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HOUSING
ALLOWANCE
AND THE RENT
OF LOW-INCOME
HOUSEHOLDS

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Tiivistelmä: Tutkimuksessa analysoidaan yleisen asumistuen vaikutuksia tukea saavien kotitalouksien vuokraan. Aineistona käytetään tulonjakotilastosta poimitua noin 12 000 kotitalouden otosta vuosilta 1994–2003. Vaikutus arvioidaan hyödyntämällä vuoden 2002 tukijärjestelmän uudistusta, jossa tuensaajien tuki nousi, mutta tuensaajien joukkoa ei muutettu. Tuki nousi uudistuksessa keskimäärin 12 prosenttia. Tuen lisäys ei ollut tasainen, vaan vaihteli 0–38 prosenttiin riippuen asunnon sijainnista, koosta ja iästä. Tulosten mukaan jokainen uudistuksen lisäämä euro tukea nosti tuensaajien vuokria yksityisellä sektorilla 60–70 senttiä. Uudistuksella ei havaittu vaikutusta kuntien vuokra-asunnoissa asuvien tuensaajien vuokriin, koska kuntien vuokrataso määräytyy vuokra-asuntojen kustannustason ja vuokra-asuntojen välisen kustannusten tasausten perusteella.

Asiasanat: Asumistuki, vuokra-asuminen, asumisen kustannukset

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Abstract: This paper analyses the effect of a housing allowance programme on the rent paid by assisted low-income households. The data consist of some 12,000 rental households in the free market and municipal sectors during 1994–2003. The effect of the scheme is estimated using the programme reform of 2002 as an instrument. The reform increased the allowance of the already assisted households to various degrees depending on the location, size and age of housing, but had little effect on the eligibility for allowance. Results suggest that in the private sector an additional one euro of allowance increases the rent of claimants by 60–70 cents. The effect is zero in the municipal sector, due to the way rents are set.

Key words: Housing allowance, Rental housing, Price of housing
JEL: H24, R21

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1 Introduction

Housing benefits constitute a major part of the social support for low-income people throughout the developed world. Direct housing allowances to low-income tenants are typically favoured over the construction of subsidised housing blocks due to social problems in subsidised neighbourhoods. According to the EUROMOD reports, many European countries, such as the United Kingdom, Scandinavian countries and the Netherlands, pay comparable amounts of direct housing allowance (Bargain and Terraz, 2001; De Vos, 2001; Ekling and Karlsson, 2001; Hansen, 2001; Sutherland, 2001). Due to the large scale and generosity of programmes in many countries, their appropriate performance is of importance for the efficient use of public funds.

In Finland, the level of housing benefits and the programme rules are highly typical of European countries (Social Insurance Institution, 2006; Viitamäki, 2001). Therefore, an evaluation of the Finnish programmes can be informative to an international audience. The present paper focuses on the general housing allowance programme, which is the largest one and delivers allowance directly to eligible working-age low-income tenants. The purpose of the programme is to support adequate housing consumption for assisted households by reducing the effective price (rent) of the occupied dwelling faced by the assisted household and thus leaving more resources for other consumption.¹ Alternatively, assisted households may choose a higher housing consumption in the form of larger or higher quality housing rather than increasing the resources available for other consumption. Both alternatives are included as objectives of the housing allowance programme.

However, if the programme raises the price of occupied housing (*ceteris paribus*) relative to that in the absence of the programme, the resources of the government are misused.² In such a case, the price is higher because landlords charge higher rent from claimants than non-claimants. Then, the allowance does not lower the housing expenditure of assisted households in full (or at all), which leaves less or even no extra resources for other consumption. If there is a strong demand for rental housing, landlords may charge a higher rent from assisted households to cover the higher risk that assisted households would more often than others damage the property or have difficulties in paying the rent. Strong demand forces

¹ Analysis of students' or pensioners' housing allowance programmes is left out, as is that of indirect allowance that comprises public housing and allowance to housing construction.

² The programme hardly lowers the price of housing, as it is such a basic good that increased resources definitely raise the consumption of housing services (quantity and quality), even among the poorest households.

assisted households to accept a higher offer, as there is always demand for rental housing, even among non-assisted households.

This creates an allowance premium or two separate rental prices in the market: one price for assisted and another for non-assisted households. The two-price scenario would require knowledge of landlords as to whether a tenant receives the housing allowance. This is indeed the case. According to the register data on the Housing Allowance programme compiled by the Social Insurance Institution, in November 2006, for example, the programme operator paid the monthly allowance of 53 per cent of assisted households directly to the private or public landlord. The two-price scenario would also require a strong demand, which shows up well in the rising prices of rental housing from the mid-1990s up to the present.

The recent literature reveals a positive effect of housing allowance programmes on rental housing prices. For example, Fack (2006) and Laferrere and Blanc (2004) reported that housing allowance increased the rental prices in France, and Gibbons and Manning (2006) found that in the UK a reduction in the maximum payable housing subsidy reduced the level of housing subsidy and rents paid without effects on housing consumption. The present paper asks a slightly different question and evaluates whether an allowance programme affects the rents of assisted households relative to those of non-assisted ones. The possible and likely effect of a housing allowance programme on the general price level of rental housing is ruled out of the scope of the present paper.³ For the purposes of this paper, it does not matter whether the allowance programme also affects the rental housing prices of non-assisted households, since the identification strategy aims at detecting possible rental differences between assisted and non-assisted households. What is estimated here is the effect of the programme on assisted households relative to the situation had they not received allowance.

In the Finnish case, the programme may only raise the rents of assisted households in private sector rental housing. There should be no effect on public hous-

³ For example, Galster et al. (1999) observed that rental housing allowance raised rental prices in Baltimore, USA, while Susin (2002) found that those US states giving more housing allowance than others experienced a higher increase in rents. Berger et al. (2000) reported that interest allowance for house buyers increased housing prices in Sweden. There have also been numerous recent studies on the effects of housing benefits on supply and demand. For example, Blanc and Laferrere (2002) and Sinai and Waldfoegel (2002) observed, that public housing and subsidized housing construction increased the housing consumption of low-income families. The rise in consumption resulted from a combination of increases in both demand and prices. Wood and Watson (2001) reported that tax allowances have increased the housing supply in Australia. In contrast, Malpezzi and Vandell (2002) observed no supply effect of tax allowances in the USA. DiPasquale (1999) reviewed the literature on the effects of public housing allowance on housing supply. Neither effects on rental prices in general nor those on demand and supply are considered in the present study.

ing, which is mainly owned by municipalities,⁴ since in municipalities the rental price level is determined by the construction and maintenance costs of the rental building in question or by the average of the costs for all rental buildings in the municipality.⁵ This makes it difficult to rapidly adjust municipal rental prices in response to changes in programme rules. In order to check the robustness of the findings in the free market sector, the analysis is also carried out in the municipal sector. In the longer term, municipalities may also create two prices if assisted households are located in more expensive rental buildings and the costs are not shared between buildings. However, the identification strategy of the present paper focuses on the short-term reactions.

