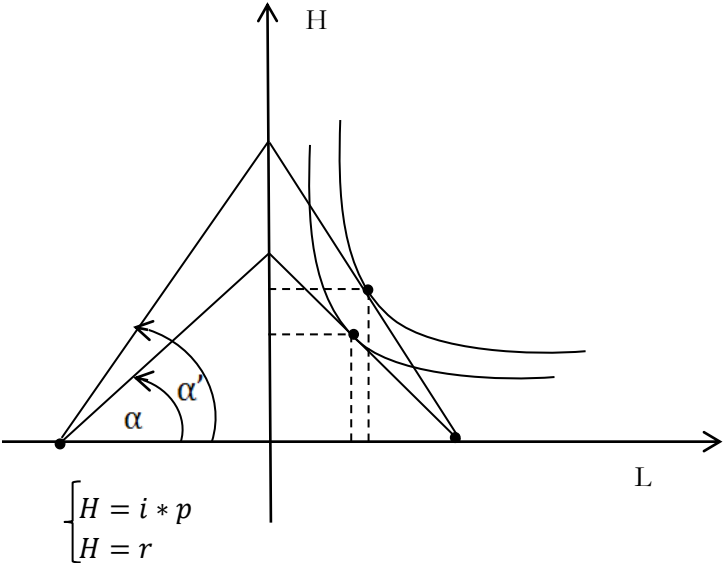
For a balanced economy, rents, in addition to operating costs, should cover the cost of capital. If the rent exceeds the full cost of capital, as broken down into periods, this means extraordinary profits. Thus, and it may be expected that capital will be relocated to the sector, savings will increase, and, consequently, the housing stock will grow. Otherwise, we will see an increasing outflow of capital from the sector. Flows concern both the home rental sector and the OOH sector as well as and the housing sector and the rest of the economy.

While analysing consumer choices in the market we usually consider the optimal choice, in the short-term and on a case-by-case basis, as the tangibly observable in the market. In the short term, supply in the market is determined by the number of homes put up for sale, rather than by the housing stock, whereas demand means people looking for housing.

The household chooses housing consumption taking into account its budget, price of housing services in the accessible form of tenure and its preferences. Thanks to interest rates and imputed rents we may analyse housing choices comparing housing with other, non-durable consumer goods. We may also compare the choices between rental housing and OOH (see Figure 4).

In Figure 4 the interest rate is represented by the angle α . Decline in interest rates will increase the angle α to α' and, consequently, will change budget constraints towards potentially higher housing consumption. Given a particular utility function this will result in the substitution effect and income effect, and, consequently, higher housing consumption. The cost of OOH is interest on the mortgage or alternative cost of own capital calculated on the market value of housing. In the case of social housing, these are rents and there is no short-term dependence on market prices and interest rates. Yet, this correlation will be observed in the long term and will cause capital flows between these markets. Actual household's expenditure on housing, is, however, higher by the amount of repaid mortgage principal, which is part of an investment element of an OOH purchase.

Figure 4. Housing consumption (H) versus consumption of other goods (L)



