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The Quasi-Normatives for Housing Affordability: Costs of Alternative Rent Structures

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The Quasi-Normatives for Housing Affordability: Costs of Alternative Rent Structures in Social Housing (Scotland 1996, Czech Republic 2001)

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Introduction

The affordability of housing has become a common way of summarising the nature of the housing problem in many market-based housing systems. During the 1980s the term "housing affordability" became very popular among policy makers and during the 1990s the growing number of housing researchers were engaged into the study of this concept and its methodology, mostly in a very critical way (Bramley 1994, 1991, Hallet 1993, Hancock 1993, Stone 1990, Whitehead 1991, Hulchanski 1995, Hills et al 1990, Freeman et al 1997, Linneman & Melbolugbe 1992, Maclennan & Wiliams 1990).

There are two main types of affordability measure applied for rental housing: the rent to income ratio and the residual income measure. The first varies according to whether gross or net household income is used, whether gross rent or rent net of housing allowance is used, and whether utilities or charges are included in the rent. The latter type is calculated as net household income, less the rent, less a minimum income amount laid out in the country's welfare system. Generally, the net rent to net income ratio is the most popular indicator, often used also in the international comparisons.

According to Hulchanski (1995), both measures are used in six possible ways: description, analysis, administration of subsidies, definition of housing need, prediction of the ability to pay the rent or mortgage and selection criteria. The first three could be considered as "quite valid" (p. 475), the rest are all invalid uses. Though using the rent to income ratio for administration of subsidies helps to target housing subsidy to lower income households (and it is quite valid), "the decision as to where to draw the line, that is, what specific definition of eligibility is to be used for a subsidy programme, is a subjective judgement. It cannot be based on an objective scientific determination." (p. 477). Many other housing researchers agree with Hulchanski by making the distinction between actual affordability (what tenants pay) and *normative affordability* (what should tenants pay) (Hancock 1993, Oxley & Smith 1996). "There is much criticism of the use of affordability measures for these normative purposes." (Freeman et al 1997, 22). Thus according to researchers, social science cannot offer the answer to the question "What should tenants pay?".

In developed market economies of 1990's with traditional emphasis on individual freedom, this fact would not induce drastic state intervention for greater affordability that would change completely the structure and functioning of housing market. The situation is quite different in transitional countries of Central and Eastern Europe. Many countries applied right-to-buy policy on former state rental housing but some of them (Czech Republic, Poland) decided to decentralise the decision on housing privatisation to local authorities and this led to much lower speed of privatisation. In those countries the rental housing remained a significant tenure by its share on country total housing stock but a sharp decrease in state subsidies and maintenance of

non-targeted "first generation" rent control significantly distorted the functioning of the whole housing market (Lux 2000, 2002, 2003; Lowe and Tsenkova 2003).

In the Czech Republic, for example, the state refused to subsidise new housing construction but decided to maintain strong tenant protection and rent control in the overwhelming majority of municipal and private (restituted) rental flats. Since 1994, a market rent was allowed only for new tenancies (vacant or new flats). The low level of controlled rents caused the doors for newly formed households looking for affordable rental housing to be closed. Also, the scale of black market rental contracts grew rapidly. A new type of social injustice has appeared because of segmentation of households according to their housing conditions into two groups: those living in the privileged housing tenure (home-ownership obtained during the previous regime, rental housing with low controlled rents) and those living in unprotected tenure (home-ownership acquired for market prices or "market" rental housing).

Rent control is not well targeted according to household income and flats with controlled rents are occupied by similar share of households from all income deciles. This means that about 10% of the highest income households in the Czech Republic according to net household income distribution used the advantage of controlled rents (Lux et al 2003). Though the average rent to income ratio was only about 6-7% in rent-controlled sector in 2002, social science cannot answer the question if it is too much or too low. The goal of this article is, however, to attempt to simulate indirect economic normative on rent settings in social (rent-controlled) housing and via that also on rent-to-income ratio for households living in social (rent-controlled) housing.

The housing affordability problems of lower income households are solved through supply and demand side subsidies in European Union member states. Supply side subsidies (called also *bricks and mortar subsidies*) are represented mostly by social rental housing[1]; the demand side subsidies by different housing allowance models. The shift to demand side subsidies during the 1990s was driven by the need to cut government spending and reshape housing allowance not only as an important housing policy tool but also as the basic instrument to assure financial affordability of rental housing.

No methodological approach can fully compensate for subjective normative judgement of financial affordability of housing in context of other necessary consumption of needy households (traditional normative affordability approach). For the purpose of this study we will, however, assume that welfare safety network based on evaluation of need and consumption prices is incorporated in existing model of housing allowance (demand side subsidies). The meaning of this means-tested benefit is to help those with insufficient income to cover the housing costs. Such help is based

[1] Although there is no common housing policy of the EU all the EU member states (with the only exception of Greece) have a social rental housing sector varying between 1% (Spain) and 37% (the Netherlands) of the total housing stock. The sector is non-profitable; it can be public; and it is designed mainly for population with lower incomes that could not afford to get housing on the free market. The construction is financially supported by the public authorities (besides the Netherlands); rents in social housing flats are somewhat lower than on market; the allocation of flat depends on fulfillment of certain social criteria (besides Sweden), eg. income ceiling. In recent years, responsibility for housing policy has been developed to regional or municipal government in several European countries, as central governments have either reduced their responsibility for, or even withdrawn from, this area of social policy (Stephens & Goodlad 1999, Walker 1998).

on actual (or expected) housing costs, household income and sometimes household structure.

However, to hold this as an assumption we need to test the effectiveness of the particular housing allowance by answering two questions: does housing allowance help more lower income households than higher income households and is it set in such a way that even substantial changes in rent prices would not decrease the financial affordability of rental housing for those in need (basically those who already receive an allowance)? If we were able to answer both questions positively then we could assume that an allowance provides a good safety network for those who need assistance (low income tenants) from social (rent controlled) rental housing.