The data comprise a sample of some 12,000 Finnish households living in the free market or municipal sector between 1994 and 2003. In the main part of analysis the allowance effect is estimated using the years 2000–2003, which encompass the reform of the housing allowance programme that took place in 2002. The reform increased the upper limits of rent per square metre that were acceptable for allowance. Since eligibility hardly changed, the rise in the rent ceilings increased the amount of allowance received by assisted households without affecting the pool of non-eligible households living in similar housing.

The change in highest acceptable rental prices did not depend on the characteristics of the households, but on certain characteristics of housing units. This facilitates a comparison within assisted households facing different changes in the rent ceilings and between assisted and non-assisted households in housing units facing the same limit increase. The estimation proceeds in several steps. First, difference-in-differences estimates indicate how much the rent changed due to the reform among assisted families compared with non-assisted families. Since the effect of the reform on the amount of allowance depended on the housing characteristics and not the characteristics of the households, similar assisted households were treated differently in the reform. A second set of estimates indicate how much the rents of assisted households increased due to differing increases in the amount of allowance. Finally, a similar approach shows how much rents changed following the reform among assisted families living in a certain type of housing compared to non-assisted families who were living in housing where the limit would have changed exactly as much had they received allowance.

⁴ From the population of rental tenants, 49% live in free-market housing, 42% in public housing owned by municipalities and the final 9% in other types of housing, the construction of which is partially subsidized by the government (Ministry of the Environment, 2002).

⁵ For example, in 2004 one-fifth of municipalities equalised the rent among all their rental housing, whereas another 30 per cent of municipalities equalised only some of the rents or those among a proportion of municipal housing (Hiltunen & Mynttinen 2005). The remaining municipalities did not carry out any cost sharing among rental housing.

The results indicate that one additional euro of housing allowance leads to an increase of 60–70 cents in the rent paid by claimants, leaving 40–30 cents available to reduce their net rent and increase their consumption. In contrast, the effect is zero in the municipal sector, due to the way rents are set and since in the short term tenants and municipalities do not have time for relocation. The remainder of the paper is organized as follows. Section 2 describes the housing allowance programme, Section 3 discusses the theory and method of analysis, Section 4 describes the data set, Section 5 provides the results, and finally Section 6 concludes.

2 The scheme

The housing allowance programme for low-income households is funded from the government budget. Housing allowance is paid to households on the basis of their housing expenditure, which includes the monthly rent, water and heating costs. Not all expenditure is accepted, but there is a ceiling for acceptable housing expenditure per square metre. The ceiling mainly depends on the size of the housing, but also on the location, construction year and heating system. For example, the ceiling per square metre decreases as the size of housing increases, creating an upper limit for the size of housing acceptable for compensation. Housing expenditure per square metre exceeding the ceiling is paid by the tenant only.

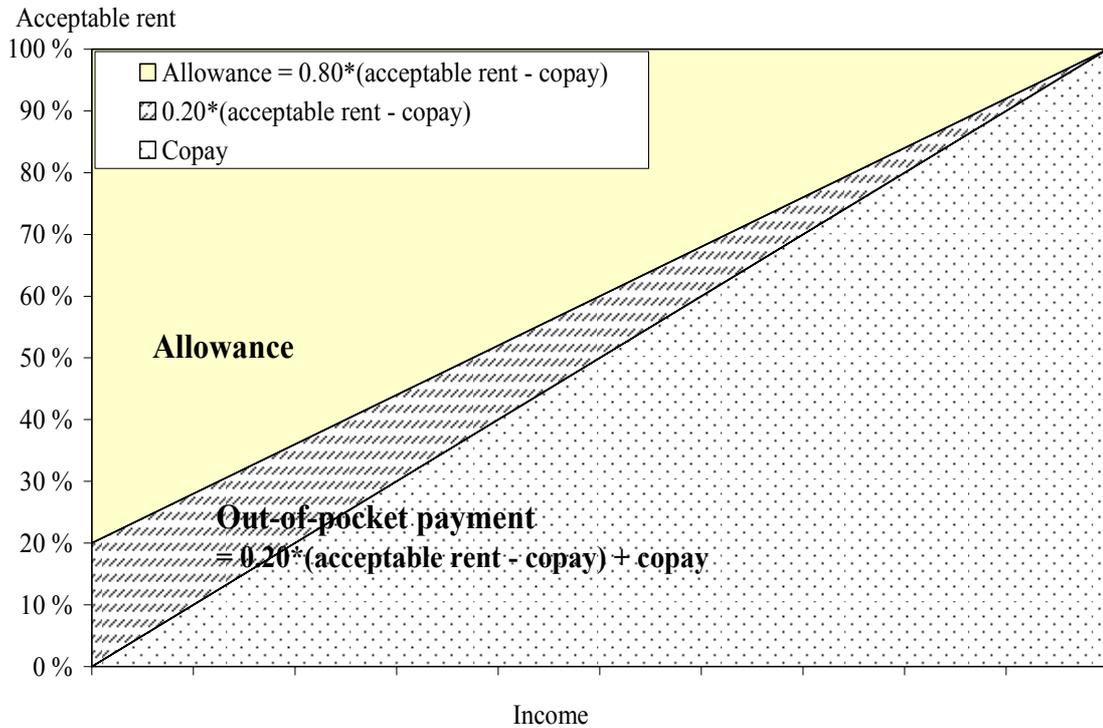
The programme compensates part of the acceptable housing expenditure (rent), with the remaining part being paid by households as out-of-pocket payment. The programme compensates 80 per cent of the acceptable expenditure exceeding the out-of-pocket payment. Out-of-pocket payment consists of two parts. One part can be referred to as ‘copay’, which depends on the household’s gross income, size and location. At one extreme, if the household in question is poor, the copay is consequently zero and the programme compensates 80 per cent of the acceptable rent. Even in this case the household pays the remaining 20 per cent of the rent (plus any part of the rent exceeding the ceiling). This 20 per cent proportion is the second part of the out-of-pocket payment.

