Households' willingness to pay for public housing☆

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A B S T R A C T

In the presence of price controls, nonmarket housing allocation mechanisms such as queueing prevent households from revealing their marginal willingness to pay for housing through market prices. We derive the households' marginal willingness to pay using the intuitive idea that the length of the queue for a specific house reflects the households' willingness to pay for housing characteristics. We apply our methodology to public housing in the Amsterdam Metropolitan area and show that, *on average*, the households' marginal willingness to pay for a unit of public housing is close to its marginal costs. This suggests that the welfare loss of public housing through distortions in housing supply is rather limited and is mainly through distortions in housing demand. We provide indirect evidence of the latter by showing that queueing induces inefficient matching of households and housing.

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1. Introduction

For regulated rental housing markets with nonmarket allocation and rent control, standard hedonic pricing methods in the toolkit of the economist cannot be applied because these methods require rents to be freely determined (Rosen, 1974). We will start from the premise that in regulated rental housing markets, households do not reveal their willingness to pay through the price, but through other mechanisms such as queuing and waiting. This paper proposes an intuitive methodology that estimates the marginal willingness to pay for housing characteristics on waiting lists. We apply this methodology to public housing by estimating a hedonic waiting time function which reveals the effects of housing characteristics (including the controlled rent) on the length of the waiting time.[2] Based on this hedonic waiting time function, we derive the households' marginal willingness to pay for public housing and compare this with the cost of providing public housing.

Waiting lists are central to the allocation of a number of goods (Cheung, 1974). Typical examples are waiting lists for public health care treatment where individuals have to wait for treatment or surgery (e.g., Pizar and Prentice, 2011) or public housing where households have to wait for rental housing (Lindsay and Feigenbaum, 1984).[3] Public housing waiting times strongly vary (from months to decades in our data) because of heterogeneity in housing characteristics such as location, size and their value when commercially sold, which we will exploit in our methodology. For households on waiting lists, the price of a public house is equal to its rent plus the cost of receiving the public house later (Propper, 1995; Deacon and Sonstelie, 1985, 1989, 1991).

Allocation mechanisms of public housing that use waiting time strongly differ between countries and even between cities of the same country. We focus on Amsterdam where it is *not* the case that households line up for a specific public house or in a specific neighborhood (as in New York). In Amsterdam Metropolitan Area, which contains several municipalities, a *choice-based* allocation system is used in which eligible households may choose from

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[3] The idea to use queueing time to derive the willingness to pay has been used before in the context of a homogeneous good where its demand is independent of the demand for other homogeneous goods on waiting lists (Lindsay and Feigenbaum, 1984; Pizar and Prentice, 2011). For healthcare, this assumption seems accurate (i.e., new kidneys demand is independent of heart surgery demand). In markets with *heterogeneous* goods such as housing, this assumption is untenable, as the length of the queue for one good type is related to the length of the queue of other good types. Other healthcare studies studying waiting lists apply contingency valuation methods, which have well-known limitations (Propper, 1995; Bishai and Lang, 2000).

a large set of houses that are different in many characteristics including the level of the controlled rent.[4] Registered households may apply for *any* public house which becomes vacant in the municipality where they live or work. Conditional on applying, the household with the highest priority status – defined as the household with the longest waiting time – is considered first. Once eligibility is checked, which depends mainly on household income, the household may either accept or reject the offer. Households are permitted to reject unlimited without penalty to maintain the position in the waiting list. When a vacant house is rejected, the household with the next-to-highest priority status is considered until the house is accepted. The rental contract offered to the household is permanent. As a consequence, when household incomes of public housing residents increase above eligibility targets (after a certain period), residents will not be evicted out of their current residence into the private sector.

We are interested in the welfare effects of supplying public housing which is allocated using waiting time and where the rent is controlled. Our paper fits therefore in the literature that assumes that there is no medium of exchange as money (Wheaton, 1990; Svensson, 1994; Anas, 1997; Abdulkadiroglu and Sönmez, 1999; Arnott and Igarashi, 2000; Sönmez and Unver, 2010, 2011). We mainly focus on the distortionary effect of *inefficient public housing supply* (i.e., public housing associations offer houses that are too large or too small, on average, from a welfare perspective) and estimate the *average* of the households' marginal willingness to pay for public housing, where the average is defined for the population of public housing renters. This estimate is useful, because for households with a quasi-linear utility function, which is a somewhat restrictive assumption as discussed later on, and given constant returns to scale in housing production (which is a common assumption, see Epple et al., 2010), public housing supply is optimal when the average of the households' marginal willingness to pay for public housing is equal to its marginal cost. In the current paper, we test for this optimality condition.