Only then we can start a discussion on levels of rents in social (rent controlled) housing (supply side of state interventions) and we can pursue it by looking at relative public costs of alternative rent levels. Let us define the percentage value of increase or decrease in public (both state and municipal) expenditures incurred by rent price change as relative public costs RPC_{t+1}:

$$RPC_{t+1} = \frac{PC_{t+1}}{PC_t} \tag{1}$$

It is well known that rent increase in social (rent controlled) housing does not have to be connected only with public savings. Our hypothesis is that there is such break-point from which further rent increase in social (rent controlled) housing would produce higher public costs. This may be caused by side effects of a policy preferring housing allowance to supply side subsidies. These effects have to be also measured, though assuming that housing allowance is optimal with respect to the help those who need assistance.

We take the level of average rent price with the lowest relative public costs as economic "quasi-normative" on rents in social (rent-controlled) housing. This is because the benefit system is supposed to provide effective help to those who need it (there is no justification for additional public spending) and econometric cost-benefit analysis took into account not only the most relevant public cost/benefit items but also side effects of particular housing allowance and housing policy generally. The "quasi-normative" on average "optimal" rent may be then used to set a "quasi-normative" on average rent to income ratio in social (rent controlled) housing sector.[2]

The relationship between social rents and public costs has been already surveyed by some UK social researchers (Wilcox & Meen 1995, Holmans & Whitehead 1997) paying attention to the danger of overshooting in rent price increases. This shows that the quasi-normative approach is not in any sense limited to special interest of transitional economies and can be applied in those Western European countries having still significant social housing stock (France, Sweden, the Netherlands, UK).

[2] The average itself has often no practical meaning as there are different households with different incomes and rent to income ratios living in social (rent controlled) housing. However, if simulations are conducted on representative data sets this can produce much more detailed set of "normatives" for each social, professional or income group of households. In this article we use rough averages just because the intention is only to describe the potentials of the quasi-normative approach.

In this study we used Scotland (1996) and the Czech Republic (2001) as case studies to show how this approach can contribute to the discussion on rent and affordability policies both in existing and accession European Union countries. Both countries are comparable with regard to population and both have substantial social (rent controlled) housing sector: social housing constitutes 34% of housing stock in Scotland (Wilcox 2002) and rent controlled housing around 26% of housing stock in the Czech Republic (Lux 2002).

Firstly, we need to test the effectiveness of housing allowances. The UK housing benefit (*HB*) is computed according to the following equation (Gibb et al. 1999):

$$HB = R - t(Y - A)$$

where R is a real gross rent, Y household net income, A an applicable amount (equal generally to income support) and t is taper having value of 0.65. If a household is in a receipt of income support (living minimum) then full actual rent is paid by housing benefit. It is supposed that the household will cover its rent by £0.65 from each £1 of income above the level of income support. This means that allowance is strictly targeted to lower income households. Moreover, every rent increase is for households in receipt of housing allowance fully compensated by an increase in the amount of allowance if everything else (household income) remains constant. We can therefore assume that the allowance provides effective help to those in need.

The amount of housing allowance in the Czech Republic is computed only with respect to household income and real housing costs are not included there. The Czech model uses only the tariff costs and the amount of allowance (*HA*) is calculated according to the following equation:

$$HA = \text{household costs} - \frac{\text{household costs} * \text{net household income}}{\text{subsistence minimum} * 1.6}$$

Household costs are set in fixed value on the level of the minimum amount to cover average housing expenditures. The subsistence minimum (and indeed household costs too) varies according to the size of household. To test the effectiveness of the model we need to rewrite a model into a more formal style as follows:

$$HA = NC\frac{(MI - RI)}{MI},$$

where NC are normative costs, RI is real income, MI is maximum income. When real income is equal to maximum income, allowance is zero, when real income is zero, allowance is equal to normative costs. The implicit taper is 0.1.

It is clear that the Czech housing allowance is a means-tested benefit providing help mainly to those with lower incomes. However, as real costs are not included in the computation and tariffs reflect only the level of rent prices in 2001, the potential rent increase would be connected with the decrease in financial affordability of housing for those in receipt of housing benefit. We assumed, therefore, that tariffs used in the equation will be "uprated" proportionally to simulated rent increase in each stage of simulation which, we think, reflects the logic of the model itself.

However, although we indexed the normative housing costs to rent price increases, we did not change other important item in an equation: maximum income. If only housing cost tariff part increased and maximum income remained constant then we would assume that with each rent increase the household will pay a higher share of their own income on rent. Although we did not know how the State would fix the model, we made the additional assumption that maximum eligible income is indexed in a same way as housing costs' tariffs and rent increase is fully compensated by benefit to those in its receipt.

It was necessary to identify the main public cost items relevant in context of rent simulations. As we intended to measure relative public costs we selected only such cost items that were changing with rent prices. We included the Housing Support Grants (revenue subsidies to local authorities on municipal housing), grants on new social housing construction (capital subsidies to Scottish housing associations), housing benefit costs and Retail Price Index (RPI) costs. RPI costs indicate the additional costs of uprating of pensions and benefits when increase in rent prices is reflected in national Retail Price Index.

We also added some other cost items that had been often neglected: labour market costs and costs connected with residualisation of social housing. Among the latter one we included the costs via voids of social landlords; for others we did not, unfortunately, have reliable statistics. The costs of rent arrears were not included as it had been verified that they were not dependent on rent price (More et al. 2003, p. 88; Housing Corporation 1997, p. 12). Developing equation 1 we can formalise the computation of total public costs as follows:

$$PC_t = HSG_t^- + RS_t^- + RPI_t^+ + HC_t^- + LMC_t^+ + HBC_t^+ \qquad RS_t > 0 \qquad (2)$$

where PC_t are total annual public cost a t-simulated rent level (further, t-stage of simulation), HSG_t housing support grant subsidy, RS_t potential revenue subsidy for housing associations (if positive), RPI_t RPI costs, HC_t housing construction costs, LMC_t labour market costs and HBC_t housing benefit costs. Costs via voids decrease the rental income of social landlords. The signs show an expected correlation of variable with rent price.

