Housing Allowances, Mobility and Crowded Living: The Norwegian Case

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Abstract

Housing allowances should enable economically weak households to accommodate in good qualitatively housing. Utilising a special feature of the Norwegian housing allowance system, we study how housing allowances affect the incidence of crowded living and mobility. We investigate housing market behaviour in a treatment group in a situation in which variations in housing situation feeds directly into variations in the amount of housing allowances received. This is compared it to the behaviour of a control group in a situation where variations in the housing market behaviour do not feed into variations of the amount of housing allowances received.

Our empirical analyses reveal that the probability of moving out of crowded housing conditions is 14 percent higher among housing allowance receivers whose amount of housing allowances is affected by marginal variations in the pre-allowance housing expenses, than in the control group. The findings of this paper could have implications for the way housing allowance systems is designed and revised.

Keywords: Housing allowances, Housing Choices, Affordability, Crowdedness, Housing policy

1. Introduction

Some form of housing allowances are a (central) part of the housing policy in most western countries. In almost all of these countries, the explicit ambition is that housing allowances should both improve housing conditions of vulnerable households and reduce poverty, Kemp (2007). Even though there are some studies of how housing allowances affect housing conditions of receivers, it is fair to say that the literature on this topic is sparse. This paper aims to be a contribution to the knowledge and understanding of how housing allowances affect housing market behaviour and housing conditions of receivers.

A number of studies shows that housing allowance receivers spend more on housing than otherwise similar households do. There is, however, disagreement on how to interpret this. Some argue that the higher rents paid by tenants with housing allowances demonstrate that the housing allowances receivers live in higher quality housing (e.g. Venti and Wise, 1984 and Koning and Ridder, 1997); others see the higher rents paid by receivers of housing allowances as showing that housing allowances leak out into higher rents (e.g. Kangasharju, 2010 and Fack 2006). These two different interpretations yield dramatic different policy recommendations. The problem in interpreting differences between rents of housing allowance receivers and others is due to the fact that cross-sectional variations in market rents

measures (though imperfectly) quality variations and that targeted transfers increase demand and consequently pushes market rents upwards. Hence, there are theoretic arguments to believe that housing allowances both increase the quality of housing and rents, which of these two effects that dominates can not be determined through theoretic arguments alone.

The Norwegian housing allowance system covers 70 percent of an increase of the housing expenses for some receivers, for receivers with housing expenses above a ceiling the housing allowances will not cover any part of an increase of the housing expenses.[1] The variation in the marginal prices confronting quite similar households provide us with an opportunity to study how housing allowances affect mobility and housing choices conditional on residential relocation. More specifically, we study whether variation in marginal prices feeds into differing propensities to move out of crowded housing conditions and whether there are any systematic differences in crowdedness subsequent to a move.

There are two important reasons to direct the attention towards crowdedness in an analysis of housing allowances. Crowdedness is a quality indicator that is not directly affects by housing allowances, such as e.g. rents potentially are. Secondly, reductions in the incidence of crowdedness most certainly is a step towards more decent housing conditions for vulnerable households.

Rather than deriving and estimating a full-scale model of housing choices, which incorporates housing allowances, this paper focus on one particular dimension of housing consumption, i.e. the interdependencies between residential crowding and the housing allowance system. The important contribution of the paper is that it analyses empirically effects on crowdedness that as opposed to market rents are not directly affected by the housing allowances. Important findings are that households in the treatment group have a higher propensity to move out of crowded conditions than households in the control group. Similar differences are found for destinations of movers, regardless of whether they lived under crowded conditions initially.

The study utilises a data set extracted from administrative registers. Hence, background information and information on the housing situation of all receivers of housing allowances

[1] For public tenants the housing allowances cover 80 percent of an increase of the rent up to the ceiling. In this paper we do not distinguish between marginal prices of 0.2 and 0.3.

are used in the analyses. Using register data one avoids the problems of interpreting any possible bias of results due to selective response rates in surveys. This is especially important when studying vulnerable households, Shroder (2002).

By a focus on one particular aspect of housing allowance systems (i.e. the interplay between ceilings of housing expenses and marginal prices) that differs between countries, our analyses should have an interest when designing housing allowance systems also outside Norway. E.g., our analyses clearly demonstrate the importance of the housing expense-ceilings different households face.