3.2. Choice of homeownership

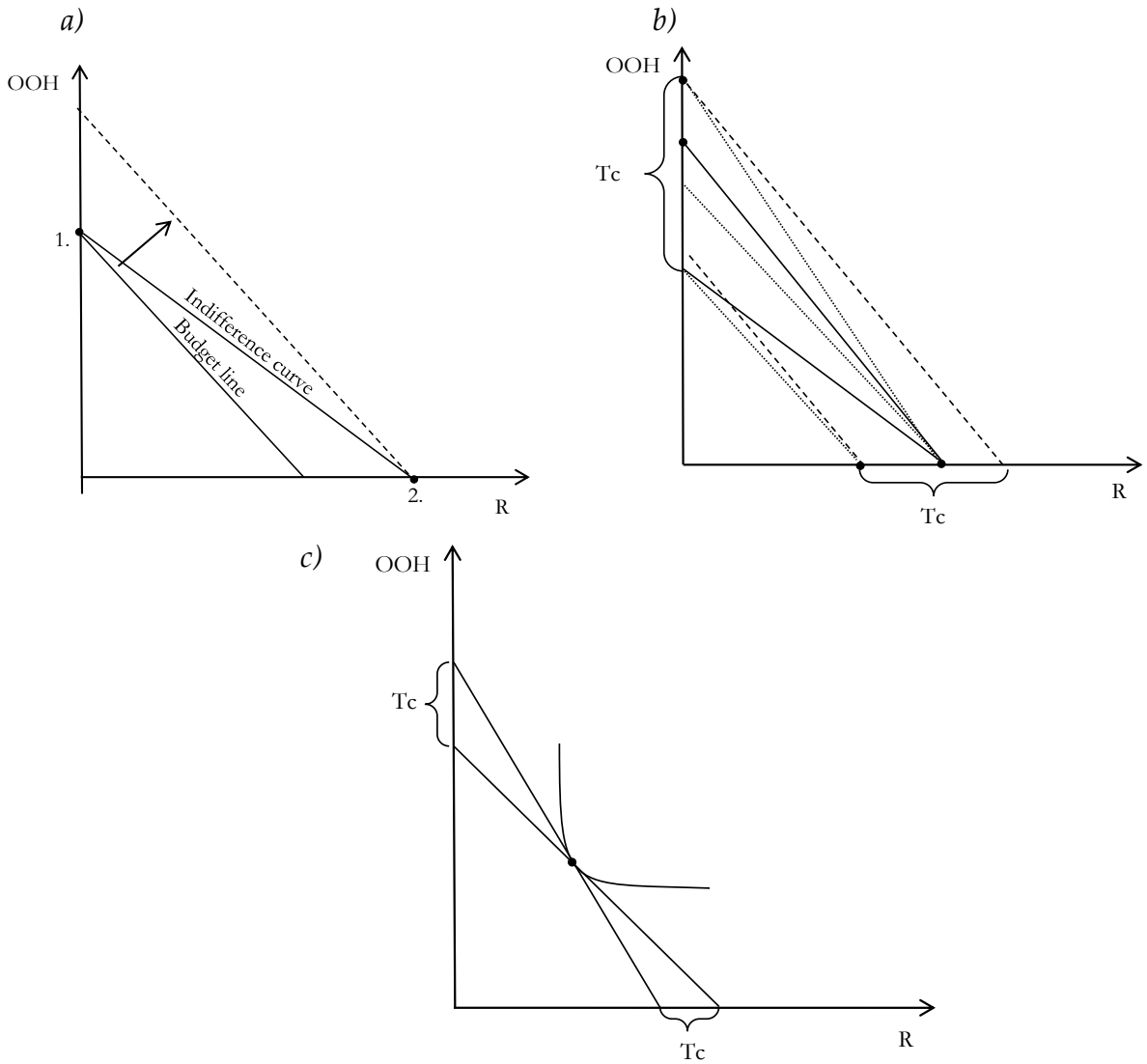
The choice of homeownership may be considered as the choice of substitute forms of consumption.

The object of the comparison can be cost of homeownership versus home rental cost or the cost of interest on mortgage and alternative cost of own capital adjusted for taxes and subsidies, and taking into account future capital gains versus net rent (rent payments exclusive of home maintenance charges). The indifference curve is the substitution correlation between the cost of credit and net rent, adjusted for preferences (for example, job requiring employee flexibility and reluctance to be committed to a fixed dwelling place), and consumer expectations (for example, higher prices). The budget line is the actual value of housing consumption that can be achieved in these two forms, taking into account the existing taxes, incentives and OOH and rental housing subsidies, affecting the actual consumption possibilities.

