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Is Social Housing Affordable?

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Is Social Housing Affordable?*

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WORK IN PROGRESS, PLEASE DO NO CITE

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Abstract: Supply subsidies to owners of rental housing construction are typically aimed at increasing the overall size of the housing stock or at guaranteeing affordable housing for low-income households. This paper studies whether and how much the tenants of the social housing units benefit from this subsidy. We use on free market rental units and subsidized rental units owned by the city of Helsinki. Our data contain detailed information about the characteristics of the units, including their location. We employ hedonic regression methods to predict rents for the subsidized units and use the results to calculate the subsidy the tenants obtain when occupying a subsidized unit instead of an otherwise similar free market rental unit. We find that on average the monthly subsidy per unit is 246 Euros, whereas the average monthly subsidy per unit's square meters is 3.88 Euros. We also find that there is substantial heterogeneity in the amount of subsidy that different subsidized units receive.

Key words: Housing supply subsidies, Social housing, Hedonic regression

JEL codes: H22

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1. Introduction

An important form of public sector participation in the housing market is the provision of supply subsidies for construction of rental housing. Increased public sector housing construction may benefit households in two different ways. First, it may increase the overall supply of housing. The increase in the overall stock of housing should lead to a lower price level which benefits all households regardless of whether they rent subsidized or free market units.¹

Second, the subsidy to construction of certain units may lead to lower rents than in otherwise comparable free market units. The details of the implementation of the supply subsidies vary to a great deal from one program to another. However, the general feature of these schemes is that the subsidy is allocated to the owners of social housing complexes in exchange of a commitment to a regulated rent level. In this type of situation, it is unclear how the subsidy is divided between the owners and the tenants of the subsidized units. This issue is particularly interesting because it is conceivable that the division of the subsidy varies from one housing market area to another.

The aim of this paper is to study whether the tenants of social housing units indeed face lower rents than those in free market rental housing and how this rent difference varies depending on the characteristics of housing units. It seems fair to say that the issue has not received much attention in the literature. A recent exception is Burge (2011) who studies how much the tenants benefit from the low-income housing tax credit (LIHTC) program in the US. In the LIHTC program, the owner of the housing complex receives a tax credit in return to committing to charging regulated rents. The rent ceiling is based on income level of the area in question and the size of the apartment. Burge (2011) finds that the LIHTC is unlikely to lead to meaningful rent savings for the tenants.

Our approach differs from Burge (2011) in two important respects: First, we use actual data on regulated units to assess the benefits of regulation for the tenants. Second,

¹ Depending on the local housing market conditions, supply subsidies may increase the overall stock of housing or simply crowd out private housing projects that would have been executed in the absence of the subsidies. The existing empirical evidence suggests that supply subsidies lead to substantial crowding out and therefore benefit little in terms of increased overall housing stock (e.g. Malpezzi and Vandell, 2002, Sinai and Waldfogel, 2005, Baum-Snow and Marion, 2009 and Eriksen and Rosenthal, 2010).

we have much more detailed information about the characteristics of the units (including location) which allows for a more reliable comparison of similar units.

The research question is important for various reasons. For instance, the location of subsidized units differs systematically from that of private rental units within densely populated urban areas with high house prices. Therefore, a simple comparison of average rental levels in subsidized and private rental units will give misleading information on the benefits of subsidized units for tenants.

We will address these issues using data on the rental housing units in the city of Helsinki. Almost half of the rental housing stock of Helsinki can be characterized as social housing in the sense that the units are subsidized in different ways. Our data cover both free market and social housing sector. We first employ hedonic regression methods to recover implicit prices for different housing attributes within the free market segment.² As a second step, we use the implicit attribute prices from the free market hedonic regressions to predict a free market rent for the subsidized units. We are then able to calculate, based on our prediction, the degree of the unit specific subsidy for the tenants in the subsidized units by comparing the prediction and the actual rent for a given subsidized unit.³ The amount of the unit specific subsidy reveals how much the tenants benefit from occupying a subsidized unit relative to having rented a comparable unit from the free market. Finally, we analyze whether and in what way the unit specific subsidy depends on the characteristics of the unit.