After the introduction in this first Section, the paper proceeds with background information on the Norwegian housing allowance system and the incidence of crowded living. Section 3 gives a selective review of the literature on housing market behaviour and housing allowances. The empirical specifications are discussed and the data used are described in Section 4. The results of the empirical analyses of the interdependencies between mobility behaviour, housing allowances and crowded living are presented in section 5, while Section 6 concludes the paper.

2. Background: The Norwegian Housing Allowance and Crowded Living

Housing allowances are determined by a gap formula; see e.g. Fallis (1990) or Gibb (1995). Based on the number of family members and family income a *reasonable housing expenses-measure* is determined – 70 percent of the difference between the *reasonable housing expenses-measure* and actual housing expenses (up to a ceiling) is covered by the housing allowances. The size of the ceiling varies geographically and with household size. As a consequence households with housing expenses below the ceiling face a marginal price of one money unit increase of the housing expenses of 0.3 (for public tenants 0.2), while the marginal price for households above the ceiling equals 1.

Another way to illustrate the combined effect of the ceiling on housing expenses and the gap formula is to compare two stylised households. One household A, who moves from a unit with housing expenses below the ceiling to another unit with expenses below the ceiling and another one B, who moves from a unit with expenses above the ceiling to another unit with expenses above the ceiling. For household A the move directly affects the amount of housing

allowances received, while for household B the amount of housing allowances is not affected at all by the move. In order to assess how the housing allowances affect housing choices we compare mobility and housing choices of households like A and B above. This is done in a multivariate frame described later on in the paper.[2]

The ceilings vary with household size and should mirror variations in the cost of decent housing between households of different sizes. The geographical variation should capture regional variation in the price level of decent or societal satisfying quality housing. A ceiling on the housing allowances intends to take away subsidies and incentives to excess housing consumption. Hence, the ceilings are an expression of the systems attempt to balance social justice and market incentives, Turner and Elsinga (2005). Owner-occupiers and public and private tenants face equally sized ceilings. It is worth noting that there does not exist any open transparent algorithm that documents how levels and variation in ceilings are determined and adjusted. Neither does there exist any available empirical analyses of the tightness of the ceilings for different types of households at different locations.

In contrast to many other countries the Norwegian housing allowance system aims to be tenure neutral, it covers public and private tenants and owner-occupiers. As most European systems, the Norwegian housing allowances are an entitlement. If the eligibility criteria are met, a household will receive an amount calculated by the gap formula, as long as they apply for it. This stands in contrast to the US Section 8 vouchers that eligible households have to queue up for, see e.g. Steele (2001) and Eriksen and Ross (2012).

Eligibility for housing allowances are determined by income and housing expenses alone. Initially the Norwegian housing allowances were targeted towards families with children and households on different types of welfare benefits (including old-age pensions). A reform in 2009 opened up the system for all low-income families. This reform increased the number of housing allowance receivers by close to 20 percent. A more comprehensive description of the Norwegian housing allowance system and how it has evolved over time, can be found in Nordvik and Åhrén (2005) and Nordvik and Sørvoll (2014). Nordvik and Sørvoll argue that

[2] Obviously, households who passes through the ceiling from above or below as a result of a move will have an average marginal price somewhere between 0.3 (or 0.2) and one. We base our empirical analyses on the marginal price around the initial housing expenses rather than on this average marginal price.

over the last 10-15 years the focus and the justification of the housing allowances have shifted from an emphasis on decent housing to the housing allowances' role in the combat of poverty.

In May 2010, about 6 percent of all households received housing allowances, on average they received a monthly sum of 2,191 NOK[3]. This corresponds to an annual budgetary cost of 3,325 millions NOKs. About 5.7 percent of all Norwegian households received housing allowances in May 2010. To put these figures in perspective: the average housing allowance covers 37.5 percent of the average housing expenses of the receivers, 19.2 percent of the median income of the receivers and 6.4 percent of the median post tax income of all Norwegian families.

We study the incidence of crowded living among Norwegian housing allowance receivers. There are different ways to define crowded living. We use the definition most common in Norway. That is: A household is considered to have a crowded housing situation if it is either living in a one-room flat or is living in a housing unit with a number of rooms (not counting kitchen and bathroom) lower than the number of members in the household. These criterion for crowdedness can seem a bit un-nuanced (i.e.by not distinguishing between children and adults). Some would also claim that they are not very strict. For our purpose this is, however, not very important. We use the established Norwegian criterion of crowdedness as a threshold in our analyses of the capacity of the housing allowance system to affect the propensity to choose away low quality housing. The important thing is that almost everyone prefer a unit above the threshold to a unit below the threshold.