The issue of mortgage principal repayments made by owners of OOH who finance them with a mortgage, needs a little more attention. In the long term, in the state of equilibrium, rents should cover alternatives costs of capital and its depreciation. Alternative cost of capital, taking into account rent risk should be close to the cost of mortgage financing. Yet, in reality, this is far more complicated as housing depreciation takes several dozen years, during which housing undergoes repeated repairs, including overhauls and changes owners several times. As a result, it is difficult to calculate the full instalment of mortgage principal and the full alternative cost of capital. In the short term, the level of rents and prices in the OOH markets is determined by short-term changes in demand. However, the amount of depreciation charge will usually be lower than the principal instalment, which is an element of forced savings. Consequently, this may result in lower cost of rental. In fact, the current relationship between supply and demand in the OOH and home rental market will be the decisive factor.

The factor which decides about stability of OOH housing versus rental housing are costs related to change of ownership transaction. In the case of small differences in the angles of slope of the budget curve and the indifference curve, even small changes in their shape caused by changes in prices, rents, subsidies and taxes, and interest rates or household preferences (propensity to invest or greater mobility), would result in frequent shifts between one form and the other form. In fact, the market does not observe such phenomena due to high transaction costs (costs of sale and purchase of property, cost of termination of home rental contract). One of possible ways to approach the problem of choosing housing is shown in figure 5a, 5b and 5c.

Figure 5a, 5b and 5c The impact of transaction costs (T_c) on the choice of OOH versus rental (R)



When treating an apartment as a market rent and its purchase financed with a mortgage or own capital are considered as perfect substitutes, cost-effectiveness of transactions for the consumer, understood as maximization of its utility within a particular budget and prices of housing services (rental versus ownership) will be the decisive factor. In the state of equilibrium, the consumer will not know what to choose (ambivalent choice) - Figure 5a, however, each change in rental terms and conditions, which can be priced, as well as cost of ownership (cost of capital and other charges) will cause abrupt changes in ownership or rental decisions and movements along the consumer's indifference map (see Figure 5a). In this case, the slope of the consumer's budget line will change. As a result of rising rental costs and declining availability of housing in this form consumers will opt for homeownership (point 1). On the other hand, lower rental costs will urge consumers to choose home rental (point 2). The situation is similar as regards changes in ownership costs. In fact, the choice is impacted by these additional factors, which are not only differently valued by different households and affect them to a different extent (for example, credit constraints). They are also assigned a different likelihood of future realization (for example, prices will rise, rents will fall or higher taxes will be imposed, tenant protection will be liberalized, etc.). On the contrary, these factors are located on the indifference map of the consumer, who, depending on the economic situation, may give priority to savings in the form of home ownership or mobility associated with home rental. As a result, the actual curves of individual household choices cease to be curves characteristic for perfect substitution goods. Depending on market relationships between interest expenses and net rent they go upward and downward on a case-by-case basis. At the macroeconomic level, this will cause a specific distribution of choices between the discussed forms of ownership, resulting in economically important proportions between rental housing and owner-occupied housing (Figure 5c). It is also worth noting that in the real economy, there are generally various intermediate forms between market rental and home ownership (subsidized rental, rental in community housing stock, forms of ownership such as co-operative ownership right or tenant ownership right), which means that the actual preference map and the budget line are not bimodal, and the choice is more complex.

The analysed model, due to bimodality of decisions and volatility of expectations and preferences of households and the actual cost of rental housing and owner-occupied housing (expectations about home prices, interest rates and subsidies) is marked by high volatility of decisions, which is not observed in the real markets characterized by stickiness and accumulating tensions. The factor behind this discrepancy are high transaction costs (deposit, restrictions in the case of early termination of the rental contract, the cost of buying and selling the property and obtaining a mortgage). As a result, ownership structure is relatively stable, and arbitrage understood as the flow of stock between the two markets, limited (Figure 5b). Therefore, when analysing aggregated choices in the market (Figure 5c), it can be seen that the equilibrium point (the current structure of rental housing and owner-occupied hous-

ing) will be very stable and will fuel adjustment processes only after profits from the transaction significantly exceed transaction costs.