To the extent that households in social housing units face lower rental rate than those in comparable free market units, social housing programs can be said to be successful. This success may, however, entail also disadvantages. First, in order for the social housing program to succeed in directing the subsidy to households in need, some type of rationing is required. Households apply and are granted the unit based on some criteria which may include e.g. the need, income and wealth. This process may require

² Naturally, we do not claim to obtain unbiased estimates for the implicit prices since we do not have a quasi-experimental setting for any of the attributes. The aim of the hedonic regression analysis is simply to obtain out-of-sample predictions. We address unobservable neighborhood heterogeneity using spatial fixed effect.

³ Of course, for a general equilibrium assessment of the social housing program, the effect of the program on free market rental rate should be taken into account. If subsidized housing increases the stock of housing, the effect can be negative. Otherwise regulation is likely to increase free market rental rate. For more discussion on the former issue, see. e.g. Early (2000). Furthermore, elimination of the subsidy scheme would probably result in a new sorting equilibrium where the new equilibrium housing prices may differ considerably from the current equilibrium prices. See e.g. Bayer and McMillan (2012).

waiting and will most likely contain at least some elements of discretion by the local authorities making the decisions. As a result, out of those households who are eligible, some receive the unit and others do not. This feature of the system is unavoidable but clearly problematic from equity point of view. (See e.g. discussion in Quigley, 2011.) In addition, if there are large differences in the unit specific subsidy, households that obtain a subsidized unit are treated quite differently. In particular, it is not self evident that the poorest households end up in units with the largest unit specific subsidy.

Second, compared to demand subsidies (e.g. housing allowances or vouchers) an important feature of supply subsidies is that they are tied to a particular housing unit.⁴ Therefore, the household continues to enjoy the subsidized rent as long as it occupies the same unit, but will lose the benefit if it moves and fails to find a new subsidized unit. As a result, this type of subsidies may create lock-in effects.⁵ It is important to note, however, that the degree of lock-in is expected to depend on the unit specific subsidy.

We plan to address also these questions in future work. Naturally that requires data about the characteristics of the tenants in the subsidized and free market rental units. However, providing reliable answers to these questions also requires detailed information about the actual benefit of the supply subsidies for tenants of the subsidized units. This paper should therefore be seen as the first important step in addressing these issues.

The paper continues as follows: In the next section, we discuss the institutional details of the Finnish state subsidy system with special focus on Helsinki. After that we present and discuss the data we use. In section 4, we describe our empirical strategy. The results are presented in section 5 and section 6 concludes.

⁴ The main motivation for supply subsidies is that they are place-based and in principle can be used to alleviate the (possible) negative effects of neighborhood segregation. Segregation is a natural phenomenon in an urban area with heterogeneous land quality and local amenities. Given that these amenities are normal goods, high-income households tend to outbid low-income households. Therefore, households will sort into neighborhoods according to income (e.g. Bayer et al., 2007). While natural, this tendency may also have harmful effects. In preventing segregation, supply subsidies could be preferable to demand subsidies precisely because they can be tied to a certain geographical location. For more on this discussion, see e.g. Galster et al. (2008) and Cheshire et al. (2008).

⁵ See e.g. Lui and Suen (2011).

2. Institutional setting

In 2010, there were roughly 330,000 housing units or dwellings in Helsinki out of which 85% were flats in apartment buildings. Of the overall housing stock, 45% were owner-occupied and 45% rental units.⁶ Of the rental units, almost half (48%) can be characterized as social or subsidized. The most important components of the subsidy for owners of the subsidized units are low lot rents and interest loan subsidies provided by the state.

The city of Helsinki owns 60% of its land area and holds roughly 4,500 housing lot rent contracts. The rented housing lots can be divided into those for single-family houses, town houses and apartment buildings. The contracts are managed by the Real Estate Department of the city of Helsinki. A fraction of these contracts are made with other entities of the city.