The copay increases in relation to gross income and also varies according to the size and location of the household. Consequently, as copay increases, so does the overall out-of-pocket payment. When the gross income per household member within a certain location rises sufficiently, the out-of-pocket payment exceeds the ceiling, resulting in zero allowance. Figure 1 illustrates how the allowance and out-of-pocket payment evolves within one housing unit according to the income level of the household.

The allowance programme underwent three major reforms in the mid-1990s but then remained stable between 1998 and 2001. The reform in 2002 raised the acceptable rent ceilings (the highest rents per square metre acceptable for allowance). The size of the raise only depended on housing characteristics (the location, size and construction year of the housing). The increase did not depend on any of household characteristics, the length of tenancy or the sector of housing (free market vs. municipal sector). Before the reform, about 80 per cent of the assisted households were living in housing where the rent per square metre was higher than the ceiling and were paying the part beyond the ceiling themselves. The reform increased the allowances of this majority of assisted households according to the programme conditions by 80 per cent of the rise in the ceilings. As can be seen below, rises in ceilings were considerable, so the allowances in-

creased markedly. After the reform, in 2005, the ceiling was exceeded in 50 per cent of the housing occupied by assisted households (Social Insurance Institution of Finland, 2006). In contrast, the reform did not affect the allowance of the minority living in housing less expensive than the ceiling. Furthermore, the reform slightly decreased the copay of households, but the change was small, resulting in a negligible effect on the number of eligible households. In other words, the reform hardly changed the number of assisted households, but raised allowance paid for those households that were already eligible before the reform.

*Figure 1. Allowance and out-of-pocket payment relative to the acceptable monthly rent according to the level of income of the assisted household living in a certain type of housing. Out-of-pocket payment consists of two parts, copay and $0.20 * (\text{acceptable rent} - \text{copay})$*



3 Empirical design

3.1 The long-term approach

Before utilising the reform, OLS regressions provide baseline estimates. The logarithm of monthly rent (including water and electricity costs) per square metre is regressed on an allowance indicator and covariates. The non-assisted households also live on rent in similar housing, but their income is too high to qualify for allowance or they do not apply for allowance.⁶ Income is measured by the disposable income that is net of gross earnings, taxes paid and transfers received, including possible housing allowance (disposable income = gross earnings - taxes paid + transfers received).

The coefficient on the allowance variable is interpreted in the following way. The programme performs as intended if the assisted and non-assisted households having the same level of disposable income pay an equal rent for similar housing, although a proportion of disposable income of the assisted comes from the allowance programme rather than from other sources, such as earned income, unemployment insurance and social allowance. In other words, the disposable income of assisted and non-assisted households would, together with other relevant covariates, explain the variation in rent, leaving the coefficient for the allowance dummy as zero. A positive effect would indicate both a price effect and/or long-term relocation by tenants or municipal landlords, although the length of tenancy is controlled within the year in question (length of tenancy in months). Allowance is also measured as a logarithm of euros per square metre of housing. In these specifications, household income is measured as the logarithm of disposable income minus the possible allowance.

Disposable income probably does not adequately control for inherent differences between poorer and richer households. One way of checking the validity of the baseline estimate is to drop from the sample the richest households and estimate the effect of allowance on rents among those assisted and non-assisted households that are in close proximity in their income distribution. As another way to improve the common support, non-parametric matching models are run. To conserve space, the matching analysis is confined to simple nearest neighbour matching models.

Another possible problem with the OLS results is that even in restricted samples, other unobservable characteristics can correlate with the allowance status and rents. These are mainly differences in rental prices within the regional groups in the data at hand (21 regions and 3 categories for the level of urbanization). The

⁶ There are also a small number of households who live in such small and cheap housing that the rent is lower than the threshold discussed above.

validity of the baseline result is checked by re-running the parametric model and allowing a possibility that the selection on unobservables is not necessarily zero, as in the OLS approach. When a valid instrument is not available, it is possible to obtain guidance on the extent of bias by testing how much the results change if the selection on unobservables is not zero, but it is the same as the selection on observables (Altonji et al. 2002 and 2005).

The selection on unobservables equals that on observables if (1) the set of observed variables is chosen randomly from the full set of variables that determine recipient status and the rent per square metre and (2) the number of observed and unobserved variables is large enough so that none of the elements dominates the distribution of eligibility or rent. The assumption that selection on observables equals that on unobservables represents one extreme, where the constraints on collecting data are sufficiently severe that it is better to think of the observables as a more or less random subset of the elements of all possible covariates. The OLS assumption represents the other extreme, where the set of covariates has been systematically chosen to eliminate the endogeneity bias in the current context. However, neither of the two extremes is likely to be true in many cases, meaning that the true effect is between the two extremes. Consider the following framework:

$$\text{Ln}(\text{Rent per square metre}) = \alpha_1 \text{Allowance} + X'\beta_{1a} + \varepsilon \quad (1a)$$

$$\text{Allowance} = 1(X'\beta_{1b} + u > 0) \quad (1b)$$

$$\begin{bmatrix} u \\ \varepsilon \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}\right) \quad (1c)$$

where X refers to the set of observables used in both equations and Allowance is a zero–one indicator for housing allowance. The coefficient α_1 shows the effect of the programme. The system is under-identified due to the absence of an exclusion restriction. In the following, the parameter ρ is treated as non-identified. If the OLS assumption holds in this framework, $\rho = 0$. In contrast, if the selection on observables equals that on unobservables, then ρ equals the coefficient in a regression of the fitted values of equation (1b) on the fitted values of equation (1a) in the absence of the allowance effect: $\rho = \text{Cov}(\beta_{1b}, \beta_{1a})/\text{Var}(\beta_{1a})$.