A total of 11.4 percent of those who received housing allowances over the period analysed, resided in crowded housing. Using data from the Norwegian survey of the Level of Living Conditions 2007 it is estimated that 6.6 percent of all Norwegian households (i.e. both receivers and non-receivers of housing allowances) live under housing conditions that satisfy the criteria for crowded housing, see Aarland (2010). It is of course no big surprise that there is a higher incidence of crowded living among housing allowance receivers than in the general population.

[3] By the end of 2014 the value of 1 Euro was approximately 9.00 NOK.

3. Impact of Housing Allowances, Prior Studies

There is an extensive literature that describes housing allowance systems and/or presents descriptions of the receivers of housing allowances and different aspects of its use, e.g. Kemp (2007), Hills (2001), Steele (2001), Whitehead et al. (2005) and Norris et al. (2008). These studies are valuable, informs the scholarly debate of housing allowances and some of them have also played an important role in the development of housing allowance systems. Somewhat in the same strand of literature we can also count Gibb (1995) and Fallis (1990), both of them contributed to the way we describe housing allowance systems.

The amount of studies that more explicitly address and test empirical propositions of how the housing allowances actually affects housing market behaviour and the post-allowance income distribution, are sparser. The relative scarcity of studies addressing distribution empirically is surprising, Koning and Ridder (1997) noted that '*Although there is little discussion of the goals of the RA (*Rent assistance*) program, it seems that recently the merit good argument has lost ground to distributional considerations.* p.2'. Some studies on distributional matters are found, e.g. Gibbs and Kemp (1993) and Nordvik (2012). Neither of these account for the effect housing allowances may have on pre-allowance incomes, Bergh (2005).

Even though the prime interest of Koning and Ridder (1997) lies in estimation of parameters capturing relative preferences for housing and other consumption, they calculate the equivalent variation of the transfers in the Dutch housing allowance system. They find that the same distributional effect that the housing allowances yield could have been achieved with targeted money transfers at a cost of 50 percent of the cost of the housing allowance program. Murray (1994) describes the mechanism behind this in the article with the self-containing title *On the inefficiency of multiple in-kind transfers*. One might argue that this type of argument somehow misses the target as most housing allowance systems intend explicitly to 'distort' housing choices, e.g. because of external effects, intra-household distributional concerns or purely paternalistic arguments, Nordvik and Sørvoll (2014). On the other hand: The type of arguments put forward by Koning and Ridder (1997) and Murray (1994) should be part of a political economy debate on the design of housing allowances and the purpose of the systems.

The housing allowance experiment in the US in the late 1970's sparked of a first wave of studies of how a housing allowance system affects housing consumption of the recipients. Venti and Wise (1984) estimated a simultaneous model of rental demand and mobility. The

estimates were used as a base for simulations of the effects of two hypothetical support schemes: A lump-sum transfer to all eligible households and a scheme where a transfer covered a share of the gap between an upper limit and 25 percent of the household income. This gap formula applied only to those who consumed a minimum level of rental housing. Around 2-7 percent of an unconstrained lump-sum transfer was found to be used to increase consumption of rental housing; this was due to the combination of substantial mobility costs and quite low estimated income elasticities. Under the combined gap/minimum rent scheme 8-68 percent of the housing allowance fed into increased housing consumption. Note that the wide interval for the simulated effects was caused by variations in the parameters of the hypothetical housing allowance schemes. These simulation results had a strong resemblance to actual data for households who were actually exposed to similar schemes.

Koning and Ridder (1997) note that the Dutch housing allowance system yields a kinked budget line, and describe the housing choices of eligible households as a kind of global utility maximisation where the local optima at each of the linear segments of the kinked budget curve is compared. The estimated system is used to calculate an answer to the hypothetical question: How would housing market choices of the receivers have been if the housing allowances system had been abolished. They find that on average, each money unit of HA increases housing consumption by 73 percent and conclude that: *If the sole purpose of the HA program is to increase housing consumption, it appears to be rather successful* (p.29).