3.3. Choice of housing as a heterogeneous good

Another important factor to be taken into account in the analysis, is heterogeneity of housing, understood as defined in the theory of heterogeneous goods by Rosen (see Rosen, 1974). It means that the value of housing is the sum of the values of its attributes constituting the value for which we pay at market rates. In the case of housing, these attributes may range from purely functional features, through aesthetic ones, to features related to the social sphere (social structure of the residential estate and its environment, proximity to public services). The previously discussed form of ownership is another feature of housing. These features are valued by different households, and their value also changes in the evolution function of household (household's developmental cycle). According to Rosen, although we cannot observe the market of particular features and partial values of the good (hence the name "hidden markets" and "hidden prices"), they do exist and these markets together with hidden prices can be estimated indirectly. Heterogeneous nature of housing as a good is, however, considerably broader in scope than commonly assumed in the appraisal of the market value of housing and in the theory of Rosen where it basically concerns one type of utility value defined by a series of detailed features. Rosen's analysis of the market differs quite significantly from the classical analysis of the consumer both in terms of technical aspects as well as theoretical ones. First of all, there is a classical equilibrium price as the consumer does not purchase the quantity of goods, but their quality. Market price is therefore described as a curve rather than by points, whereas the market is understood as a compilation of its segments. Thus, the choice concerns the amount of quality in a good and the quantity of a good. As a result, it cannot be measured by points and is not subject to classical optimization. Consequently, Rosen introduces unintuitive, individual curves of offer and choice as equilibrium points for the overall curve describing the relationship between the quality of a good and its price. Optimization, especially by the real estate developer, assumes optimization of the amount of quality of good and the volume of production of goods, which, in the case of a real estate developer, does not necessarily have to give clear-cut solutions. Fortunately, in the case of housing, which is a typically heterogeneous good, while conducting the analysis involving the consumer, the first choice is generally one housing unit, which boils down the problem of optimization to the choice of quality which in the case of housing means the choice of the basket of characteristics. Under the assumption that quality may also be quantified and valued, this means that it is possible, at least at a basic level of analysis, to use the classical theory of consumer.

However, there are also problems related to adjusting the housing market to this theory, especially as regards housing market research. In the Rosen's model, the quality is somewhat standardized and concerns perishable goods. Consequently, the

buyer has no problem to adapt it both in the case of individual transaction, as well as when choosing a particular market segment. In the case of the residential market, each housing unit and the related quality is different, and its supply is largely based on the already existing stock. As a result, the normal situation is when consumer's preferences and the structure of supply mismatch slightly, which must lead to a natural inconsistency (ambiguity) in the valuations of housing attributes.

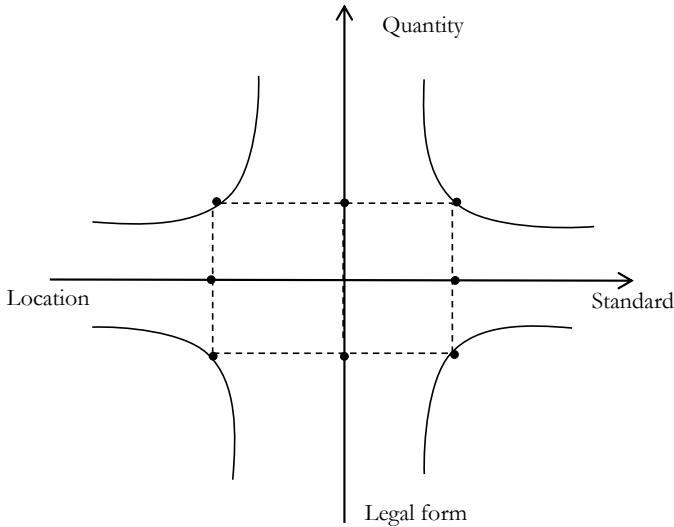
Also the breakdown of variables into purely quantitative and qualitative ones may be an oversimplification. In the case of housing, one of its characteristic, namely its size is also heterogeneous in nature. It can be understood as the size of housing expressed in meters, number of rooms, or in a specific case, as the choice between one, two or three dwellings (for example, at the household's level, a house shared with the child's family or two independent apartments, and perhaps even one more housing unit as investment of savings). This element is particularly important when analysing demand at the macroeconomic level, as the use of an inadequate measure of quantity (number of dwellings per 1 000 inhabitants, number of square meters per 1 000 inhabitants, number of rooms per 1 000 population or number of households per 1 000 inhabitants), will result in an erroneous assessment of market processes. If housing demand is the result of growth in a household's size (more children), then the market will see, first of all, growth in demand for new space, through rising demand for the size of housing expressed in square meters. If, however, the rise in demand will be driven by bigger number of households (aging of population or, on the contrary, growing number of young couples), this rise in demand will mean growing demand for independent housing, often built in a special formula for the elderly or smaller housing as the first home for young households . This will also mean that unit prices (per square meter) of larger or smaller housing in the market will change accordingly.