Although this method alleviates the endogeneity problem, it does not change the fact that the equations (1a-1c) depict a long-term relationship. Therefore, tenants have time to adjust their housing consumption according to the level of allowance and municipalities may relocate tenants according to their assistance status. Although this is partly taken into account by the variable that controls for the length of housing tenure, a variable that only measures the tenure within a year may not be adequate. These may result in a possibility that part of the effect of

allowance may be due to tenants' choices rather than landlords' discretion. Furthermore, these approaches may fail to account for all unobserved factors due to the lack of instruments.

3.2 The reform of 2002

The main method of estimation uses the latest reform of the housing allowance program in 2002 as an instrument to evaluate the effect of allowance on rents per square metre. This part of the analysis concentrates on the years 2000–2003. During this period the reform of 2002 was the only year the programme rules changed. First, a difference-in-differences approach is used to regress log rent per square metre on controls, year dummies, the allowance dummy and their interaction term, where the coefficient, α_2 , on the interaction term reveals the programme effect.

$$\text{Ln}(\text{rent}/\text{m}^2) = X'\beta_2 + \sigma_2\text{After} + \delta_2\text{Allowance} + \alpha_2(\text{Allowance}*\text{After}) + \varepsilon \quad (2)$$

The model is estimated separately for three two-year periods, before (2000–2001), during (2001–2002) and after the reform (2002–2003). The After variable always refers to the latter of the years in each period. To gain from a larger sample size, it is also estimated jointly for the whole period 2000–2003. In this case the After variable refers to the two years after the reform.

Second, the allowance amounts are directly utilised and the changes in the rent ceilings are used as an instrument. In these specifications, household income is measured as disposable income minus possible allowance. The highest acceptable rental prices for allowance can be computed for all rental units, irrespective of the allowance status and other household characteristics. The reform in the limits depended on the location, size and construction year of the rental housing. It did not depend on the assistance status or other household characteristics. The change in these limits first facilitates a comparison within similar assisted households living in distinct housing that faced different changes in rental ceilings. Second, the change in the limits facilitates a comparison between assisted and non-assisted households within housing units facing the same increase in the ceilings, controlling for other characteristics.

Estimation within the pool of assisted households is carried out by running an instrumental variable regression of the log rent per square metre on the logged amount of allowance per square metre and controls. The allowance variable is instrumented by the change in the rent ceilings in 2002 (Change*After, equation 3b).

$$\text{Ln}(\text{rent} / \text{m}^2) = X' \beta_{3a} + \gamma_{3a} \text{Change} + \sigma_{3a} \text{After} + \alpha_3 \text{Ln}(\text{Allowance Euros/m}^2) + \varepsilon \quad (3a)$$

$$\text{Ln}(\text{Allowance Euros} / \text{m}^2) = X' \beta_{3b} + \gamma_{3b} \text{Change} + \sigma_{3b} \text{After} + \lambda_{3b} (\text{Change} * \text{After}) + \varepsilon \quad (3b)$$

Parameter α_3 shows the elasticity of rental prices with respect to the reform among assisted households. The Change variable refers to the difference in the logged rent ceilings between 2001 and 2002 and After refers to the years 2002 and 2003. The approach assumes, on the one hand, that the change in the rent limits in 2002 is not correlated with the changes in rents after controlling for common year effects (the After variable), the housing characteristics determining the scale of upcoming change in the ceilings before the reform (the Change variable), and the other covariates. On the other hand, it is assumed that the instrument is strongly correlated with the amount of allowance. This is indeed the case, since about 80 per cent of the assisted households were living in housing where the rent per square metre exceeded the ceiling before the reform. The reform increased the ceilings on average by 19%, and the programme compensated 80% of the increase for this majority of assisted households.

Since the reform only increased the amounts of allowance for those already eligible, it left virtually unchanged the eligibility for allowance, i.e. the allowance status. Therefore, the final specification utilises both the assisted and non-assisted households. In the first stage of the instrumental variables regression, the log amount of allowance per square metre is regressed on the full set of covariates and interactions between Change, After and Allowance variables. The variable Change*After*Allowance is the excluded instrument in the second stage, where the log rent per square metre is regressed on other interactions between the Change, After and Allowance variables and all covariates. Both of the instrumental variables models are run in log terms and euro terms for both free market and municipal sectors.

4 Data

The present study analyses rental tenants in a random sample of 12,021 households in the ‘Statistics of Income Distribution’ compiled by Statistics Finland (Table 1). Somewhat more than one fifth of households received allowance between 1994 and 2003 in these repeated cross-sectional data. The relative proportion of assisted households was clearly lower in the free market than the municipal sector, due to income and other eligibility criteria in municipal housing where rents are below the free market level.

Table 1. Number of observations

	Free markets	Municipal	All
Assisted	1.322	1.461	2.783
Not assisted	5.660	3.578	9.238
All	6.982	5.039	12.021
Shares, %	18.9	29.0	23.2

Overall, the real rental price of housing (in 2003 prices) increased by 15% during the period of analysis. The average real rent paid by the assisted households per square metre per month during the whole period was 15 cents lower than that of non-assisted ones (Table 2). The difference was 18 cents and statistically significant in the free market sector. In contrast, the assisted households paid 19 cents more in the municipal sector, implying that assisted households in the municipal sector live in newer and higher quality housing than their non-assisted counterparts.

Table 2. Rent per square metre according to sector and allowance status

	Non-assisted	Assisted	Difference	t-test value
Free market	7.95	7.76	0.18	2.1
Municipal sector	6.79	6.98	-0.19	-4.1
Both sectors	7.50	7.35	0.15	2.7

The numerous control variables include disposable income (and its second power term), the number of household members (as separate dummies), the length of stay in the current housing during the year of measurement (1–12 months), the location (the city of Helsinki, rest of the capital province and 19 other provinces), the year of construction of the housing (and its second power term), the degree of urbanisation of the municipality (four classes), the sector of the landlord (free

market or municipal housing), and year dummies. Controls also include dummies for households in which either adult works or is unemployed (against the possibility that both parents are out of the labour force), and for those whose youngest child is younger than 18 years old. All controls (including the year effects) are also interacted with two location indicators that obtain 1 when the housing is located in the capital city or in the capital province. This is carried out to control for special features of housing markets in the capital city of Helsinki and its surroundings.⁷ Rents and income are measured in 2003 prices. Table A1 in the Appendix lists all covariates.