Hence, the results of both Venti and Wise (1984) and Koning and Ridder (1997) indicate that housing allowances have a quite strong effect on equilibrium choices. In both these articles, housing consumption is measured by the rent. Others like e.g. Kangasharju (2010) have also found that housing allowance receivers pays higher rents than otherwise similar households do, but interpret this as a subsidy leakage; a one Euro increase of the housing allowances increase total rents by 0.6-0.7 Euros. This result prevails even when controlling for characteristics of the rented units. Fack (2006) finds results of a similar magnitude for France. The results of Koning and Ridder (1997) and both Kangasharju (2010) and Fack (2006) are quite similar, but the interpretations differ markedly.

One of the few papers that explicitly link crowded living and housing allowances is Enström Öst (2012). She studies a reform in the Swedish housing allowances that was implemented in 1997. Prior to 1997, the Swedish system resembled the Norwegian system with a gap-like

formula and a ceiling on the housing expenses. In 1997, a spaciousness constraint was added. Floor space above a certain threshold was not eligible for housing allowances. As compared to the former system this raised the marginal price for households with housing expenses above the spaciousness constraint and below the ceiling on housing expenses.

Using a difference-in-difference strategy Enström Öst (2012) analyses how the propensity to move into crowded housing was affected by the 1997-reform. She finds a clear and consistent positive effect. The magnitude of the estimated effect differs somewhat with variations of specifications but lies, in average, in the range of a 15-20 percent increased risk of crowded living for those who were hit by the reform. Hence, the analysis of the effect of the Swedish reform reveals a both substantial and statistical significant effect of the housing allowances on housing consumption.

The question of how housing allowances feed into market rents is directly addressed by Susin (2002). Using a cross-section of Census tracts in the 90 biggest metropolitan areas in the US he finds that the rent increases in the lower segments of the rental housing market dominate the effect of housing allowances. Susin (2002) argues that this is due to the combination of an inability of the HA-system to lift households into the middle segment of the housing market and a very low elasticity of supply in the lowest segment of the rental market.

This brief overview of central literature on housing allowances form a background for formulation of two hypotheses the will be tested in the remainder of the paper. Both of them can be seen as derived from a more general hypothesis that adjusting housing consumption upwards is more likely when the housing allowance system carries part of the cost of increased housing expenses.

H1: The probability that a household is relocating is higher when the housing allowances carries part of an increase in the housing expenses.

H2: Conditional upon relocation, the probability of moving into crowded housing is lower when the housing allowance system carries part of an increase of the housing expenses.

Hence, the paper follows Venti and Wise (1984) (and also Hanuchek and Quigley, 1978) in combining a focus on mobility and consumption in the analysis of housing allowances.

4. Data and Empirical specifications

This paper does not rely on any fully specified theoretical model of housing market choices. Rather it leans on previous literature, specifies some hypotheses, and test them in a suitable multivariate frame. Two questions were crucial for our specification of a suitable multivariate frame for the tests of the hypotheses. Firstly, choice of functional form, and secondly how to account for the fact that the propensity to live under crowded conditions before and after a move can be correlated – even when controlling for covariates, e.g. due to omitted variables.

The models we estimate intend to capture determinants of two categorical phenomena. Either a household moves or not and either it is living under crowded housing conditions or it is not. Hence, it seems natural to use some discrete regression model – a variety of a probit/logit-model. However, as Mood (2010) has demonstrated: In the presence of omitted variables, estimation of non-linear models, such as e.g. the probit, will yield coefficient estimates biased towards zero. Assuming that there 'always' are some omitted variables, the probit/logit approach have some clear disadvantages.

An alternative to non-linear probability models is the linear probability model (LPM). As is well known such an approach also do have serious problems, e.g. heteroscedasticity and meaningless predictions (Maddala, 1983). Hence, the choice is between two alternatives each with their own problems and weaknesses. Balancing these problems up against each other a probit-approach is chosen. Two arguments tipped the choice in this direction. The somewhat forward-tilted S-shape of the interdependency between covariates and probabilities imposed by the probit-specification seems far more plausible than the constant linear effect imposed by the LPM model. Secondly, as Mood (2010) showed, the bias of the estimates in the probit model can be strongly reduced by calculating average marginal effects over the sample.

Hence, the paper uses a probit as a frame for the tests, as in equation (1).

(1) $$P(Move) = F(x\beta + \alpha_2 K_2 + \alpha_3 K_3 + \alpha_4 K_4)$$

Where K_i is a set of dummy indicators, combining initial crowdedness/non-crowdedness and a high (=1) or low (=0.2 or 0.3) marginal price.

