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Can Risk Averse Private Entrepreneurs Efficiently Produce Low Income Housing

Paul Makdissi

Quentin Wodon

UNIVERSITÉ DE SHERBROOKE

Can Risk Averse Private Entrepreneurs Efficiently Produce Low Income Housing?*

Paul Makdissi† Quentin Wodon‡

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Abstract

Under rent ceilings and quality floors for low income housing units, imperfect information on the ability of tenants to pay their rent may lead the decentralized production of housing units by risk averse private entrepreneurs to be inefficient. A coordinating agency and/or subsidies for new tenants would help to produce more housing, thereby increasing the profits for landlords while also enabling more low income households to find housing.

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† Département d'économique, Université de Sherbrooke, 2500, boulevard de l'Université, Sherbrooke, Québec, Canada, J1K 2R1; Email: paul.makdissi@USherbrooke.ca.

‡ AFTPM, World Bank, 1818 H Street, NW, Washington, DC 20433, USA, Email: qwodon@worldbank.org.

1 Introduction

The literature on employment points out to the fact that there is a cost for firms to match their needs with the workers that they are hiring (Jovanovic, 1979; Miller, 1984). This matching process is imperfect as firms do not have full information on the future level of productivity of the workers that they are hiring. This leads many firms to hire workers, and then fire some of them (those who proved less productive) in order to hire new workers who may not appear very different on the basis of their observable characteristics from the workers who just lost their job.

As noted by McCall (1991), the issue of matching workers with jobs is more problematic for younger workers who lack experience and have not yet proven themselves. For more experienced workers, their past successful record of employment is a signal that firms can use in order to minimize the risks associated with hiring new workers. Note that this signal on individual worker quality is available to all firms, not only to those that employed these more successful workers, since on the labor market workers make their employment record public.

A similar point could be made about the housing market. New and younger tenants who have not yet proven that they are able to pay their rent (or new owners who have not yet proven that they are able to pay their mortgage) are probably more risky for landlords (or banks) than tenants or owners who have already proven themselves and have a good credit record.

If markets were fully flexible, the rents paid by tenants or the quality of the housing units provided to them would adjust to fully take into account these risks and the information available to landlords. But in the low income housing markets, rents are typically subject to ceilings, and housing quality must respect some minimal standards, so that costs are subjects to floors. Then there may be cases under which the decentralized provision of housing units by private landlords will not be efficient. This is because the production of information on the quality of tenants (i.e., who pays and who does not pay the rent) is a public good that will not be taken into account by private landlords in their own optimization function[1].

The model presented in this paper shows that landlords may produce or make available housing units at a level at which the cost of producing new units will be below the expected benefit to them from renting these units. By contrast, a coordinating

[1] A similar point was made by Makdissi and Tejedo (2004) in the case of labor markets.

agency might better take the public good nature of the information on the quality of tenants into account, and this would result in a higher level of production and also in higher profits for landlords[2]. In the absence of such a coordinating agency, production or other subsidies for landlords in the low income housing market would make sense on efficiency grounds apart from the more traditional equity arguments advanced in the literature[3].

2 Model and Results

Consider VNM (Von Neuman-Morgenstern) private landlords maximizing their actualized expected utility of income over an infinite time horizon[4]. The landlords derive their income from renting housing units in the low income housing market. This market is regulated so that there is a maximum level of rent denoted by $\overline{h}$. The production cost of housing units is given by $c(q)$ with $c'(\cdot) > 0$ and $c''(\cdot) < 0$. The landlords are risk averse, so that their preferences may be represented by a Bernoulli utility function $u(\cdot)$ with standard asumptions $u' \geq 0$ and $u''(\cdot) \leq 0$.

The landlords face non-payment issues among their tenants, with a proportion $p \in [0,1]$ of non-payment among new tenants, i.e. tenants who are renting a unit for the first time in their life. This proportion p is unknown a priori. If $F(\cdot)$ represents the cumulative distribution function of p over the interval $[0,1]$, then its expected value is $\mu = \int_0^1 pdF(p)$.

Tenants live (and thereby rent their unit) for two periods. In the first period, they rent their unit for the first time, so that landlords do not have any specific information on the probability that they will not pay their rent. In the second period however, the tenants have a credit rating record, so that any landlord will know if they have been good at paying their rent or not in the previous period (the fact that there is a

[2]Whether the coordinating agency would itself have the incentives to perform adequately is another issue. In the context of mortgages for low-income households, see for example Ambrose and Thibodeau (2004).