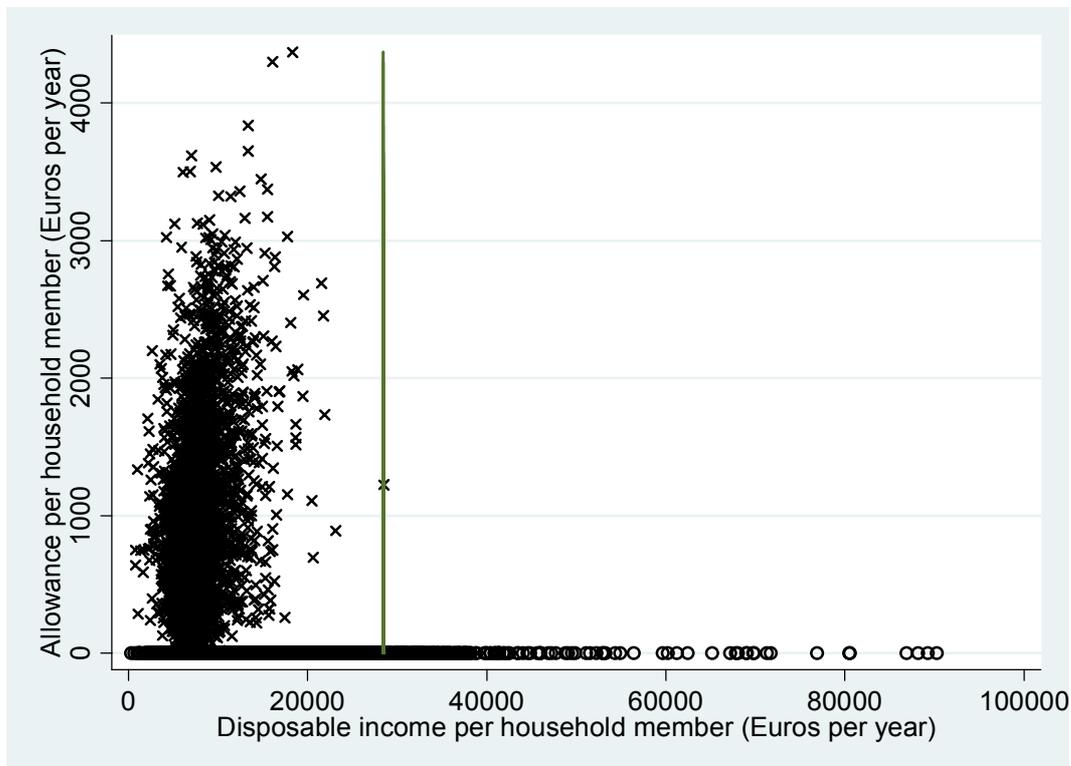
Table 3. Covariates according to allowance status, the mean of 1994–2003

	Non-Assisted	Assisted	Difference	t-test value
Housing size, m ²	61.4	62.4	-1.0	-2.1
Household size (number of members)	2.2	2.4	-0.2	-7.0
Square metres / household size	32.2	30.6	1.6	5.2
Construction year of housing (or the latest year of basic renovation)	1973	1976	-3.6	-8.7
Gross income per household member, € per year	18.358	9.310	9.048	41.1
Disposable income per household member, € per year	12.940	7.823	5.117	38.8
Disposable income per household member, € per year, excluding those non-assisted households richer than the richest assisted household	12.216	7.823	4.393	44.7
Disposable income per household member, € per year, excluding 20% of the richest households	10.256	7.704	2.552	38.9
Disposable income per household member, € per year, excluding 40% of the richest households	8.625	7.361	1.264	25.1
Disposable income per household member, € per year, excluding 60% of the richest households	7.211	6.756	455	10.6
Disposable income per household member, € per year, excluding 80% of the richest households	5.827	5.728	99	2.2

⁷ Other interaction terms with the location dummies did not affect the coefficients of interest.

In terms of the most important covariates, the average size of assisted households is larger and consequently the average size of housing is larger than for non-assisted households (Table 3). However, the average housing size per household member is smaller among assisted than non-assisted households. More importantly, the assisted households have a lower income than the others. This is markedly so when measured in gross terms per household member, and remains clear even when measured in terms of disposable income. A lack of common support shows up well in a scatter-plot of disposable income per household member against the amount of allowance per household member (Figure 2). Altogether, 260 non-assisted households (out of the total of 12,021 households in the data) have a higher disposable income per household member than the richest assisted household. The mean difference in disposable income between the groups somewhat decreases when these households are excluded from the sample (Table 3). However, the difference remains statistically significant even when 80 per cent of the richest households (irrespective of the allowance status) are excluded from the sample.

Figure 2. Disposable income per household member (horizontal axis) and the amount of allowance per household member (vertical axis) for the assisted (X) and non-assisted (O) households