- K_1 identifies households in non-crowded housing with housing expenses below the ceiling.
- K_2 identifies households in non-crowded housing with housing expenses above the ceiling.
- K_3 identifies households in crowded housing with housing expenses over the ceiling.
- K_4 identifies households in crowded housing with housing expenses below the ceiling.

In the estimations K_1 is omitted, i.e. the coefficients of the other K's is measured relative to the coefficient of K_1. α_i (i=2,3,4) are coefficients to be estimated. The α's are the coefficients we primarily is interested in. x is a set of controls, table 2 describe the controls that are used.

When the determinants of the probability of moving out of crowdedness is estimated we account for the correlation between the initial situation and the housing situation subsequent to a move, by employing a probit version of the selection model of Heckman. Hence, we control for non-random selection into the two possible initial states: crowdedness and non-crowdedness.

Our analyses utilise a complete sample of housing allowance receivers over the period from August 2009 up to May 2010. The data are extracted from the administrative register used by the Norwegian State Housing Bank in their operation of the housing allowance system. In the analysis of mobility, we use only observations of households observed both in August 2009 and in May 2010. Furthermore, we assume that long-distance mobility is not related to housing allowances. For this reason, we do not use observations on households that has moved between municipalities[4]. Descriptive statistics are given in table 1, where the variables used in the analyses are presented by their mean and standard deviation.

[4] Admittedly some local housing markets cross municipal borders. By omitting all moves between municipals we get rid of all long-distance moves, but we miss some observations of within local-housing-market moves.

Table 1 – Descriptive statistics

	Mean	Standard deviation
Moved	0.068	0.253
Over ceiling – Marginal price=1	0.435	0.496
Crowded – August 2009	0.114	0.318
Crowded – May 2010	0.114	0.318
Couple	0.085	0,279
Number of children	0.421	0.956
Age Household head	52.61	21.06
Log Income	10.999	2.857
Growth number of children	0.013	0.136
Reduction number of children	0.178	0.146
Growth number of adults	0.0171	0.133
Reduction number of adults	0.006	0.079
Public rental	0.445	0.497
Private rental	0.296	0.457
N=	93 166	

A quick glimpse on the descriptive statistics reveals that singles without any children dominate the data set we analyse and that there is a high incidence of relatively elderly people.

5. Empirical results

As described above we test how the propensity to relocate is affected by the interplay between a crowded housing situation and the marginal price of housing consumption a household face. This is done within a probit framework. In the table, marginal effects averaged over all 93 154 observations are reported. Marginal effects are chosen over estimated or exponentiated coefficients (Odds ratios) because they have a more intuitive interpretation. Averaged marginal effects are chosen in order to minimise the (downward) bias, see Mood (2010).

Table 2 – The propensity to move, average marginal effects

	Marginal Effects	SE, Delta
Not crowded, below ceiling, K_1	0	
Not crowded, over ceiling, K_2	**- 0.005**	0.002
Crowded, over ceiling, K_3	**0.012**	0.004
Crowded, below the ceiling, K_4	**0.020**	0.003
Couple	**- 0.014**	0.003
Single	0	
Number of children	**0.003**	0.001
Age Household head	**-0.002**	0.0002
Age squared/100	**0.001**	0.0002
Log Income	**- 0.002**	0.0002
Growth number of children	**0.086**	0.004
Reduction number of children	**0.021**	0.005
Growth number of adults	**0.028**	0.005
Reduction number of adults	**0.101**	0.007
Public rental	**0.022**	0.002
Private rental	**0.058**	0.002
Owner-occupiers	0	
N=	93 154	
LR Chi-sq (12)	3 693.36	
Pseudo R^2	0.089	

Average marginal effects significantly different from zero at a 5%-level in bold

Before turning to the variables of prime interest (i.e. the K's) we just observe some interesting structures of our estimated coefficients of the control variables. Couples have lower moving propensities than singles. This is consistent with the claim of Kan (1999) that moving costs equal the sum of moving costs within a family. Renters, especially private sector tenants moves more frequently than owner-occupiers do. It is also interesting to note that there are strong and asymmetric effects of changes in family composition. Furthermore, the moving probability falls, at a decreasing rate, with increasing age. Hence, the estimated model adheres quite well to previous research, theoretical expectations and to common sense.

The estimated model fits data quite well. Several indicators confirm this: i) all estimated coefficients are significantly different from zero at a level of significance far below 0.05, with sensible signs, ii) the value of the test statistic LR Chi-sq is most certainly satisfying, iii) the model discriminates well between movers and stayers, for an illustration see the table below.