We emphasize that our empirical analysis focuses on rent-controlled public housing and not to rent-controlled private housing. A key difference is that rent control of private housing *reduces* private supply below its optimal level in terms of quality (Moon and Stotsky 1993). In contrast, public housing suppliers receive substantial subsidies in order to reduce rents but not housing quality and there is not necessarily a welfare-reducing reduction in the housing suppliers' expenditure on housing or housing maintenance. In contrast to private suppliers, it is imaginable that public housing suppliers oversupply quality, implying that houses are offered that are too luxurious from a welfare perspective. Consequently, in general, it is unknown whether the suppliers' expenditure on public housing supply is insufficient or excessive from an economic welfare perspective.

Our contribution is threefold. First, we propose a methodology to derive the marginal willingness to pay for housing characteristics given nonmarket housing allocation based on waiting time. We are particularly interested in households' willingness to pay for one monetary unit of public housing, i.e. the marginal willingness to pay for the *market value* of a public house when sold in the private property market. The market value is of interest because it is not only a reasonable measure of renters' overall housing consumption but also the preferred measure of societies' capital costs for public housing. The latter is important, because it enables us to compare the societal benefits of one unit of public housing with the societal costs of provision.

More formally, we model the use of the waiting time as a non-market allocation mechanism where (identical) households (who are eligible for public housing) choose from a given set of heterogeneous public houses with different rents and market values.[5] Rents are regulated at the national level. It is therefore reasonable to treat the rent as exogenous because it is primarily determined through a regulatory process rather than market forces.[6] The length of the queue for each type of public house is then endogenously determined, effectively creating a market for public housing, which is cleared by a *distribution* of waiting times. One of the immediate implications is that houses that are more attractive to renters (e.g., houses with a lower rent-to-market value) have a longer queuing time. Based on the market equilibrium distribution of queuing times, households will sort themselves into different types of houses which reveals their willingness to pay for public housing characteristics.

Second, we apply the methodology to public housing in Amsterdam Metropolitan area. Our data are roughly a 10% random sample of all *new rental contracts* obtained from one of the largest public housing associations in this area. We have selected households that received a public house through waiting (rather than through an urgency label, which applies for example for divorced females with small children). We then focus on the subsample of households who do not receive housing subsidies and who use public housing for the first time.[7] The sample analyzed by us contains 774 observations. Although this sample is not very large, we emphasize that we are the first study to use detailed information on housing allocation matches including the rent paid, as stipulated by the rental contract, as well as the queueing time which allows us to estimate the renters' marginal willingness to pay, MWP, for public housing characteristics.[8]

To be more precise, we estimate the average MWP for a monetary unit of public housing and show that it close to its marginal costs suggesting that the *supply* of public housing is not too far from its optimum. Our results are quite different from studies which report deadweight losses of reductions in *private* housing supply due to rent control, which receives a lot of attention in the literature (e.g., Gyourko and Linneman, 1989; Moon and Stotsky, 1993; Sims, 2007). Our results are in line with Glaeser and Luttmer (2003) that the distortions of housing market regulation are not so much through inappropriate supply but through inefficient matching.

Third, we contribute to the literature which argues that households vary in their willingness to pay for housing. Due to rent con-

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[4] Choice-based allocation, which implies that registered households actively search in a vacancy list, has been introduced in many other cities including London in 2001, and Toronto in 2014. In London, about one hundred households apply per unit, so the market is thick. The latter also applies in Amsterdam.

[5] For alternative, but restrictive, approaches using measures of residential mobility, see Bartik et al. (1992) and Van Ommeren and Koopmans (2011). In the latter approach, households are assumed to search for accommodation. We assume that households simultaneously choose the length of the queue and the characteristics of the public house. The latter seems reasonable when the market is thick as is the case for the Netherlands.

[6] In our econometric estimation procedure, we will provide estimates assuming that the rent is endogenous to deal with unobserved housing characteristics.

[7] In the Netherlands, housing subsidies are provided by the national government as a supplementary income to *poor* households. We select households that do not receive housing subsidies for a number of reasons. One fundamental reason is that housing subsidies are household specific. Another reason is that housing subsidies are not observed and these have to be approximated with imputed subsidies, and that subsidies will change when the income of the household will change. We focus on households who occupy public housing for the first time, because only for these households' waiting time is well-defined.

[8] We cite Geyer and Sieg (2013): "Local housing authorities are not willing to disclose detailed micro-level data on wait lists. To our knowledge, there is no empirical research that uses household level, *wait list data* to study rationing in public housing markets. The key challenge is, therefore, to estimate a model that treats the wait list as latent.". In the current paper, we estimate the model that treats the waiting list explicitly.