Consequently, when speaking about consumer's choices in the housing market at the microeconomic level we mean *de facto* two choices which, however, correspond to the following correlations:

- Classical microeconomic choice is the choice between housing, other goods and savings. When speaking of savings we mean savings for housing (consumption over time) and housing as savings (housing as a tangible fixed asset).
- Choice, let's call it conventionally a hidden choice to distinguish it from the previous one, is the previously discussed choice of quality, namely, in the case of housing the choice of the bundles of housing features.
- Equilibrium, let's call it conventionally – hidden micro-choices. The choice of housing characteristics is obviously connected with the choice of housing. Formally, this means that in the consumer's utility function, housing is a nested utility function of its features. Consequently, the choice of housing consumption is always the choice of a bundle of characteristics. This means that a change in prices of other goods affects the choice of housing and the choice of its characteristics, and vice versa.

For graphical presentation of the chosen attributes of housing, housing quality may be, with some simplification necessary for the model analysis, reduced to housing standard, its location and legal status. Thus, the standard of housing may be broken down into the standard of the building, the housing and the neighbourhood or the so-called standard of internal and external housing. On the other hand, location is the location of the housing itself in the building, location of the building, the residential estate, the district and the city. Legal form is related to the strength of ownership rights. This means that the housing market gives priority to stronger rights (for example, ownership is valued higher than co-ownership or perpetual usufruct), or rights without restrictions (rights of way, right to life-annuity, etc.). Basic choices of housing attributes made by consumers determining the size and the structure of home value as a consumer good are presented in Figure 6a. For the purpose of graphical presentation, the real choice which takes place in the six dimensional space is reduced to 4 dimensions, disregarding the choice of quantity-legal form and standard-location.

Figure 6a. Basic choices: quantity-legal form and standard-location



While discussing the issue of a hidden choice, we usually present the consumer's budget line in a simplified manner, suggesting its classical shape (see Figure 5a, b, c). In fact, the budget line will be non-linear; it may be discontinuous, and may be represented by points, or broken lines, without approaching the axis (see Figure 6b). This is due to the fact that certain qualitative characteristics are determined by points (e.g. ownership). In certain sub-sector of the market correlation between quantity and quality will vary, so the consumer will move along the envelope. In the case of other characteristics, these correlations will vary non-linearly. No contact with the axis is due to the fact that a certain minimum quantity of housing is necessary to make qualitative choices and vice versa, each quantity represents a certain quality.

Correlations between the choice of a good and the choice of its attributes may be illustrated by analysing the choice of housing consumption, combined with the optimization of the quality of housing. In the first correlation, fall in the market appraisal of particular characteristics (for example, a specific location) results in growing demand for a particular feature, and consequently, for housing, and falling demand for other consumer goods. Also the decline in home prices will boost both housing demand and demand for a particular housing feature. On the contrary, the price of housing as a consumer good will drive down residential consumption and consequently, demand for a particular housing feature.