Table 3 – Predicted moving probabilities, estimated probit

	All	Movers	Non-movers
Mean	0.058	0.112	0.055
SD	0.056	0.117	0.048
10-perc	0.016	0.026	0.016
25-perc	0.023	0.049	0.023
Median	0.044	0.082	0.042
75-perc	0.074	0.126	0.071
90-perc	0.117	0.205	0.113
N=	93 154	5 438	87 716

Moving rates are not very high over the relatively short time-span analysed here. This is reflected in the low levels of the predicted moving probabilities in the sample studied. Still, the average predicted moving probability among those actually moving is twice as high as for those who did not move.

The prime purpose of the empirical model is that it should facilitate tests of our hypotheses of the interdependencies between crowded housing conditions, the marginal prices of housing allowance receivers face and mobility behaviour. This is captured by the set of dummies K_1-K_4 (K_1 is omitted from the model in order to ensure identification)[5]. The dummies are indicators of which out of four mutually exclusive categories a household belongs to.

The omitted category is households who live non-crowded and who has housing expenses below the ceiling, i.e. who faces a low marginal price of housing consumption variations. This is a kind of baseline. The other three categories are different combinations of over and below the ceiling and crowdedness and not crowdedness. The (averaged) marginal effects of the other three dummies measure the difference of the moving probability of the corresponding ceiling-crowdedness combination, as compared to the baseline.

Those who have housing expenses above the ceiling and did not live under crowded circumstances had a moving probability 0.5 percentage points below the baseline. Not a very large difference, but still statistically different from zero. It is reasonable to interpret this as a kind of pure effect of a full marginal price as opposed to a low.

[5] Using this specification one avoids the problems of interpreting interaction terms in a non-linear model, Norton et al. (2004).

Living under crowded housing conditions and facing a marginal price of 1, increases the moving probability with 1.2 percentage points. Neither this seems like a very strong increase. However, if this is related to the average moving probability in the sample of 5.8 percent one notes that an increase of 1.2 percentage points equals an increase of the moving probability of 20.6 percent.

Out of the four crowdedness/marginal price combinations, we find the strongest effect for those who live under crowded conditions and have the low marginal price. This is in line with our prior expectations. As compared to the baseline, the averaged marginal effect is estimated to 2.0 percentage points – or a predicted increase in the moving probability of as much as 35.0 percent. By comparing the predicted effect of living under crowded housing conditions we see that the effect for those who face the low marginal price is 0.8 percentage points higher than for those who face a the higher marginal price. Relative to the baseline moving probability this corresponds to a 14.3 percent higher moving probability. As both these effects are estimates with uncertainty, a test of equality of the parameters were conducted. The result of the test confirmed that the difference is significantly different from zero at a 5 percent level.

In short, the empirical model reported in table 2 fails to reject hypothesis H1. The moving probabilities are higher for those facing a low marginal price of housing. I.e. for households where the housing allowances carry part of an increase in the housing expenses.

The propensity to move into crowdedness – recent movers initially in crowded housing

The analysis above establishes that the Norwegian housing allowances provide quite strong incentives for some of the receivers (i.e. those with housing expenses below the ceiling) to move out of crowded housing conditions. Moreover, these incentives do actually have an effect on the mobility behaviour of the receivers. However, around one out of two (50.8 percent) who move out of a crowded housing situation also move into crowdedness; it remains to see which of them that move into non-crowded housing conditions. This is investigated using the Heckman-probit described above. We follow the quite frequent practise of estimating the model on a sample of recent movers. This leaves us with a sample of 6 369 observations, out of which 1 193 where living under crowded conditions prior to the move.

First, we use the sample of recent movers who initially lived in crowded housing and estimate the equation that describes the interdependency of moving into a crowded situation and a set of covariates. Using the Heckman selection-probit one takes account of the fact that households are not randomly allocated to crowded conditions initially.

The model estimation yields a Wald statistic for the full model of 80.5; with 9 degrees of freedom, this is clearly significant different from zero. Furthermore, the estimation results reveal that the correlation between the error terms in the main model and the selection equation is significantly different from zero. Hence, failure to take account of this would have given biased estimates of the coefficients of interest[6]. Here again we focus on the averaged marginal effects that are easier to interpret.