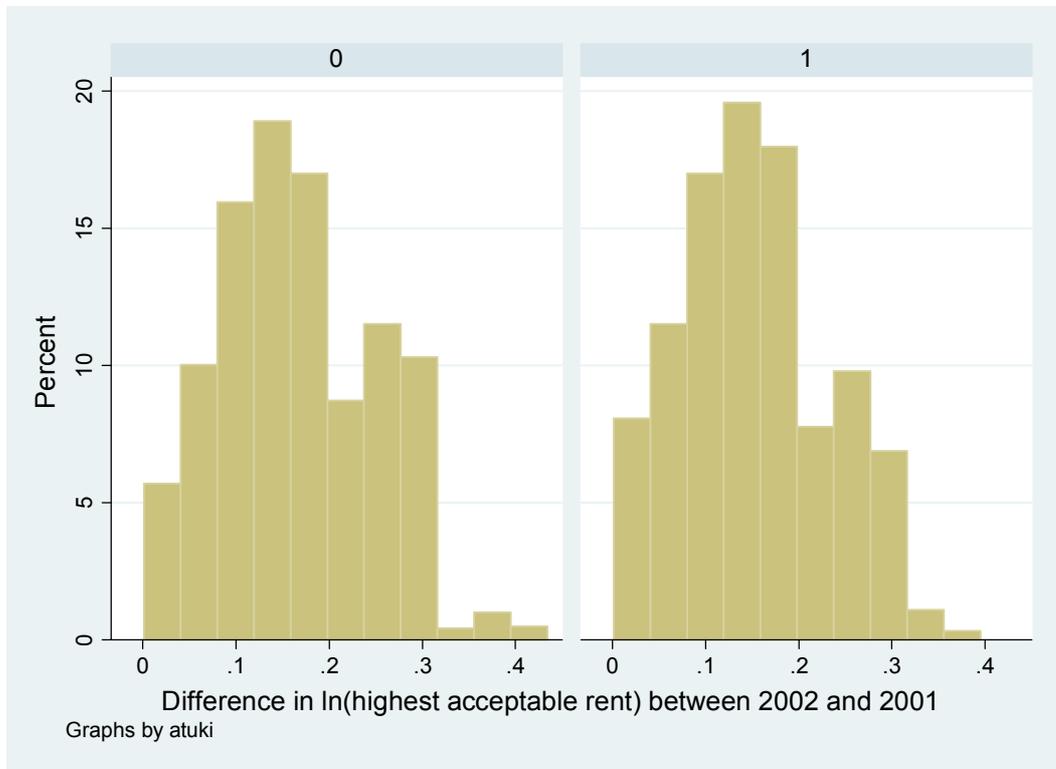
The main analysis utilises changes in the highest rents per square metre acceptable for compensation. In the reform of 2002 the ceiling increased on average by 0.17 log points, and the rise was similar in housing occupied by assisted and non-assisted households (Figure 3 and Table 4). The highest rises were 0.40 log points. The change in the ceilings had the full effect on the allowance of the majority of assisted household, as in 2000 and 2001 about 80 per cent of the assisted households lived in housing where the rent was higher than the limit (not in Table 4). The average change in the amount of allowance in the data at hand fits well with this figure, since the average allowance per square metre among the assisted households rose between the averages of 2000–2001 and 2002–2003 by 0.11 log points.⁸ The average rent per square metre of the assisted households rose by 0.065 log points. The reform obviously did not alter the allowance of non-assisted households, whose average rents increased 0.01 log points between the years.

Table 4. Mean log difference between the averages of 2000–2001 and 2002–2003

	Non-Assisted	Assisted	Difference
Rent limit	0.165	0.173	-0.008
Allowance	0.0	0.108	-0.108
Rental price	0.010	0.065	-0.055

⁸ If the average change of 0.172 log points (19%) in the rent ceilings raised the allowance of 80% of assisted households by a full effect of 80%, the amount of allowance should then increase by 0.11 log points (12 %).

Figure 3. *Change in acceptable highest rents per square area in 2002 according to assistance status (1 = assisted, 0 = non-assisted households)*



5 Results

5.1 The long-term approach

The simple difference in the logarithm of rent per square metre between assisted and non-assisted households is virtually zero (-0.006 log points). When the covariates are added to the OLS model, the allowance effect rises to about 7% (0.067 log points), and the effect remains when the allowance is estimated as the logged amount of allowance per square metre (Table 5). The housing size and level of disposable income have the strongest influence on the coefficient of allowance.^{9,10} The coefficients of the main covariates are reported in Appendix (Table A2).

Table 5. OLS regression of the log-square-rent on the allowance dummy and covariates, 1994–2003

	Whole sample	Restricted sample 1	Restricted sample 2		Whole sample	Restricted sample 2
Allowance dummy	0.067	0.066	0.051	ln(allowance/m ²)	0.075	0.088
Robust t-value	11.5	11.4	5.5	Robust t-value	11.6	8.5
Other covariates	yes			Other covariates	yes	yes
R ²	0.55	0.54	0.50	R ²	0.60	0.60
N	12.021	11.761	2.404	N	2.783	1.191
N of assisted households	2.783	2.783	1.191	N of assisted households	2.783	1.191

Notes: Restricted sample 1 excludes all non-assisted households that have a higher disposable income per household member than the richest assisted household. Restricted sample 2 excludes 80 per cent of the richest households (irrespective of the assistance status).

⁹ Since the size and income of a household are crucial determinants of rent and allowance, the robustness of the basic result is tested by experimenting with various alternatives for these variables. Disposable income is replaced, in turn, by earned, taxable and gross income. Household size is alternated using dummies for different household sizes, dummies for different numbers of adults and children, by using the number of adults and children, and finally by using the OECD consumption unit measure. Various income and family size measures produce very similar estimates for the allowance dummy (not in the table).

¹⁰ When either of them is left out of the model the allowance effect drops by 0.018 log points (not in the table). This implies that assisted households are poorer and live in smaller and less expensive flats than richer ones. The effect of other covariates on the allowance coefficient is between 0 and 0.008 log points.

Exclusion of the richest households somewhat alleviates the lack of common support. The effect decreases by 0.001 log points when those non-assisted households that are richer than the richest assisted household are excluded. Additional restrictions of the data further decrease the estimate. The effect remains at 0.051 log points even when 80 per cent of the richest households are excluded (irrespective of the allowance status). The effect increases to 0.088 log points when the most restricted sample is used and the allowance is measured as the logged amount of allowance per square metre. However, there is no theory to guide how much to restrict the sample.

As an alternative way to improve the common support, alternative nearest neighbour matching models can be run. The starting point is a sample that excludes those households that are richer than the richest assisted household (in terms of disposable income per household member). The simplest model, with one nearest neighbour and the common support imposed,¹¹ shows that assisted households pay 0.051 log points higher rent than the others (Table 6).

Table 6. Matching model. Outcome variable is Ln(rent per square metre)

	Both sectors	Both sectors	Both sectors	Free markets	Municipal sector
Estimate	0.055	0.059	0.058	0.072	0.043
t-value	4.7	5.0	6.0	4.7	3.9
Trim, %	0	5	5	5	5
Neighbours	1	1	5	5	5
N	11.761	11.761	11.761	6.752	4.963
Assisted households on the common support	2.781	2.644	2.644	1.256	1.388

Notes: The sample excludes all those households that are richer than the richest assisted household (Restricted sample 1). Common support imposed, all covariates included.