[3]On some of these equity or social arguments, see for example Grigsby and Bourassa (2004). Our theoretical argument in favor of subsidies does not detract from potential implementation difficulties. For an example of supply-side low income housing subsidies in the U.S. and its evaluation, see for example Cummings and DiPasquale (1999) and McClure (2000). For a broader review of the main programs benefiting the low income housing market in the U.S., see Olson (2001).

[4]Assume for example that at time $t = 0$, the entrepreneur is a dynasty head who cares for the welfare of his offspring. In this context, the discount factor β incorporates time preference as well as altruism.

credit rating system means that the information on the quality of tenants is available to all landlords, not only to the landlord who rented a unit in the first period to any particular tenant). At any given time t, a landlord will rent units to both new (first period) and old (second period) tenants.

The number of landlords is K. As already mentioned, the landlords cannot identify the quality of new, first period tenants. New tenants are therefore chosen randomly. After one period, "bad" tenants loose their unit since they did not pay their rent, while the identity of "good" tenants is common knowledge through the credit rating system. Let n_t^i be the number of new tenants chosen by landlord i at time t and let η_t^i be the number of good tenants among them. If the number of landlords is large, we can use the following approximation

$$\sum_{i=1}^{K} \eta_t^i = \mu \sum_{i=1}^{K} n_t^i \tag{1}$$

At the end of each period, good tenants are equaly distributed among each landlord. We will assume that the rent paid by good tenants is $\overline{h}$. We could also assume that landlords wishing to keep good tenants will offer a reduction in rent in the second period, but this would not change the key results. What matters is that at the equilibrium, each landlord will ask for the same rent and good tenants will be distributed equally among all landlords. Specifically, each landlord will have η_{t-1} good tenants at time t with $\eta_{t-1} = (\mu/K) \sum_{i=1}^{K} n_{t-1}^i$.

Assume now that there exist η_{-1} good tenants at time 0. For landlord i, the optimization problem is

$$Eu^i = \max_{\left\{n_t^i\right\}_{t=1}^{\infty}} \sum_{t=0}^{\infty} \beta^t \int_0^1 u\left(\eta_{t-1}\overline{h} + pn_t^i\overline{h} - c\left(\eta_{t-1} + n_t^i\right)\right) dF\left(p\right), \tag{2}$$

where Eu^i represents the landlord's expected utility and β is the discount factor. Using (1) in (2), we can rewrite the problem as

$$Eu^i = \max_{\left\{n_t^i\right\}_{t=1}^{\infty}} \sum_{t=0}^{\infty} \beta^t \int_0^1 u\left(\mu\frac{\sum_{k=1}^{K} n_{t-1}^k}{K}\overline{h} + pn_t^i\overline{h} - c\left(\mu\frac{\sum_{k=1}^{K} n_{t-1}^k}{K} + n_t^i\right)\right) dF\left(p\right). \tag{3}$$

Consider now the open loop Nash equilibrium of this problem. The steady-state

equilibrium values are given by

$$\begin{aligned} 0 &= \int_0^1 u'\left(\widehat{n}^*\overline{h}\left[\mu+p\right]-c\left(\widehat{n}^*\left[1+\mu\right]\right)\right)\left(p\overline{h}-c'\left(\widehat{n}^*\left[1+\mu\right]\right)\right)dF\left(p\right) \\ &+\frac{\beta\mu}{K}\left(\overline{h}-c'\left(\widehat{n}^*\left[1+\mu\right]\right)\right)\int_0^1 u'\left(\widehat{n}^*\overline{h}\left[\mu+p\right]-c\left(\widehat{n}^*\left[1+\mu\right]\right)\right)dF\left(p\right) \end{aligned} \tag{4}$$

Since $u'(\cdot)$, β, μ and K are positive, and since $\left(\overline{h}-c'(\cdot)\right)$ must also be positive, the second term of the right hand side of equation (4) is positive, which implies that the first term is negative. The interpretation of (4) is that landlords equalize the expected marginal benefits from identified good tenants in the second period, $\frac{\beta\mu}{K}\left(\overline{h}-c'(\cdot)\right)\int_0^1 u'(\cdot)\,dF(p)$, with the expected marginal cost of identifying those tenants, $-\int_0^1 u'(\cdot)\left(p\overline{h}-c'(\cdot)\right)dF(p)$. However, the fact that the first term on the right hand side is negative also implies that when renting a unit to a new tenant, landlords make available units up to a point where the expected value in terms of marginal utility of the marginal benefit $\int_0^1 u'(\cdot)\,p\overline{h}dF(p)$ is lower than the expected value of the marginal cost $\int_0^1 u'(\cdot)\,c'\left(\widehat{n}^*\left[1+\mu\right]\right)dF(p)$.