For the Czech simulations we monitored following public costs: fictitious revenue subsidy to municipal landlords (cRS_t), housing construction costs (cHC_t), housing benefit costs ($cHBC_t$), Consumer Price Index (CPI) costs ($cCPI_t$) and costs via voids. The specific allowance model in the CR (gentle taper) allows to exclude labour market implications from analysis. Costs via voids decrease the value of rental income of municipalities similarly as for the Scottish simulations.

$$cPC_t = cRS_t^- + cHC_t^- + cHBC_t^+ + cCPI_t^+ \qquad (3)$$

As all models trying to answer the question "What would happen if?" even our approach has its own obvious limits. Definitely it is not the model that would precisely count the exact public costs of higher/lower rents. The logit models we used (especially for the Czech Republic case) were not always very robust. We did not

have all needed information in one data set. As we had to transfer the model equations from one data set to another one, we could use only those variables that were in both sets thus making the model less reliable.

We were not able to simulate the impact of higher/lower rents and RPI/CPI increase on wider economy (house prices, GDP, consumption, unemployment) as profound macro-economic model would be needed for such a purpose. It is therefore necessary to stress the fact that conclusion drawn in this article should be perceived rather as useful benchmarks or framework on public housing policy in the social (rent-controlled) housing than the precise forecasts.

The "quasi-normative" on average rent price will be estimated on year basis thus assuming all other income and demographic variables during simulated rent increase/decrease stages being constant. We simulated public cost of both higher and lower rents in Scotland 1996 (five increases in rents by 10% and five decreases in rents by 10%) and public costs of higher rents in the Czech Republic 2001 (ten increases in rents by 10%).

Methodology

Scotland

We used several data sets: the *Scottish House Condition Survey 1996* (UK Data Archive), *LA Performance Indicators 1996, 2001* for local authorities in 1996 and 2001 (Scottish Executive) and *HA Performance Indicators 1996, 2001* for housing associations in 1996 and 2001 (Scottish Homes). There are two types of social landlord in UK: municipalities and housing associations. Since the middle of 1990s several performance indicators are collected for both sectors. They include the information about the average re-let time, number of re-lets, management costs per unit, etc. The *Scottish House Condition Survey 1996* (SHCS 1996) is the second national survey of house conditions in Scotland. The total survey sample contains 18,158 respondents with whom the full interview was achieved. The sample was designed to yield a nationally representative sample of dwellings in Scotland. After exclusion of those living in private rental housing we obtained 16,844 respondents' working sample.

The methodology of relative public cost estimation is relatively complex and includes large-scale econometric simulations. The need for estimates of tenure choice and employment status decisions asked for the additional estimates of house prices, user costs and wage rates. As the details on methodology of public cost measurement in Scotland can be found in Lux (2004), we will only provide a brief mathematical development of the argument here. In the paper mentioned above the reader would find, for example, also the results of logit and OLS regression models used for estimation of house prices and wages in Scotland. Developing equation 2, the particular cost items were computed as follows:

$$HSG_t = MMC^{LA} + CC^{LA} + CV_t^{LA} - RI_t^{LA},$$

where,

$$RI_t^{LA} = AR_t^{LA} * HS^{LA} * 52,$$

$$CV_t^{LA} = \frac{AR_t^{LA}}{7} * RL_t^{LA} * ARLT_t^{LA},$$

where,

$$RL_t^{LA} = RL_0^{LA} + (NLH_t^{LA} - NLH_0^{LA}),$$

$$ARLT_t^{LA} = f(AR_t^{LA}).$$

MMC^{LA} are annual management and maintenance cost of municipal housing (being constant during simulations) and RI_t^{LA} annual rental income of local authorities computed as average weekly rent (AR_t^{LA}) multiplied by 52 weeks and number of municipal dwellings (HS^{LA}). CV_t^{LA} are costs via voids computed as average daily rent multiplied by annual number of re-lets (RL_t^{LA}) and average re-let time in days ($ARLT_t^{LA}$). RL_t^{LA} is computed in relation to the difference between number of households leaving municipal housing at *t*-stage of simulation (NLH_t^{LA}) and number of households leaving municipal housing in 1996. $ARLT_t^{LA}$ is a function of average rent estimated on landlords' performance data. HSG_t can have a negative value, i.e. additional income of municipalities above the level of the costs is perceived as public finance benefit.

Similarly, the difference between total rental income and total costs is computed for housing associations. A positive value is seen as over-revenue (OR_t), negative value as a public revenue subsidy (RS_t). The over-revenue could not be viewed as public finance benefit but we assumed that 70% of such "profit" has to be used to decrease the costs of new housing construction. The methodology of computation OR_t/RS_t is similar as for municipalities; costs via voids for housing associations (CV_t^{HA}) are, however, directly the function of annual number of re-lets (RL_t^{HA}) weighted on one dwelling of a landlord:

$$OR_t(RS_t) = MMC^{HA} + CC^{HA} + CV_t^{HA} - RI_t^{HA},$$

where,

$$RI_t^{HA} = AR_t^{HA} * HS^{HA} * 52,$$

$$CV_t^{HA} = \left[f\left(\frac{RL_t^{HA}}{HS^{HA}} \right) \right] * RI_t^{HA},$$

where,

$$RL_t^{HA} = RL_0^{HA} + (NLH_t^{HA} - NLH_0^{HA}).$$

RPI costs are counted according to the relative weight of rents in RPI and estimate of total public costs of uprating of pensions and benefits connected with 0.1 percent RPI increase (£ 73 mil.) provided by Holmans & Whitehead (1997):

$$RPI_t = RPI_t^{HA} + RPI_t^{LA},$$

where,

$$RPI_t^{HA} = \frac{0.061 * \Delta AR_t^{HA}}{0.1} * 73{,}000{,}000,$$

$$RPI_t^{LA} = \frac{0.362 * \Delta AR_t^{LA}}{0.1} * 73{,}000{,}000.$$

A new social housing construction in Scotland is supported mainly through public capital grants allocated among housing associations. Public costs (HC_t) were counted in relation to the number of households from the housing associations' waiting lists satisfied by new social housing starts. In 1996, the number of new housing starts formed about 3% of total number of households registered on waiting lists of housing associations (WL_t^{HA}). We took this 3% share as a normative for computation of needed new housing starts at each *t*-stage of simulation (HST_t). If more people left the housing association sector, thus increasing the turnover, the number of people on waiting lists would decrease and consequently also the scale of housing construction. However, we assumed also that if the number of people leaving local authority housing were lower than in the zero stage of simulation, then additional new flats would be needed to be built. This additional housing normative is again equal to 3% of the difference between number of people leaving municipal housing in the zero stage of simulation (NLH_0^{LA}) and number of people leaving at particular stage of rent decrease simulation (NLH_t^{LA}). The computation of total public cost on construction of HST_t dwellings was as follows:

$$HCO_t = GR * AHC * HST_t,$$

where,

$$HST_t = 0.03 * WL_t^{HA} + 0.03 * (WL_t^{LA} - WL_0^{LA}) \qquad WL_t^{LA} - WL_0^{LA} > 0,$$

where,

$$WL_t^{HA} = WL_0^{HA} - (NLH_t^{HA} - NLH_0^{HA}),$$

$$WL_t^{LA} = WL_0^{LA} - (NLH_t^{LA} - NLH_0^{LA}).$$

HCO_t are original unit public housing construction costs multiplied by HST_t dwellings, using real average construction costs per dwelling (*AHC*) and real average grant rate in 1996 (*GR* = 0.7367). The construction costs HCO_t were, finally, also adjusted according to the rental revenue at particular *t*-stage of simulation as follows:

for rent increase simulation stages: $HC_t = HCO_t - TS_t$,
for rent decrease simulation stages: $HC_t = HCO_t + TL_t$,

where TS_t are total savings from rent increase and TL_t total loss from rent decrease at particular *t*-stage of simulation. These were computed as follows:

$$TS_t(TL_t) = \left\{ CP_t(CL_t) + AHC - \left[\frac{(AHC * HST_t - 0.7 * OR_t)}{HST_t} \right] \right\} * HST_t,$$

where,

$$CP_t(CL_t) = \frac{\Delta AR_t^{HA} * AR_0^{HA} * 52}{\frac{i}{\left[1 - \left(\frac{1}{1+i}\right)^n\right]}}. \quad (3)$$

CP_t is capital profit from rent increase and CL_t capital loss from rent decrease; i is real average interest rate and n average loan maturity for private loans of housing associations in 1996 (i = 6.7%, n = 30). Housing benefit costs (HBC_t) were computed as follows:

$$HBC_t = AHB_t^{SHCS96} * \frac{HBR_t^{SHCS96}}{TSHH^{SHCS96}} * TSHH^{Scotland} + HBAC_t,$$

where,

$$AHB_t^{SHCS96}, HBR_t^{SHCS96} = f(AR_t^{HA}, AR_t^{LA}, Y^k, A^k, \text{employment status decision, tenure choice}),$$

where AHB_t^{SHCS96} indicates the average housing benefit and HBR_t^{SHCS96} the number of housing benefit recipients generated by simulations in *SHCS 1996*. $HBAC_t$ are the benefit administration costs; Y^k and A^k are income and applicable amount of k-household. Both AHB_t^{SHCS96} and HBR_t^{SHCS96} were dependent mainly on behavioural aspects of simulations: mobility and tenure choice. To analyse it, we defined user cost of capital UC_0 as follows:

$$UC_0 = [(1-t) * i + d + a - g] * P^e,$$

where t denotes a marginal tax rate of particular householder, i is the nominal mortgage interest rate, d is the depreciation rate, a is the property tax rate, g is the expected annual rate of nominal house price appreciation and P^e estimated house price. The marginal tax rate was assumed to be zero[3] and a was dropped from the equation due to the data restrictions (Gibb & Mackay 2001, Hsieh 2002). The average nominal interest rate was 6.7%, the depreciation rate 1.2% and price appreciation (capital gain) was set at 3.7% annually. The prices were estimated using Heckman's two step hedonic price regressions. We took actual net rent as referential housing costs for social renters ($REUC_t^{SR}$) and defined relative user costs for social renters (RUC_t^{SR}) as follows:

$$REUC_t^{SR} = (R_t - HB_t) * 52,$$

[3] According to Gibb & Mackay (2001, p. 13) the erosion of tax relief in the 1990s, and its ultimate withdrawal, means that the flat tax relief owners receive on their mortgages will not impact on their UCC at the margin relative to the other arguments in the function.

$$RUC_t^{SR} = \frac{REUC_t}{UC_0}.$$

The mobility (move-stay) logit model has been tested on the variable showing the intention of the respondent (head of household) to move from the current dwelling.[4] The model for social renters had Nagelkerke R^2 almost 0.29 and with low *cut-off* value (see below) of 0.15 still 60.7% of predictions correct (Annex A). The satisfaction with home was the most significant factor influencing the intention to move. On the other hand, relative user costs were not statistically significant. As we were going to simulate the public costs of rent prices even substantially above the level of 1996 rents, we can expect that relative user cost may become a significant factor. Therefore we decreased the discrimination power of the logit model by decreasing its *cut off* value to 0.15.

Though relative user costs do not influence the decision on movement, the tenure choice of social renters seems to be dominantly driven by it. The correlation between relative user costs and tenure choice (where homeownership alternative bears value 1) was high (r = 0.25, N = 1,612) and significant on 0.01 level of statistical significance. Thus, we decided upon the three-step conditional tenure choice approach and following three conditions had to be fulfilled when social renters are moving to home-ownership:

- probability of movement measured by move-stay regression is 1;
- household fulfil basic criteria for mortgage loan extension (defined as price-to-income ratio lower than 3.5 and age of head of household lower than 55);
- relative user costs for social renters $RUC_t^{SR} \geq 1$.

We assumed that relative user cost is the most significant factor of tenure choice (if other two conditions are met) and the break-point has been set at level equal to 1 in which the movement from social housing in the basic stage of simulation reflected a real turnover in social housing dwellings in 1996. The movement from home-ownership to social housing was ignored due to its marginal scale.

Housing benefit costs as well as labour market costs were influenced by labour status decisions. The impact of rent increase on labour market incentives due to the specific UK housing allowance model with a relatively sharp taper has been the topic of many research studies in UK (Bradshaw & Millar 1991, Wilcox 1993a, Wilcox 1993b, Wilcox 1994, Ford & Wilcox 1994, Ford et al 1995, Kearns et al 1996, Kempson et al 1997, Wilcox & Sutherland 1997, Bingley & Walker 1998, Ford et al 1998, Pryce 1999 and others). It is not the purpose of this article to summarise all the findings but the main discussion is held whether or not the housing benefit system leads to poverty/unemployment trap. Though there are rational economic reasons that this may be the case, analysis of empirical data has shown that such hypothesis does not hold for all types of households.