Figure 6b. Budget line of a households in the case of a hidden choice in the residential market

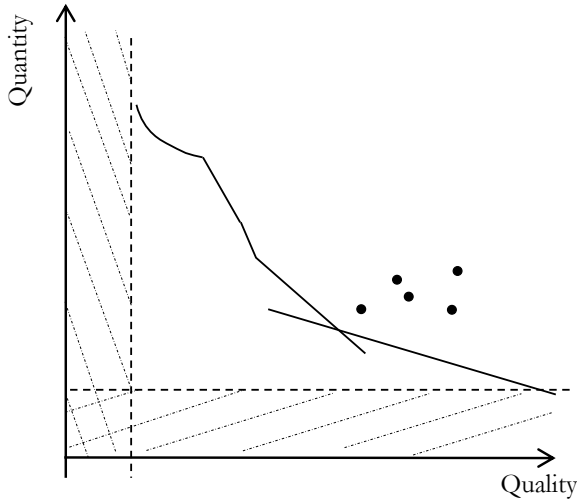
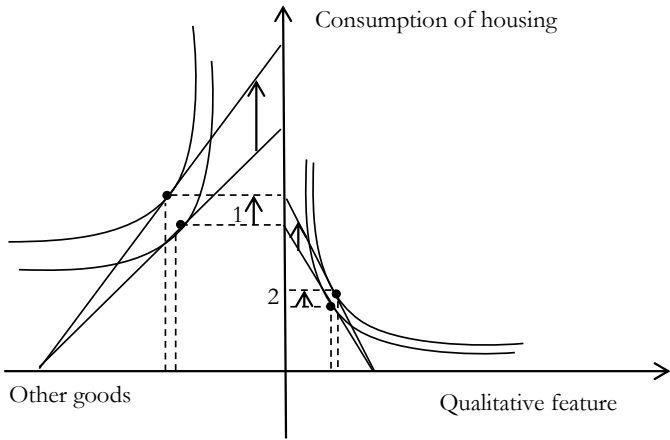


Figure 7 The choice of housing, at the left-hand side - choice of a good, on the right-hand side - choice of housing characteristics.



The second correlation is putting together the choice of housing as the sum of investment demand and consumer demand, yet, analysed from the point of view substitution or assessment of particular characteristics of a dwelling. Both demands are broken down into demands for particular housing characteristics. Purely consumer demand for housing can be, to some extent, identified with the already discussed, home rental. So the choice of OOH will always be connected with investment aspect, yet its scale and motifs may differ. As a consequence, both choices will be correlated through budget and preferences between consumption and investment aspect of housing.

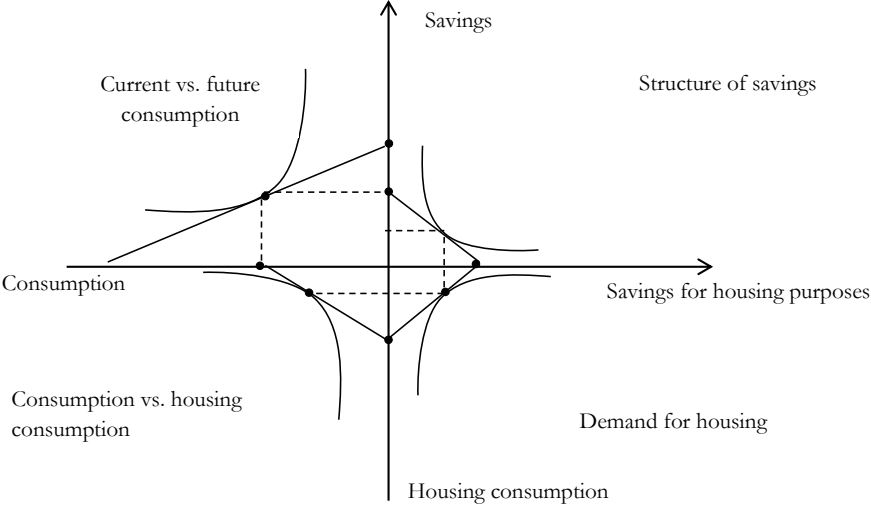
Consumption choice, like investment choice, translates into preferences for a certain bundle of features. Consequently, this leads to the assessment of consumption characteristics also from the point of view of investment (in this specific case, assessment of location attributes from the perspective of liquidity, i.e. how much the location is attractive as a consumer good and how much it is liquid, which will be decide about its choice on the preference curve which is more consumption- than investment-oriented one). We may also consider the choice between these characteristics. This problem is discussed in more detail in the next section.