There are no publicly available data sources on the lot rents in Helsinki. According to the Real Estate Department, the aim is to set the lot rents so that the rent corresponds to a 4% return on the imputed value of the lot. Typically, these imputed values are below market values. The rents of lots designated for social housing are lower than this general rule. During the time when the owner receives the state subsidy, the city charges only 80% of the lot rent. This means that in Helsinki a large share of the subsidy for the owners of the subsidized units is in the form of lot rents well below market rents.

The other part of the subsidy for owners of the subsidized units comes from the state. The program is managed by the Housing Finance and Development Centre of Finland (ARA) which is an off-budget government agency operating under the supervision of the Ministry of Environment. The main components of the system have been government loans and interest subsidy loans. The importance of both types of subsidies has diminished over time first due to deregulation of the financial system and later in the 2000's due to low interest rates.

After 2007, the government loans have no longer been available. The interest subsidy loan is applied from ARA which, when accepting the loan, gives the loan a state guarantee and pays the interest subsidies. The loan itself is granted by a bank or other

⁶ For the whole of Finland, the corresponding figures are 59% and 29%. Other tenure forms include right-of-occupancy dwellings and part-ownership housing.

financial institution. The interest subsidy covers interest payments above a threshold interest rate of 1.7%.⁷ During the construction of the units, all interest payments above the threshold are covered. Consequently, the share of the interest payments covered decreases gradually and no interest payments are covered after 23 years.

In Helsinki, roughly 70% of social housing units are owned by the city. In practice, these units are owned and administrated by a limited company (*Helsingin kaupungin asunnot Oy*) owned by the city. The property management of the roughly 43,000 units is delegated to 21 regional companies. The remaining 30% of the subsidized units in Helsinki are non-profit units of big property investment companies. The share of subsidized units in general and the share of units owned by the city vary greatly from one area of Helsinki to another (City of Helsinki Urban Facts, 2011).

The subsidized units are subject to two different types of regulation. First, the rents in the subsidized units are regulated for a certain period of time after construction (in most cases 40 years). During this period of time, the rent should be based on capital and maintenance costs of the building. The city of Helsinki can, of course, continue to set below market level rents even after the 40 year limit. Second, selection of tenants should be based on housing needs, income and wealth. In 2011, there were roughly 66,000 rental units in Helsinki that subject to at least one type of the regulation. Slightly less than 70% of these units had received a government loan and the rest an interest subsidy (ARA, 2012a).

In Finland, housing demand of the low-income households is also subsidized through a housing allowance system financed by the government through the Social Insurance Institution of Finland. Eligibility for the allowance depends on the characteristics of the households, income in particular. Eligibility does not depend on whether the household lives in free market or subsidized rental units or owner-occupied housing. In 2012, roughly 25,000 households in Helsinki received general housing allowance, and 52% of these households lived in subsidized units. The average monthly allowance was 325 Euros (ARA, 2012b).

⁷ The threshold was temporarily lowered from 3.4% to 1.7% in October 2011. The rule applies to all new loans until the end of 2014.

3. Data

Our data cover free market rental units and subsidized units owned by the city of Helsinki. The data come from two different sources. The data on free market units are collected from a website (Vuokraovi.com) where landlords publish information about the units available for rent. The website is widely used and all major institutional landlords use it as an advertising channel in addition to their own websites. The service covers the whole of Finland, but we collect information only on housing units in Helsinki. We have accessed the website on a weekly basis starting May 2012 until end of January 2013. Each observation contains detailed information about the units (rent, size in square meters, number of rooms, balcony, sauna, floor) and the building (address, building year, elevator, number of floors). A small fraction of these observations are subsidized units owned by big property investment companies. We do not include these units in our analysis.⁸

The data on the units owned by the city of Helsinki come from the regional companies of Helsingin kaupungin asunnot Oy. In April 2012, we sent requests to regional companies asking for unit specific data on the buildings they manage. We repeated the request in October and December 2012. By the beginning of 2013, we had received unit specific information on 3,800 units which is 9% of the total stock owned by the city. These observations are not geographically evenly distributed within the city. Some regional companies disclosed information of almost all their units, while others sent information regarding only a few buildings. Ten of the regional companies did not respond at all.