[4] The complete wording of the question is as follows: "How likely is it that you will try to move from this house/flat in the future. Is it 1: very likely, 2: fairly likely, 3: fairly unlikely, 4: very unlikely?" For the logistic model, the variable on probability of movement had value 1 for the first two options while value 0 for second two options.

In other words, many unemployed/employed do not respond rationally to work (dis)incentives made by benefit system because of their high commitment to work (married or cohabiting men with children) or, on the other hand, low commitment to work (lone mothers) (Ford et al 1998, p. 45; Kempson et al 1997, p. 87). According to the qualitative studies, the unemployed generally do not make profound counting of their benefits' withdrawal but they do estimate their reservation income (reservation wage). A very common case is that reservation income is being equal to the full sum of housing costs and other necessary costs of households (food, clothing, etc.). However, as we mentioned above, making the calculation at all is far from universal.

Because there were not many other options, we followed relatively transparent way of setting "sensitivity probability" probabilities of rational real reaction to working incentives (via benefit policy) for each working and unemployed person. These "sensitivity probabilities" varied from 0 to 1 for each head of household and his/her spouse. The methodology of probability setting was based, generally, on a distribution according to the several household characteristics: sex and family status of decisive person (in some cases also his/her age), number of children and in some cases employment status of spouse/head of household too (details in Lux 2004). We assumed the ceiling probability from which person became sensitive to (dis)incentives and simultaneously will start to behave according to the result of personal cost-benefit analysis set at average probability level, i.e., 0.5.

The final computation of labour market costs (LMC_t) was as follows:

$$LMC_t = (PCUNEMPL_t - PBEMPL_t) * 52,$$

where,

$$PCUNEMPL_t = APC_t^{SHCS96} * \frac{PU_t^{SHCS96}}{TSHH^{SHCS96}} * TSHH^{Scotland},$$

where,

$$APC_t^{SHCS96} = \frac{\sum_{k=1}^{n} (IS_{unempl}^k + FC_{unempl}^k - IS_0^k - FC_0^k + TAX_0^k + NI_0^k)}{n}.$$

Note that APC_t^{SHCS96} is only computed if the following two conditions both apply:

$$IS_{unempl}^k + FC_{unempl}^k + HB_{unempl,t}^k > 0.9 * NEA_0^k,$$

$$SPROB^k > 0.5.$$

$$PBEMP_t = APB_t^{SHCS96} * \frac{PE_t^{SHCS96}}{TSHH^{SHCS96}} * TSHH^{Scotland},$$

where,

$$APB_t^{SHCS96} = \frac{\sum_{k=1}^{n} (IS_0^k + FC_0^k - IS_{empl}^k - FC_{empl}^k + TAX_{empl}^k + NI_{empl}^k)}{n}.$$

Note that APB_t^{SHCS96} is only computed if the following two conditions both apply:

$$NEA^{k}_{empl} > HB^{k}_{t} + IS^{k}_{t},$$

$$SPROB^{k} > 0.5.$$

where $PCUNEMPL_t$ are weekly public costs from movements to unemployment, $PBEMPL_t$ are weekly public benefits from movements to employment, $APC_t^{SHCS\,96}$ and $APB_t^{SHCS\,96}$ are average public cost and average public benefit from labour market, PU_t^{SHCS96} number of people leaving from employment to unemployment and PE_t^{SHCS96} number of people moving from unemployment to employment generated by *SHCS 1996*. $TSHH^{SHCS96}$ is total number of households living in social housing in *SHCS 1996*, $TSHH^{Scotland}$ total number of household living in social housing in Scotland in 1996. HB_t is housing benefit at *t*-stage of simulation. For each *k*-person there are: *IS* (*k*-household income support), *FC* (*k*-household family credit), *TAX* (*k*-personal income tax), *NI* (*k*-national insurance contributions), *NEA* (*k*-net earnings) and *SPROB* (*k*-sensitivity probability), either in their original values or values calculated for employment and/or unemployment alternatives. Potential net earnings for unemployed people were again estimated using Heckman's two step regressions.

Czech Republic

Several data sets have been used. The *Family Budget Survey 2001* was the main data source for our simulations as there was no representative house condition survey (or housing demand survey) conducted till now. The *Family Budget Surveys* (FBSs) are annual surveys of the Czech Statistical Office aimed at capturing financial and in-kind flows in the management of a selected sample of households. The total FBS 2001 sample was 3,710 households.

Using data obtained by an Institute of Sociology survey entitled *Housing Attitudes 2001*, we were able to test a logit model to assess the probability of a household moving from the rent-controlled housing sector. This quota survey gathered the information on housing satisfaction, attitudes towards housing policy and monitored past and estimated future housing careers. The total survey sample was 3,564 respondents.

The methodology of simulations is very similar to the methodology used for Scotland. The tenure choice was again based on three-stage conditional approach:

1) the movement to home-ownership is economically beneficial to the household ($RUC_t^{SR} >= 1$);
2) the household meets the solvency criteria for receiving a mortgage credit (mortgage rationing);
3) the probability of movement based on the best logit model is equal to 1. The logit model on move-stay probabilities run on the *Housing Attitudes 2001* data is presented in Annex B.[5] The Nagelkerke R^2 is equal to 0.278 and with a low *cut off* value still 63.3 of predictions correct.

[5] The question used to estimate the probability of future movement was as follows: „Would you, please, tell us, what would be your desired housing where you would like to have your home and family?" The answers: current housing, other housing.

The credit constraints were much more precisely defined than for the Scottish simulations, using several "bonity" indicators according to the criteria applied by the dominant bank in the field of mortgage lending in the Czech Republic. This is because mortgage loans are unaffordable for majority part of Czech households and credit constraints form often the main factor influencing the potential movement of households to owner-occupation.