The estimate slightly rises when the matching is also trimmed by dropping 5 per cent of assisted households for which the propensity score density of the control observations is the lowest. Higher trimming further raises the estimate. Finally, increasing the number of nearest neighbours also slightly raises the estimate. When the 5 nearest neighbours are used together with previous options, the effect is 0.058 log points. The effect is clearly higher in the free markets than municipal housing, but is nevertheless statistically significant in municipal housing, a finding that casts doubts on the reliability of the static approach. The reasons for a

¹¹ Dropping assisted households whose propensity score is higher than the maximum or less than the minimum score of the non-assisted.

statistically significant effect in the municipal sector are that the approach cannot take into account the possibility that municipal landlords may locate assisted households to more expensive subsidised housing and the housing allowance may help assisted tenants to opt for more expensive housing than would be possible without the allowance.

The obtained allowance effect is biased if the assisted households occupy differently-priced rental housing in a way that is not controlled by the covariates used in either of the methods or even in the restricted samples. The amount of possible – and probable – selection on unobservables is approximated using the amount of selection on observables for guidance. This possibility is explored by examining the sensitivity of the estimate to the correlation between the unobservable factors that determine allowance and rent per square metre in the framework described by equations 1a-1c above.

The system of equations is under-identified by one parameter, ρ . When the OLS assumption applies, ρ is set to equal zero. Then, the allowance effect in the private market is 0.054 log points, even when the most restrictive sample is used, and the estimate increases with increasing and less restrictive sample sizes (Table 7). If the selection on observables equals that on unobservables, ρ is obtained by estimating the effect of covariates X on rents (excluding the effect of allowance on rents), estimating the effect of the same covariates on the allowance status, and finally estimating how much the former prediction can explain the latter. It appears that, for example, in the most restrictive sample, $\rho = -0.04$. Using this value of ρ , the allowance effect rises to 0.065. In the municipal sector the OLS effect is 0.036 in the most restrictive sample. The equations in the estimated system appear to be highly correlated, as $\rho = +0.13$. Using this value of ρ , the allowance effect decreases to virtually zero in the municipal sector.

Table 7. *System estimation: Effect of allowance according to various values for ρ*

	Restricted sample 1	Restricted sample 2	Restricted sample 2
Free markets	$\rho = 0.0$	$\rho = 0.0$	$\rho = -0.04$
Coefficient on the allowance dummy	0.075	0.054	0.065
z-value	8.6	3.6	4.9
N	6.752	1.169	1.169
Assisted households	1.322	529	529
Municipal sector	$\rho = 0.0$	$\rho = 0.0$	$\rho = +0.13$
Coefficient on the allowance dummy	0.044	0.036	0.005
z-value	6.8	3.5	0.5
N	4.963	1.235	1.235
Assisted households	1.461	662	662

Notes: The dependent variable is $\ln(\text{rent per square metre})$. All covariates included in each specification.

5.2 The reform of 2002

The main approach to deal with unobservables is to construct an instrument using the reform of 2002. A simple difference-in-differences estimation of equation (2) shows that in the free market sector the rent per square metre of assisted households displayed a similar change to that of non-assisted households during the pre-treatment years of 2000 and 2001 (Table 8, upper panel). Similarly, there was no differential development in rental prices during the post-treatment years of 2002 and 2003 (column III). In contrast, the rent of assisted households increased 0.048 log points faster between 2001 and 2002, i.e. during the years of reform (column II). Due to the low number of observations this effect is statistically significant only at the 9 per cent level, however. When all the years between 2000 and 2003 are combined the effect is 0.051 log points, or 5.2%, and statistically significant (column IV).

Quantitatively, this implies the following. Among the assisted households the rent ceilings increased, on average, by 0.17 log points or 19%. The respective change in the average allowance was 12%, since the programme compensated the full 80% of the increase for those 80% of households living in housing where the ceilings were exceeded prior the reform ($0.189 \cdot 0.8 \cdot 0.8 = 0.121$). This is supported by summary statistics (Table 4). The estimated effect of 5.2% is 43% relative to the average change in allowance ($0.052/0.121 = 0.430$). Thus, an additional euro of allowance raises the rent of assisted households by 43 cents, leaving another half a euro available to reduce the net rent of these households

and increase their other consumption. The effect is basically zero in municipal housing, suggesting that the reform only raised rents of assisted households in the private markets (Table 8, lower panel).

Table 8. Results from Difference-in-Differences models

	I	II	III	IV
	'00-'01	'01-'02	'02-'03	All
Free markets				
Allowance	0.045	0.058	0.103	0.049
Robust t-value	1.9	2.3	4.1	2.7
After	-0.015	-0.015	0.052	0.014
Robust t-value	-1.1	-1.0	3.9	1.4
Allowance*After	0.024	0.048	-0.024	0.051
Robust t-value	1.0	1.7	-0.9	2.4
R ²	0.65	0.61	0.63	0.64
N	2.192	1.322	1.368	2.660
N of assisted households	208	201	208	416
Municipal sector				
Allowance	0.029	0.036	0.054	0.029
Robust t-value	1.9	1.9	2.7	2.3
After	0.001	0.012	0.186	0.025
Robust t-value	0.1	1.0	1.3	2.9
Allowance*After	-0.017	0.025	-0.018	0.011
Robust t-value	-0.9	1.2	2.7	0.7
R ²	0.55	0.51	0.50	0.51
N	896	915	973	1.869
N of assisted households	238	241	275	513

Instrumental variables estimation of equations 3a–3b among the assisted households in the free market sector indicates that in the private market a log point increase in the allowance raises rents by 0.2 log points (Table 9). The high F-test result shows that the instrument is strong (see the results of the first stages of various specifications in Table A3, Appendix). Calculation of the marginal effects using this elasticity and the average values of rents (€8.1/m²) and allowance (€3.5/m²) per housing size among the assisted households suggests that a one euro increase in the allowance raises rents by 57 cents ($0.244 \cdot 8.14 / 3.48 = 0.57$). The effect (57%) is somewhat larger than in the simple difference-in-differences model above (43%), and it is even larger (72%) when the model is estimated in

euro terms.¹² Interestingly, Fack (2006) observed that the marginal effect of the housing allowance programme in France is also 70 cents.

The instrumental variables model can also be estimated using both assisted and non-assisted households. Now, the excluded instrument is the interaction between After, Allowance and Change variables. It appears that the elasticity of the rent with respect to allowance is 0.31, which equals 72 cents at the margin. When this model is estimated in euro terms, the effect is 69 cents.