3.4. Choice of housing demand structure (housing as savings and consumption)

Housing itself can be analysed as a complex consumer good, either directly or from the point of view of a stream of generated services, meeting consumer needs or as a tangible fixed asset generating income in the market game. In both functions housing will be a heterogeneous good, because in order to meet the needs of the owner or a commercial tenant it must offer utility features expected by the market. Together with savings functions⁷, however, these utility features will be assessed from the point of view of the ability to generate income and minimize investment risk, rather than from the point of view of the ability to meet their owners' needs. As a consequence, the utility function and internal valuations of discussed features will change. Thus, the utility function will change in the investment function, because we will not buy housing according to our own preferences, but average preferences in the marketplace, further filtered with an individual assessment of risk and profitability.

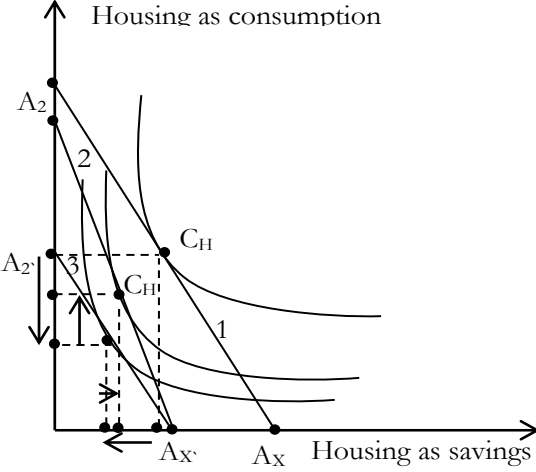
⁷ Accumulation and keeping of assets.

Figure 8. Consumer and investment demand for housing (taken as a whole or its particular characteristics)



Consequently, also new features will appear, such as liquidity, which are absent in the analysis of housing as a consumer good. As OOH, in almost every case, has both consumption and investment aspect, when speaking of housing demand will have to combine investment and consumer demand for both the entire housing unit, as well as for its individual characteristics. Change in valuation (utility function) of any of the elements will affect the equilibrium of the entire system (see Figure 8). The above reasoning can also be performed iteratively, starting with classical consumer choices (see Figure 9).

Figure 9 Consumer's choices and investment and consumption demand for housing



Full, classical model of consumer's behaviour in the residential market should include at least 7 choices:

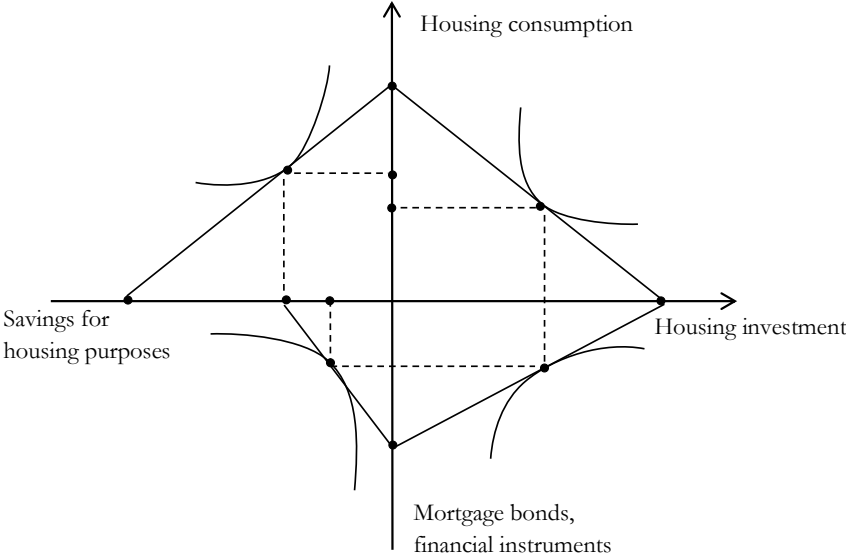
1. Consumption and savings. How much is spent on consumption (including housing) today, and how much will be spent tomorrow. In this module, housing constitutes an element in aggregate consumption and aggregate savings and it is a classical inter-temporal choice. It is the starting point for other choices.
2. Housing consumption today and savings on housing, or housing consumption tomorrow, when we consider home purchase over time. From the point of view of housing demand, this presents a dilemma: housing consumption today or savings for housing tomorrow.
3. Consumption and saving in the form of housing. In this case, housing is treated as an investment of savings to be used over the subsequent period to finance consumption.
4. Consumption of housing and consumption of other goods. This is a classical intra temporal choice.
5. Consumption of housing and the overall savings, including savings in the form of housing, which will be allocated to finance future consumption.
6. Housing consumption and savings in the form of housing, when we expect home prices to appreciate or maintain their value and generate income from rental.
7. Savings in the form of housing (home price appreciation and higher income from rent) versus other savings when we analyse the structure of assets from the point of view of return on investment and risk.