For the purpose of relative user costs' computation we needed to estimate the prices of rent-controlled dwellings. As a rule, the market price of existing flats is usually assessed using the hedonic price function and we used it for Scottish simulations. Although this methodology is relatively precise, it requires reliable statistics, which unfortunately we did not have at our disposal for the Czech Republic. Therefore, the market prices have been estimated using the *KISEB* database of advert prices. The database on bid prices collected from dominant real-estate advert magazines in main regions and cities is operated by the Institute for Regional Information. We were only able to estimate the prices per m^2 of floor area of dwellings individually for each region (eight regions) and each size category of municipality (nine categories) in the region. In Prague the size of the flat (six categories) and the qualitative category of the flats (flats of the 1^{st} and 2^{nd} category) have also been taken into account.

When computing user costs we summed up the average mortgage interest rate in 2001 (7.3%) on 70% of property value, 5% opportunity costs on the rest of property value and depreciation rate on whole property value (1%) and we decreased the total obtained by estimated expected price appreciation. We adjusted the interest rate in user costs' computation by a tax deductibility of interests through computing the optimal tax savings (tax deductibility is used by the member of a household with the highest income). The expected price appreciation has been estimated separately for eight spatial zones created according to the past price increases: in Zone 1 we assumed zero capital gain while in Zone 8, where capital was also included, we assumed average annual price appreciation of 1.5%.

As we did not find any reliable model estimating the costs via voids from performance data (there are almost no voids recorded in 2001), we used the following assumption for simulations: today there are no voids, and empty flats will appear only when the number of vacant municipal flats exceeds the number of current market rental flats in a given region, multiplied by two. We have multiplied the number of market flats by two in order to include applicants from waiting lists.

We counted also with the fictitious revenue subsidy to municipalities amounting to the difference between the cost rent (i.e., rent covering the costs of management and maintenance) and rent price at *t*-stage of simulation. Though there is no such a subsidy in practice, the logic leading to its introduction is obvious - its absence has clear consequences on the deterioration of the housing stock and low efficiency of housing management. These distortions are, however, very difficult to measure.

In compliance with the findings of the Ministry for Regional Development, the annual cost rent in existing municipal flats has been determined as 2.8% of the dwelling market price. The revenue subsidy may be negative. The additional rental income of municipalities above the level of cost rent is thus perceived as public benefit.

The weight of rent price in the consumer basket used for the purpose of pensions and benefits' uprating is 1.975%. After deducting the weight represented by private housing this amounts to 1.174%. Therefore, a 10 per cent rent increase in municipal flats will result in a 0.117% increase in the consumer price index (CPI). According to estimates of the Research Institute of Labour and Social Affairs, a one per cent increase in the CPI results in a subsequent increase of public expenditures on pensions and benefits amounting to CZK 1.84 billion.

The setting of housing construction normative is the most difficult task when looking for a "quasi-normative" on social (controlled) rents. Although we were not sure when we put as an assumption that the optimal scale of social housing construction should be a real number of social housing starts in Scotland 1996, we can be sure that the real municipal housing construction in the Czech Republic 2001 was far from optimum. As one of the goals of this article was to compare the Czech Republic and Scotland we set the normative on needed new housing in a way that reflected a huge difference between turnover rates in the Czech municipal rent-controlled housing and Scottish social housing.

As simulated, only 3% of municipal flats would become vacant in CR 2001 and this would allow to satisfy 15.8% of applicants from waiting lists. In Scotland, the vacation of social dwellings during the zero stage of simulation (1996) would satisfy, on the other hand, 35% of households from waiting lists. If we wanted to simulate the completely similar conditions then we would have to assume that the new housing construction in the Czech Republic would have to satisfy such share of households on waiting list that is equal to the full difference between the Czech and Scottish turnover rates, plus the share of households satisfied by new social housing in Scotland.

In view of the fact that the Czech conditions are very different, we have set the normative on new municipal housing as being equal to 10% of number of households on waiting lists (13,121 flats). However, this normative ratio will not remain constant in the simulations. As the percentage of satisfied applicants increases through the allocation of vacant municipal flats, the housing construction normative will decrease. The speed of this reduction has been linked to the Scottish situation - if 35% of applicants are satisfied from the vacant municipal flats, we expect the normative to fall to 3% of the number of households on waiting lists.

The rents in new municipal dwellings set in accordance with *t*-stage of simulation would not necessarily cover all the costs and therefore capital and possibly also revenue subsidies will be required. The "cost" rent has been defined as the total of all capital costs (credit repayments assuming 100% coverage of costs from commercial mortgage credits) and other management/maintenance costs calculated as 2% of the property value. The difference between the collected rent and the "cost" rent has to be covered by public funds. We cannot assume that subsidies will be only in the form of capital grants (UK dominant subsidies) because qualified credits from the Czech State Fund for Housing Development may be preferred to grants. To differentiate between subsidies (credit and grants) we expressed the values of subsidies in their net present values.

Finally, we have developed a financial optimisation program that seeks an ideal combination of qualified credit, grant and commercial credit for new construction of

municipal flats with a given rent amount. It is assumed that the commercial credit has to cover at least one third of the total construction costs (a legal restriction on co-financing from private capital). The optimisation programme then seeks an optimal interest rate of the qualified credit to complement the commercial credit in order to achieve the minimum state expenditures. A condition that must be met is that, under the given circumstances, the simulated rent price must not be lower than the cost rent. If this cannot be achieved, only then may the grant be used. The qualified credit amount decreases and is replaced with a grant until the cost rent comes to be equal the simulated rent. If the total of the commercial credit combined with the grant on the rest of costs was still generating cost rent higher than actual rent in the particular *t*-simulation stage the revenue subsidy would assume to cover the difference.