Table 1 reports descriptive statistics for the units in our sample. Overall we have 8,417 observations out of which 5,266 are free market units. The table lists the housing attributes in our data. In addition to physical attributes, we have also calculated Euclidian distances to the central business district (CBD) of Helsinki and the nearest subway or train station for each unit.⁹

From Table 1 we see that the average monthly rent per square meter in subsidized units is half of the average rent in the free market units. However, the average

⁸ Currently we have too few observations of this sector to include them in the analysis. We plan to use these observations in the future when we have more data.

⁹ In subsequent work, these distances will be calculated using actual road distances and converted into travel times.

difference between the free market and subsidized rents would not be a good measure of the subsidy that tenants of the subsidized units receive. The reason for this is also evident from Table 1. Free market units and subsidized units differ in many respects: subsidized units (in our sample) are on average larger, younger and situated farther away from the CBD than free market units. These observations motivate the use of hedonic regression techniques in recovering more reliable estimates of the subsidy.

Table 1. Descriptive statistics.

	All		Free market		Subsidized	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of units	8 417		5 266		2 932	
Rent (€/m ² /month)	16.9	7.66	20.7	7.35	10.3	1.26
Rent (€/month)	894	371	1029	379	645	195
Floor area (m ²)	57.3	21.2	53.7	21.9	63.0	18.6
Age (years)	33.4	28.1	39.9	32.1	22.8	13.9
New building (0/1)	0.10	0.30	0.11	0.32	0.08	0.27
Floor level	3.10	1.74	3.08	1.74	3.15	1.76
Elevator (0/1)	0.62	0.48	0.58	0.49	0.72	0.45
Number of floors in the building	5.12	1.94	5.18	1.98	5.06	1.87
Sauna (0/1)	0.18	0.38	0.25	0.43	0.04	0.20
Balcony (0/1)	0.72	0.45	0.59	0.49	0.96	0.19
Distance to CBD (km)	6.98	4.02	5.52	3.80	9.53	3.03
Distance subway/train stop (km)	0.98	0.71	0.99	0.69	0.92	0.71

4. Econometric specification

In this section, we describe how we obtain an estimate of the subsidy for given subsidized unit. The first step in our empirical analysis is to estimate what the rent of a given subsidized unit would be in the absence of the subsidy. In order to do this, we need to have information on how different attributes of the units are priced in the free rental market. To this end, we treat the housing units as differentiated products and use hedonic regression techniques to estimate hedonic or implicit prices for different housing attributes using data only from the free market units. We then use these implicit prices to predict market rents for subsidized units.

We specify the following hedonic rent regression

$$(1) \quad p_i^{free} = \mathbf{x}'\boldsymbol{\beta} + f(l_i) + u_i,$$

where p_i^{free} is the monthly rent of a free market unit i , \mathbf{x} are the unit's physical attributes, $f(l)$ an unknown function of location of the unit (l) that captures unobservable location specific attributes, and u is the error term. We use spatial (zip-code) fixed effects as proxies for the unobservable neighborhood quality $f(l)$.¹⁰ Spatial fixed effects are a natural way to model spatial heterogeneity, since our aim is to predict market rents, not to estimate the (causal) effects of various neighborhood attributes on rent level.

Using the predicted rents, we define the unit specific subsidy for subsidized unit j as

$$(2) \quad subsidy_j = \hat{p}_j^{free} - p_j^{sub},$$

where \hat{p}_j^{free} is the out-of-sample prediction from Eq. (1) for a subsidized unit j (based on the unit's observed attributes) and p_j^{sub} is the unit's actual rent.