The allowance effect could not be detected in the municipal sector either within assisted households or between assisted and non-assisted households (Table 9). The instrument is extremely weak, resulting in perverse estimates for the parameter of interest.

Table 9. Results from instrumental variable estimation

	Free markets	Municipal housing	Free markets	Municipal housing
	Dep. var. ln(rent/m ²)			
	assisted only	assisted only	All	All
ln(Allowance Euros/m ²)	0.244	-0.725	0.309	0.151
t-value	2.5	-0.6	2.1	0.2
Marginal effect	0.57	-1.54	0.72	0.32
R ²	0.71	-3.8	0.61	0.49
N	416	513	2,660	1,869
Partial R ²	0.034	0.001	0.016	0.000
F-test	12.4	0.39	42.6	0.24
	Dep. var. rent / m ²			
Allowance Euros/m ²	0.718	10.3	0.689	0.525
t-value	3.5	0.3	1.7	1.1
R ²	0.77	-73	0.65	0.45
N	416	513	2,660	1,869
Partial R ²	21.2	0.000	53.5	0.005
F-test	0.056	0.1	0.020	8.7

Notes: In the upper panel, the excluded instrument is the log change in the rent ceilings after the reform (in 2002 and 2003). In the lower panel, the excluded instrument is the change in the rent ceilings after the reform in euro terms. Each specification has all covariates.

¹² Rent per square metre is regressed on the amount of allowance in euros and the change in rent ceilings is measured in euros.

6 Conclusion

The paper analysed the effect of a housing allowance programme on the rent paid by the assisted working-age low-income households. The analysed random sample consisted of some 12,000 rental households, 23 per cent of which received allowance during the period 1994–2003. The main part of analysis concentrated on the years 2000–2003 using the programme reform of 2002 as an instrument.

The long-term results utilising the whole data indicated that the assisted households pay higher rents than their non-assisted counterparts. The main results utilising the programme reform indicate that one additional euro of housing allowance leads to an increase of 60–70 cents in the rent paid by claimants, leaving 40–30 cents available to reduce their net rent and increase their consumption. This suggests that if the government wants to increase housing allowance to low income households, it has to at least double the intended amount, as more than one half leaks to the landlords. An obvious way to stop the leakage is to cease paying the allowance directly to the landlords. This, of course, may result more often than before in failures to pay rent, if the assisted households misuse the allowance.

The programme was not observed to raise the rents of assisted households relative to non-assisted ones in municipal housing, at least in the two-year period analysed. This is due to the way rental prices are set in the municipal sector. Since they are tied to the costs of rental housing, municipalities cannot adjust the rents of assisted families in the short term according to changes in the programme rules.

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Appendix

Table A1. Variables used in estimations

Variable name	Description
Allowance	1 when allowance received, otherwise 0.
Change	Log-difference in the upper rent limit per square metre between 2001 and 2002
Disposable income	Ln(disposable income of the household)
Disposable income squared	Ln(disposable income of the household) ²
Construction year	Construction year or the year of latest renovation
Construction year squared	(Construction year or the year of latest renovation) ²
Square area	Ln(square area of the housing)
Square area squared	Ln(square area of the housing) ²
Tenure 12 months	1 if the household has been living at the current address for at least 12 months
Household size	A dummy for each number of household members
Free markets	1 when the housing is in the free market.
Municipal housing	1 when the housing owned by a municipality.
Housing area	21 indicator variables for 1997-1999 and 20 variables for the other years.
Degree of urbanisation	4 indicator variables. Categories are: capital region, other urban areas, small towns, rural municipalities.
Building type	Separate dummies for single housing, semi-detached housing, row housing, block of flats
Rental type	main tenant, subtenant
Employed	1 when the head of the household employed
Unemployed-short	1 when the head of the household has been unemployed for less than 12 months
Unemployed-long	1 when the head of the household has been unemployed for at least 12 months
Retired	1 when the head of the household has retired
Youngest child less than 18 years old	1 when the youngest child is less than 18 years old.

Table A2. *OLS coefficients of the main control variables in specification I in Table 5*

	Coefficient	robust t-value
Allowance	0.067	11.5
ln(Disposable income)	-0.20	-1.9
ln(Disposable income) squared	0.01	2.7
Construction year	-0.13	-6.9
Construction year squared	0.00	7.1
ln(Square area)	-0.72	-5.4
ln(Square area) squared	0.04	2.6
Tenure 12 months	-0.07	-16.0
Household size (ref. 7 members)		
1	-0.10	-3.9
2	-0.08	-3.1
3	-0.09	-3.9
4	-0.07	-3.0
5	-0.06	-2.4
6	-0.07	-2.1
Market type (ref. municipal housing)		
Free markets	0.10	17.1
Employed	-0.00	-0.7
Unemployed less than 12 months	-0.01	-2.5
Unemployed for at least 12 months	-0.02	-2.3
Retired	-0.07	-6.5
Youngest child less than 18 years old	-0.02	-1.9

Note: Control variables also include the geographical area (20 dummies), degree of urbanisation (3 dummies), building type (4 dummies), rental type (main tenant vs. subtenant), and the interaction term of the Helsinki dummy and the capital region dummy with all other control variables. The reference categories are in parentheses. The model has a heteroskedasticity correction.

Table A3. *First stage results of the instrumental variable models*

	Assisted only			All	
	Dep. var. ln (Allowance/m ²)			Dep. var. ln (Allowance/m ²)	
	Free markets	Municipal housing		Free markets	Municipal housing
Change*After	2.743	-0.500	Change*After*	2.23	0.022
t-value	3.5	-0.67	Allowance t-value	6.5	0.10
R ²	0.27	0.33	R ²	0.74	0.50
N	416	513	N	2.660	1.869
	Dep. var. Allowance/m ²	Dep. var. Allowance/m ²		Dep. var. Allowance/ m ²	Dep. var. Allowance/ m ²
Change*After, Euros	1.537	0.093	Change*After*	0.962	0.458
t-value	4.6	0.32	Allowance, Euros t-value	7.3	2.9
R ²	0.36	0.36	R ²	0.78	0.80
N	416	513	N	2.660	1.869

Notes: Each specification has all covariates and interactions between Change and After variables (specifications with the assisted households only) or those between Change, After and Allowance variables (specifications with all households).

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