Table 4 – Probability of moving into crowded housing conditions, recent movers initially in crowded housing, Average marginal effects

	Marginal Effects	SE, Delta
Over ceiling	**0.066**	0.026
Couple	0.072	0.041
Age Household head	0.002	0.004
Age squared/100	0.0001	0.002
Log Income	0.005	0.002
Growth number of children	**0.136**	0.035
Reduction number of children	**- 0.111**	0.030
Growth number of adults	0.085	0.047
Reduction number of adults	**- 0.198**	0.053
N=	6 369	
N Uncensored	1 193	
Wald	**80.50**	
LR independent equations	**28.15**	

Average marginal effects significantly different from zero at a 5%-level in bold

The model fits data well, and averaged estimated marginal effects are largely in line with a priori expectations. We do, however, note that quite a few of the estimated (averaged) marginal effects are not significantly different from zero. This stands in contrast to the results from the estimation of the model of mobility. This is a natural consequence of the fact that the model of the propensity to move into crowdedness is estimated on a far smaller sample than

[6] Note that while the marginal effect of facing a high marginal price in a model which did not take account of the correlation of the mechanism that generates crowded living subsequent to a move and the selection into crowdedness prior to a move is as high as 14.1 percentage points, while the estimate from our selection model is 'only' 6.6 percentage points.

the moving model reported above. It also relates to the fact that housing is a complex multi-dimensional good. Even though crowdedness is an important dimension of housing, there is a trade-off between crowdedness and other qualities of housing.

The estimated models ability to discriminate is also fairly good. Among those that the model treats as being at risk of crowdedness in May 2010 (i.e. those in crowded housing in August 2009 and has moved house since then) 50.9 percent moved into crowded housing conditions. When we split the at-risk-group according the May 2010-outcome on the crowdedness-variable we see that the mean predicted crowdedness probability among those who actually experienced crowdedness were 60.2 percent while for those who factually moved out of crowdedness the corresponding average predicted probability is 41.4 percent – a not very impressive but still a fairly good discrimination.

Table 4 shows that the empirical model that work as a frame for the tests of our hypotheses also includes controls for changes in the number of both children and adults. The same holds true also for the analysis reported in table 5 below. Hence, when we report estimated differences in the propensity to move into crowded housing between households above and below the ceiling, we report differences controlled for changes in family composition.

As table 4 reveals, those who have a marginal price for changes in the housing expenses of unity have a probability of moving over to another crowded housing situation that is 6.6 percentage points higher than that of the households who face a low marginal price. Starting from a probability equal to the baseline this implies that while those under the ceiling had a probability of moving into crowdedness of 50.9 percent, the probability of those above the ceiling is 57.5 percent. In other words: facing a marginal price of one, rather than 0.3 (or 0.2) increases the probability of crowded living subsequent to a move of about 13 percent. Hence, the estimates here demonstrate that the Norwegian housing allowance, by tilting marginal prices downwards, has an ability to enable and encourage households to increase the quality of their housing consumption, e.g. by relocating from crowded to non-crowded housing.

The propensity to move into crowded housing – recent movers initially in non-crowded housing

Then we turn to the choices of recent movers who prior to the move lived under non-crowded housing conditions. Also this question will be analysed using a selection probit of the

Heckman-type that account for non-random selection into the initial state non-crowdedness. Again, we report average marginal effects rather than estimated coefficients.

Table 5 - Probability of moving into crowded housing conditions, recent movers initially not in crowded housing, Average marginal effects

	Marginal Effects	SE, Delta
Over ceiling	**0.018**	0.007
Couple	**0.030**	0.012
Age Household head	**- 0.005**	0.001
Age squared/100	**0.004**	0.001
Log Income	**- 0.004**	0.001
Growth number of children	**0.073**	0.006
Reduction number of children	- 0.012	0.014
Growth number of adults	**0.062**	0.011
Reduction number of adults	**- 0.068**	0.022
N=	6 369	
N Uncensored	5 176	
Wald	**260.18**	
LR independent equations	**44.09**	

Average marginal effects significantly different from zero at a 5%-level in bold

Both the tests of the full model fit (the Wald) and the test of the desirability of using a statistical framework that takes account of non-random selection into initial state (LR independent equations) has clearly satisfying and significant values. This together with a large number of significant and sensible signed, coefficients contributes to a trust that the statistical model is appropriate.