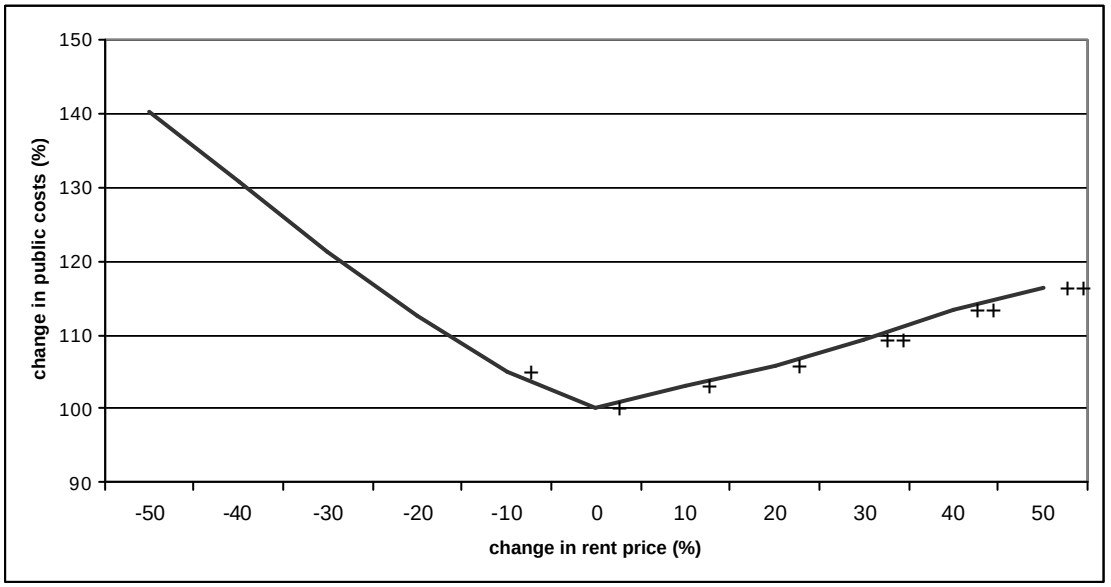
Conclusions and Discussion

Scotland

The Figure 1 shows the development of relative public cost curve for Scottish simulations. We observe that zero stage rent prices (real 1996 rent prices) were probably optimal from the point of public cost/benefit measurement and that there was not much room for neither rent increase nor rent decrease in 1996.

It is very difficult (perhaps impossible) to account for all the costs of social housing residualisation, especially to estimate the neighbourhood effect on criminality and vandalism. However, it is clear that benefit dependency is one of the main indicators. If we suppose that 60% and higher benefit dependency share may result in the additional costs following from anti-social or criminal behaviour (marked as „+“) and 70% and higher benefit dependency share may increase it even further more (marked as „++“), the space for any further rent increase seems to be really limited.

Figure 1: Relative public cost curve for alternative rent settings in Scottish social housing, 1996



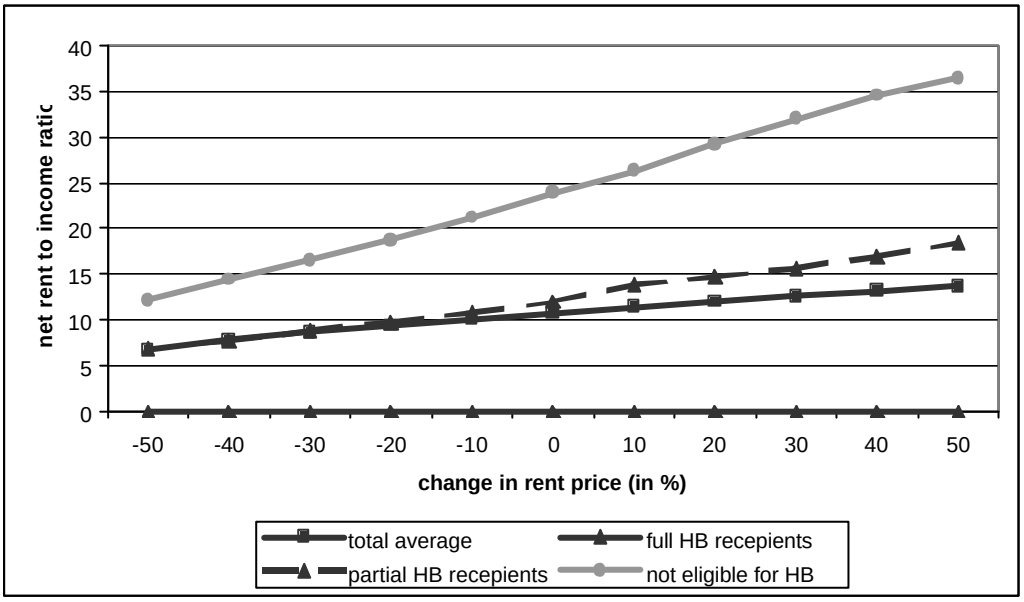
Source: own calculation

While labour market costs have only marginal influence on relative public costs, housing benefit costs, on the other hand, have not only the highest elasticity but also

very high dynamic. Naturally, high dynamic is present for HSG subsidy too. Although the public benefit from lower HSG subsidy and lower housing construction costs after 10% rent increase exceeds the housing benefit costs, the RPI costs offset the difference. Moreover, fall in HSG subsidy is limited by increase in costs via voids while increase in housing benefit costs is, though only slightly, accelerated by increase in administration costs. High level of benefit dependency, low HSG subsidy and low housing construction costs already in 1996 are main reasons why there was not much room for rent increase in Scottish social housing in 1996.[6]

The „quasi-normative" on rent price is thus equal to real 1996 average rent in social housing sector and therefore the „quasi-normative" on average housing affordability ratio (net rent to income ratio) in the Scottish social housing is equal to about 11% (Figure 2).

Figure 2: Average rent to income ratio for alternative rent settings in Scottish social housing, 1996