From the point of view of the housing sector, the basic consumer choice model will be choice no. 5, namely housing as a consumer and investment good, which reflects the previously discussed dual function of housing. In this correlation, although we analyse the choice, the cumulative effect of consumption and investment demand is visible in the market.

To explain this choice, the model may be reduced to conditions no. 1, 3, 5 and 6, which allows to present it in two dimensional four quadrant coordinate system.

The full sector model is the sum of consumption and investment demand combined with savings for housing purposes. It shows the relationship between the financial sector and monetary policy and the housing sector (see Figure 10). This model in the lower quadrants is supplemented with a choice between saving for housing in universal institutions (banks, investment funds) and sector institutions (purchase of mortgage-backed securities, contract loan systems) and the choice between housing investment (direct investment) and investment in sector's debt securities and the saving system. The main factor affecting this model is the interest rate. Short-term movements in interest rate affect housing demand and the size and structure of savings.

Figure 10 Housing demand and housing savings of households



The functioning of the model will depend on how much consumers and investors rely on current processes, and to what extent they predict future sequence of events, especially on the basis of the past experience. It can be assumed that consumer behaviour will be more based on current trends, while investment behaviour will include, to more extent, an element of prediction. In general, the model may include many assumptions to test the flow of funds as well consumption and savings in the sector.

For example, interest rate hike will reduce housing demand through higher costs of housing services. At the same time, investors can expect fall in real estate prices, in the medium term, driven by limited demand. Consequently, they will refrain from investment purchases. On the other hand, higher interest rates on deposits will urge households to increase savings for housing purposes in the banking sector.

If, however, there is a possibility of indirect investment in the housing sector through the purchase of mortgage-backed securities, especially the most popular instruments with fixed interest rates, interest rate hike will decrease their value and increase profitability. If they are instruments with fixed interest rates, interest rate increases will not raise the risk (credit risk). Conversely, interest rate cuts will increase consumption and investment demand, given cheaper credit and expected price increases. At the same time, households with fixed-rate loans will refinance them on a mass scale, which will result in liquidity surplus faced by investors.

4. Summary

Many studies examining the impact of the housing sector on the economy use simplified realities, disregarding heterogeneity of housing and complex housing decisions, both in terms of consumption and investment. This often leads to erroneous conclusions derived from these models.

The purpose of the article was to deepen the knowledge about consumer's choices at the microeconomic level, in order to better understand home buyer's behaviours and their impact on the housing market.

The key issue in the analysis is to take into account consumer's choice between different types of consumption (including housing consumption), housing investment demand and housing consumption demand and various forms of home tenure.

Also consumers' appraisal of housing significantly influences their decisions. It is worth noting that households ascribe a different value to the additional amount of housing, already in possession of a certain quantity of housing and a different value when purchasing their first housing.

It is worth noting that by relying on hedonic models, not commonly used in Poland, we may distinguish attributes that have a significant impact on the value of housing and attempt to make an objective appraisal of the property.

Only an analysis which combines these aspects of consumer's choice can adequately describe and explain the actual developments in demand in the residential market.

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