In addition to unobservable neighborhood attributes, we need to worry about unobservable unit attributes, most importantly the condition of the unit. Unfortunately, we do not have data on the units' condition. This is a potential problem because the difference in the predicted market rent and the actual rent for the subsidized units can arise from an omitted variable. It is likely that free market landlords have stronger incentives to maintain and improve the condition of their units because private market rents will reflect the condition of the unit. This is not necessarily the case in social housing. In this sense, our estimates of the unit specific subsidy should be seen as upper bounds for the true subsidy.

¹⁰ In future work, we aim to use semiparametric methods (e.g. the local linear model) to improve our prediction model. Here the idea would be to control for unobservable spatial amenities using a spatially smooth function of a unit's coordinates. See e.g. Rossi-Hansberg et al. (2010) and McMillen (2010).

5. Empirical results

5.1. Hedonic regressions

Tables 2 and 3 present the results for hedonic regressions based on Eq. (1). In Table 2, we exclude spatial fixed effects, whereas in Table 3 the fixed effects are included. For comparison, we also report hedonic regression results for the sample of subsidized units. The comparison of the regression coefficients or the implicit prices across these samples is interesting in its own-right and reveals how the city officials price the subsidized units compared to free market units.

The implicit prices in the subsidized unit sample do not necessarily reflect market valuations of the attributes, but instead are administratively set by the city of Helsinki (or the regional companies). Of course, the city could have used market information when pricing their units. If the implicit prices of the different attributes were the same in the free market units and subsidized units, the city officials would have priced their units to match exactly the market valuations of different housing attributes. In this case, any subsidy (that is, rent below market rent) would be reflected simply as a difference in the intercept terms of the two hedonic regression models.

Clearly this is not the case, however. The price schedules of the free market and subsidized units differ in most attribute dimensions. This also illustrates why it would not make sense to estimate a hedonic model using all observations and measure the average subsidy simply by including a dummy for the subsidized units in that regression. The comparison of the price schedules also give us the first the hint on where exactly the subsidy for a given unit arises.

From Table 3, we see that adding spatial fixed effects changes the estimates for the implicit prices. This is to be expected because in these regressions we are utilizing only within zip-code variation in the attributes. For example, within this small geographical area, distance to CBD no longer has a statistically significant coefficient. This is not a problem for our prediction exercise and we use the free market hedonic regression in Table 3 to estimate the unit specific subsidies.

Table 2. Hedonic regression results without spatial fixed effects.

Variable	Free market		Subsidized	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	-930.0**	166.1	-956.8**	182.7
Log(floor area)	543.5**	45.10	451.6**	41.80
Number of rooms (ref. 1 room)				
2 rooms	-6.300	24.98	-25.44*	9.635
3 rooms	44.10	41.39	5.793	14.17
4 rooms	191.70**	56.01	69.52**	18.57
5 or more rooms	316.8**	114.7	127.9**	26.32
New building (0/1)	-76.36	78.58	38.64**	3.823
Age (ref. less than 10 years)				
11 - 20 years	-153.4**	35.22	5.999	30.55
21 - 30 years	-166.4**	52.81	-27.70	25.74
31 - 40 years	-165.8**	52.07	17.34	47.85
41 - 50 years	-82.64**	30.72	-70.23*	29.74
51 - 60 years	-95.22	59.90	..	..
61 - 70 years	-9.979	39.06	..	..
over 70 years	-27.15	54.63	..	..
Floor level	20.24*	8.286	-1.903	4.465
Elevator	31.23	50.15	-7.439	12.26
Floor level x elevator	-15.83	10.29	5.852	5.060
Number of floors	5.667	6.289	3.340	1.652
Sauna	145.2**	28.85	102.8*	36.21
Balcony	-47.79**	17.77	-34.98	25.38
Log(CBD distance)	-131.1**	33.54	-100.9**	30.90
Log(subway/train distance)	35.45*	14.31	8.680	11.35
N	5 258		2 932	
R ²	0.63		0.97	

Notes: The table reports results from hedonic regression models where the dependent variable is the monthly rent of a unit. Standard errors are clustered at the zip-code level. ** and * indicate 1 and 5 percent significance levels, respectively.

Table 3. Hedonic regression results with spatial fixed effects.