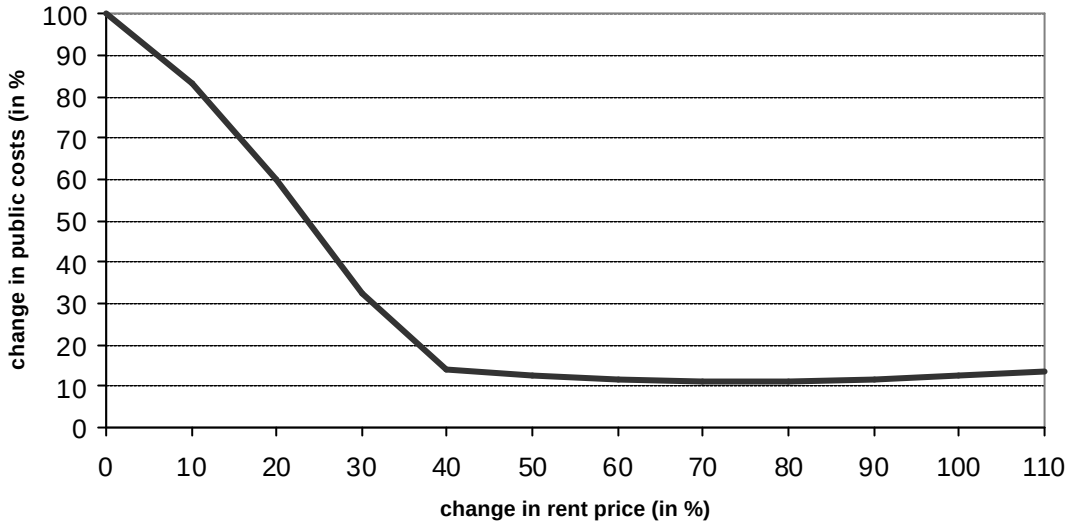
Source: own calculations, Scottish House Condition Survey 1996

Czech Republic

Figure 3 shows the shape of relative public cost curve for Czech simulations. It is clear that the space for "rational" rent increase in the Czech municipal rent controlled housing is much wider than it was in the Scottish social housing in 1996.

[6] The sensitivity analysis of the model has been pursued and the results are presented in Lux (2004). The main conclusion was that even substantial changes in entry parameters and/or assumptions used for simulations would not move optimum from zero stage of simulation, if all other relevant factors were taken into account.

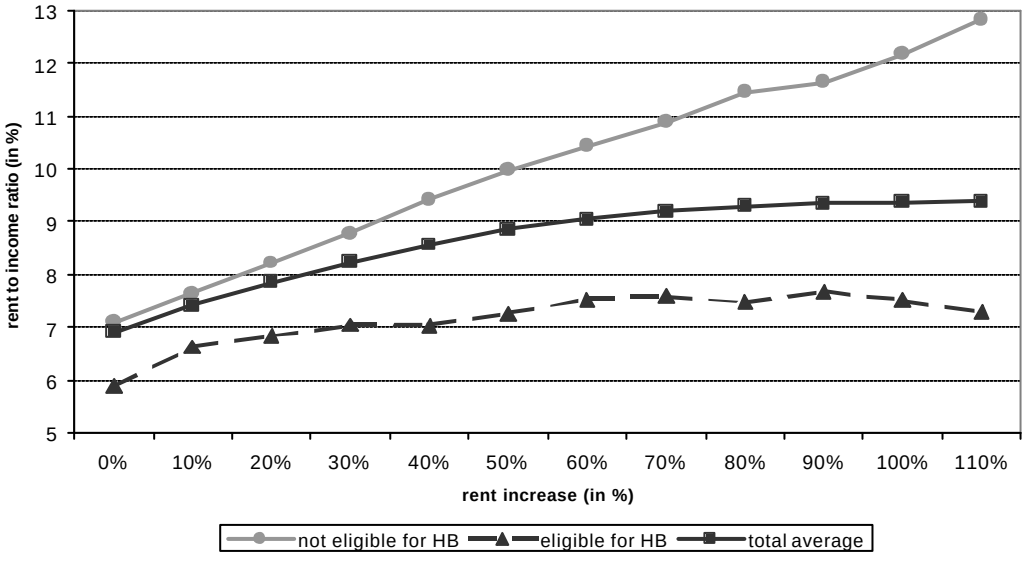
Figure 3: Relative public cost curve for alternative rent settings in Czech municipal rent-contolled housing, 2001



Source: own computations

We can see that from 70% rent increase simulation stage any further rent increase becomes counterproductive from the point of view of public expenditures because it does not result in any public savings. Figure 4 shows the development in average rent to income ratios for different simulation stages. A "quasi-normative" on average rent to income ratio in the whole sector would be, according to the results from relative public costs' analysis setting optimum at rent price equal to 1.7 multiply of current price, slightly more than 9%.

Figure 4: Average rent to income ratio for alternative rent settings in Czech municipal rent-controlled housing, 2001



Source: own computations, Family Budget Survey 2001

It is necessary to note that the model can work on disaggregate levels also, although we did not apply more detailed regional or location differentiation. The *Scottish House Condition Survey* data contains a large household sample allowing for the special simulations for regions, sometimes even separately for the biggest cities (see, for example, the Gibb & Mackay 1999 report on the Glasgow social housing need and demand study). The work on the Czech *Family Budget Survey* data is, however, more limited. Such analysis may come up with much more precise and detailed results but it assumes that all estimations (prices, rents, wages, etc.) are made separately for each selected spatial unit. The same applies for more precise work with averages. Instead of using country averages for final cost computation it would be better to use separate averages for each regional or location unit.

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ANNEX A
Logit model: Move-stay decision (social renters), Scotland

Variable	Beta
Constant	*-3.566***
Satisfied with current housing	-1.198**
Age of HOH[1]	-0.047**
Squared age of HOH[1]	0.000**
Male HOH[1]	-0.361**
Ln of permanent income	0.636**
Tenement housing	0.555**
Nagelkerke R^2	**0.288**
Predictions correct	**60.7% (cut-off 0.15)**
N	**6.806**

[1] head of household
** significant on 0.01 level of significance
Source: own computation, Scottish House Condition Survey 1996

ANNEX B
Logit model: Move-stay decision, Czech Republic

Variable	Beta
Constant	*1.510***
Size of residence 1	-0.147
Size of residence 2	-0.449*
Size of residence 3	-0.172
Size of residence 4	-0.505**
Size of residence 5	-0.414**
Size of residence 6	-0.229
Size of residence 7	-0.304
Construction time 1	1.379**
Construction time 2	0.907**
Construction time 3	0.766**
Construction time 4	0.834**
Detached housing	-1.787**
Age of respondent	-0.046**
Nagelkerke R^2	**0.278**
Predictions correct	**63.3% (cut-off 0.23)**
N	**3.336**

** significant on 0.01 level of significance; * significant on 0.05 level of significance
Note: categories of size of residence are ranked from small villages to big urban centres (Prague forms referential category); categories of construction time are ranked from oldest to youngest constructions (construction after 1990 forms referential category). Source: own computation, Housing Attitudes 2001.