Before interpreting the estimated marginal effects, it is useful to note that among housing allowance receivers who moved between August 2009 and May 2010 and did not initially live in a crowded situation, 9.9 percent moved into crowded housing conditions. As already remarked; housing is a complex good and there is a trade-off between crowdedness and other characteristics. Among housing allowance receivers we find a number in a vulnerable situation, some of them may for different reasons experience situations where they are forced to move. In part, our estimation results capture destinations for such forced movers.

The estimated marginal effect of having to pay the full price of improvements of the housing conditions rather than the subsidised price scheme that housing allowance receivers with expenses below the ceiling are granted, are measured by the *Over Ceiling*-line in the table

above. The marginal effect on the propensity to move into crowded conditions measured in percentage points is with 1.8 percentage points, far lower for housing allowance receivers who initially were living non-crowded than what we found those who initiated in crowded conditions – but still significantly larger than zero.

When interpreting the marginal effect measured in percentage points one should bear in mind that the baseline probability for a crowded destination among those initiating a move from a non-crowded situation is also far lower than for those initiating their move from a crowded situation. If we start from the average share in this particular group 9.9 percent and compare those over and under the ceiling around this point we see that those above the ceiling have an estimated probability of moving into crowded housing of 11.7 percentage points. This small difference of 1.8 percentage points amounts to a not insignificant difference of 18.2 percent. As long as housing expenses are below the ceiling the housing allowance has a capacity to induce households to choose higher quality housing consumption, than they otherwise would have done – also for those who initially is not living under crowded housing conditions.

The empirical analyses of the propensity to move into crowded housing fails to reject hypotheses H2. Both movers starting out in crowded and in non-crowded housing conditions have a smaller probability to move into crowded housing when the housing allowances cover part of the variation in housing expenses.

6. Concluding remarks

Our analyses have demonstrated that both mobility and the propensity to move into crowded housing is affected significantly by the design of the housing allowance scheme – significantly both in a statistical and a substantial sense. This was demonstrated within a multivariate framework where we tested for differences in moving probabilities and destinations between households for whom the housing allowance system generates a subsidised (tilted) marginal price of housing and those who face the full price.

At one level, one could say that the empirical results of the paper hardly are very surprising. We would still claim that they are important and that they add to the knowledge on housing allowances and their effects. There is at a theoretical level, uncertainty of how strong de facto incentives housing allowances provide. Some claim that housing allowances typically are

designed in a not very transparent way that reduces the strength of the incentives, e.g. Lindbom (2010). Furthermore, housing allowance schemes are reformed and changed and there is a danger that household reacting to short-term incentives may feel a risk of exposing themselves to future moving costs.

One advantage of our approach where we study the incidence of crowded living when analysing how housing allowances affect housing conditions rather than as often is done: measuring housing consumption with the rents, is that we avoid the problem of separating the effect on housing consumption from the effect on rent levels in general. Hence, our estimations lend support to Venti and Wise (1984) and Koning and Ridder (1997) who concluded that housing allowances improve the housing conditions of receivers. This stands in contrast to Kangasharju (2010) and Fack (2006) who interpreted similar results as indications of subsidy leackage. Obviously, one cannot give any conclusive answer to a question of whether housing allowances increase rents or whether it increases quality. It affects both of them and the balance of the effects is determined by income and supply elasticities, in the short and the long run.

The analyses presented in this paper could, together with the fact that more than four out of ten housing allowance recipients have housing expenses above the ceiling, form a basis for a rethinking of parts of the design of the housing allowance system. For households in this situation the power of the housing allowances as incentives for improved housing conditions are fairly weak. If one regards increased housing consumption as important for the housing policy one should think over whether the ceilings should be lifted or whether one should do anything about the relative levels of the ceilings. Somewhat along the same lines; maybe one should consider a more smooth and gradual increase of the marginal price than the prevailing structure where the marginal price jumps from 30 percent to 100 percent as one passes the ceiling. To put it more general: Not only the amount of resources put into a housing allowance system matters for the output, the structure and parameters of the systems are crucial for the outcomes.

Future research on housing allowances should address the characteristics of the systems such as the marginal price and ceilings. Pursuing these topics could enable researchers to provide constructive advice to policy makers on design and revision of housing allowance systems. Furthermore we have obtained our results by comparing the housing market behaviour of

housing allowance receivers whose amount of housing allowances received are independent of their housing market behaviour (those with housing expenses above the ceiling) to a group whose size of the housing allowances are depending of their choices (those with housing expenses below the ceiling). Obviously, the research should in the future also be extended by comparing the housing market of receivers and non-receivers of housing allowances.

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