Variable	Free market		Subsidized	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	-753.8**	155.8	-1215**	126.0
Log(floor area)	562.9**	45.63	461.7**	35.31
Number of rooms (ref. 1 room)				
2 rooms	-27.46	20.59	-30.08**	8.010
3 rooms	46.89	36.73	-6.049	9.506
4 rooms	210.2**	48.31	53.78**	8.956
5 or more rooms	253.7*	103.48	110.1**	13.62
New building (0/1)	-38.58	57.26	26.54**	1.106
Age (ref. less than 10 years)				
11 - 20 years	-180.1**	31.67	-28.82	14.56
21 - 30 years	-195.8**	33.56	-62.50**	10.41
31 - 40 years	-163.4**	40.65	-73.52**	9.389
41 - 50 years	-77.27*	34.52	-107.6**	13.01
51 - 60 years	-128.6**	43.47	..	..
61 - 70 years	-74.55	42.06	..	..
over 70 years	-124.6*	50.60	..	..
Floor level	14.80**	4.325	4.556*	1.564
Elevator	-33.55	19.84	-0.988	7.293
Floor level x elevator	-6.504	5.453	-0.767	1.802
Number of floors	-9.425*	4.031	2.423**	0.754
Sauna	113.8**	14.20	-17.47	17.89
Balcony	-40.56**	14.57	-32.37	20.43
Log(CBD distance)	31.45	29.86	58.03**	14.01
Log(subway/train distance)	-60.76*	24.08	-3.369	10.18
N	5 258		2 932	
R ²	0.73		0.98	

Notes: The table reports results from hedonic regression models where the dependent variable is the monthly rent of a unit. Standard errors are clustered at the zip-code level. ** and * indicate 1 and 5 percent significance levels, respectively.

5.2. The amount of subsidy

Next we calculate for each unit the monthly subsidy based on Eq. (2). The predicted free market rents (\hat{p}^{free}) are based on the free market regression with fixed effects reported in Table 3. Figure 1 illustrates the distribution of the monthly subsidy. The average monthly subsidy per unit is 246 Euros, whereas the average monthly subsidy per unit's square meters is 3.88 Euros. The average monthly rent per square meter in our data is 16.9 Euros. However, these average amounts mask substantial heterogeneity in both subsidy measures. Naturally, the variation in the left-hand-side of the figure is mostly due to size differences of the units. But interestingly the heterogeneity remains even when the subsidy is measured in Euros per square meter of the unit.

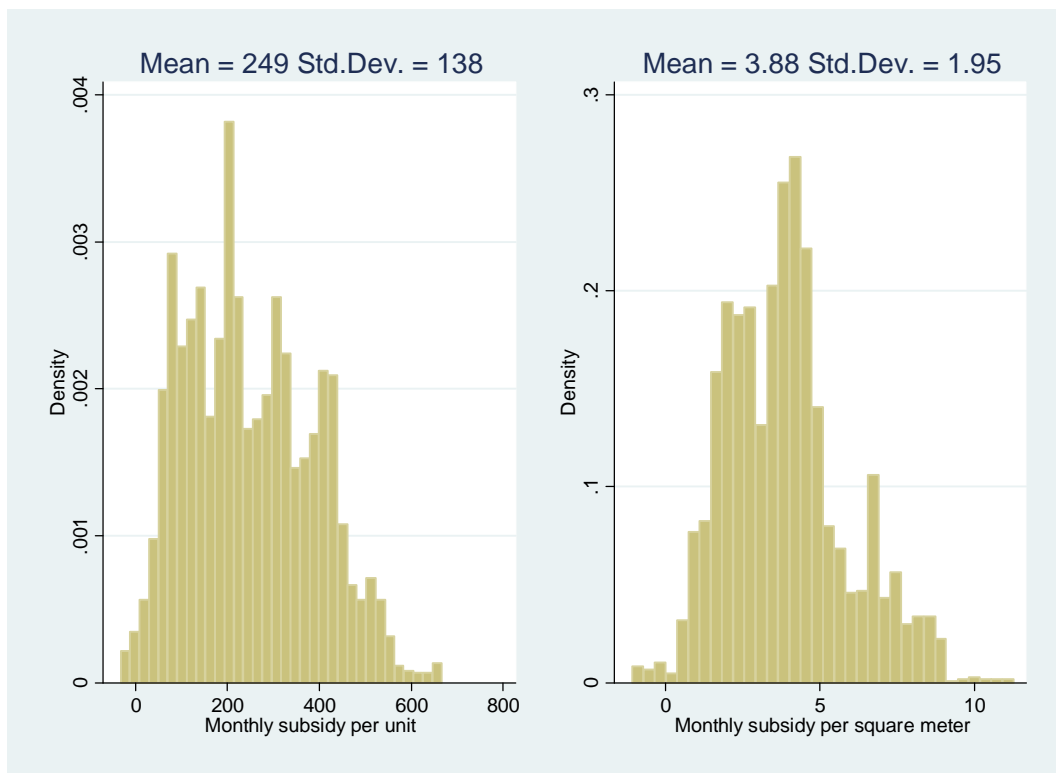


Figure 1. Distribution of monthly subsidies.

To learn more about the heterogeneity in the subsidy across units, we present, in Table 4, conditional means of the subsidy levels for different unit types using regression analysis. Table 4 includes results from two different regression models. In the left-hand-

side the dependent variable is the total monthly subsidy of the unit and in the right-hand-side the monthly subsidy per square meter. According to Table 4, conditional on the size and age of the unit, the subsidy (both per unit and per square meter) decreases as the distance to the CBD increases. The subsidy per square meter is highest for one room units (studios) and clearly lowest for large units with 5 or more rooms. Furthermore, newer units command larger subsidies per square meter.

Table 4. Monthly subsidy in different housing unit types.

Variable	Subsidy per unit		Subsidy per square meter	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	351.6**	6.795	7.723**	0.129
Number of rooms (ref. 1 room)				
2 rooms	49.44**	5.143	-0.440**	0.097
3 rooms	144.5**	5.329	-0.215*	0.101
4 rooms	266.4**	6.043	0.180	0.114
5 or more rooms	249.2**	14.132	-0.812**	0.268
Age (ref. less than 10 years)				
11 - 20 years	-84.74**	6.852	-1.502**	0.130
21 - 30 years	-48.49**	5.691	-0.824**	0.108
31 - 40 years	-41.94**	7.088	-1.008**	0.134
41 - 50 years	12.84	6.695	0.265*	0.127
Distance to CBD	-18.58**	0.833	-0.321**	0.016
N	2 932		2 932	
R ²	0.72		0.50	

Notes: The table reports results from regression models where the dependent variable is either the monthly subsidy of a unit or the monthly subsidy per square meter of a unit. ** and * indicate 1 and 5 percent significance levels, respectively.

6. Conclusions

In this paper, we analyzed whether subsidized rental units (owned by the city of Helsinki) have lower rents than comparable free market units. We used hedonic regression techniques and data from free market rental units to recover free market rents for the subsidized units. The difference between this prediction and the actual rent of a subsidized unit is our measure of the subsidy that a particular unit receives.

On average the monthly subsidy per unit is 246 Euros, whereas the average monthly subsidy per unit's square meters is 3.88 Euros. We also find that there is vast heterogeneity in the amount of subsidy that different subsidized units receive, both in terms of total monthly subsidy and monthly subsidy per square meter of the unit. More precisely, conditional on size and age of the unit, the subsidy (both per unit and per square meter) decreases as the distance to the CBD increases. We also find that the subsidy per square meter is highest for one room units (studios) and clearly lowest for large units with 5 or more rooms and that newer units command larger subsidies per square meter.

An interesting future avenue for research would be to obtain data and background characteristics of the households who occupy the units in our data. This would give us information on what type of households benefit the most from the subsidy system. Since the allocation mechanism of the subsidized units is quite unclear, it is not obvious that the benefits accrue to those in most need.

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