An alternative to the decentralized functioning of the market would be to have some agency intervening in order to maximize the joint expected utility of all landlords taken at once, by solving the following problem

$$\sum_{k=1}^{K} Eu^k = \max_{\left\{\left\{n_t^i\right\}_{t=1}^{\infty}\right\}_{i=1}^{K}} \sum_{i=1}^{K}\sum_{t=0}^{\infty}\beta^t\int_0^1 u\left(\mu\frac{\sum_{k=1}^{K}n_{t-1}^k}{K}\overline{h}+pn_t^i\overline{h}-c\left(\mu\frac{\sum_{k=1}^{K}n_{t-1}^k}{K}+n_t^i\right)\right)dF\left(p\right). \tag{5}$$

The steady-state equilibrium of this problem is given by

$$\begin{aligned} 0 &= \int_0^1 u'\left(\widetilde{n}^*\overline{h}\left[\mu+p\right]-c\left(\widetilde{n}^*\left[1+\mu\right]\right)\right)\left(p\overline{h}-c'\left(\widetilde{n}^*\left[1+\mu\right]\right)\right)dF\left(p\right) \\ &+\beta\mu\left(\overline{h}-c'\left(\widetilde{n}^*\left[1+\mu\right]\right)\right)\int_0^1 u'\left(\widetilde{n}^*\overline{h}\left[\mu+p\right]-c\left(\widetilde{n}^*\left[1+\mu\right]\right)\right)dF\left(p\right) \end{aligned} \tag{6}$$

By comparing (4) and (6), we can see that $\widetilde{n}^* > \widehat{n}^*$ (since $K > 1$). The reason why the coordinating agency performs better is due to the fact that individual landlords only consider their own expected marginal benefit in the second period when optimizing their behavior, $\frac{\beta\mu}{K}\left(\overline{h}-c'(\cdot)\right)\int_0^1 u'(\cdot)\,dF(p)$, while the coordinating agency takes into account the expected marginal benefit of all landlords taken togethger, namely $\beta\mu\left(\overline{h}-c'(\cdot)\right)\int_0^1 u'(\cdot)\,dF(p)$.

This situation is somewhat similar to Hardin's (1968) "tragedy of the commons" for renewable natural resources for which there is a free access. Here, the common

resource is the pool of identified good tenants to which all landlords have free (or quasi free) access. In the case of natural resources, the situation leads to over-extraction of the resources, while in our case, there is under-production of the common resource represented by the information on good tenants. If the demand for housing unit on the part of tenants is inelastic (everybody needs housing), the decentralized provision by risk averse landlords does not maximize social welfare.

3 Conclusion

This notes provided a simple model under which the provision of low income housing units by risk averse private landlords is inefficient, as the marginal benefit from providing additional housing to the market would more than compensate for the cost of making these additional units available to tenants. A coordinating agency which would take into account the information generated by tenants on their ability to pay their rent would help to produce more housing units, and it would do so in a profitable way. The problem is that in the absence of such a coordinating agency, the information generated in the first period on the quality of the new tenants is a public good which is not taken into account in the maximization behavior of decentralized landlords.

It should be noted that the situation arises in part because both the rents and the quality of the housing units are regulated in the model. If we assume that tenants have an inelastic demand for housing (everybody needs a dwelling), prices would adjust upward to clear the market if there were no rent control. Alternatively, the cost of the housing units could adjust downward (lower quality) in order to clear the market at the rent ceiling. Yet in the low income housing market, we do typically have both rent ceilings and quality floors, so that the markets may not clear.

A potential implication of our model is that in the absence of a coordinating agency (or if creating such an agency is not feasible), governments willing to minimize the proportion of the low income population without adequate housing could implement policies (e.g., production subsidies for private landlords or even public housing production) in order to acheive full efficiency in the functioning of the housing market.

References

[1] Ambrose, B. W., and T. G. Thibodeau (2004), Have the GSE Affordable Housing Goals Increased the Supply of Mortgage Credit?, *Regional Science and Urban Economics,* **34**: 263-73.

[2] Cummings, J. L., and D. DiPasquale (1999), The Low-Income Housing Tax Credit: An Analysis of the First Ten Years, *Housing Policy Debate,* **10**: 251-307.

[3] Grigsby, W. G., and Bourassa, S. C. (2003), Trying to Understand Low-Income Housing Subsidies: Lessons from the United States, *Urban Studies,* **40**:973-92.

[4] Jovanovic, B. (1979), Job Matching and the Theory of Turnover, *Journal of Political Economy*, **87**:972-990.

[5] Hardin, G. (1968), The Tragedy of the Commons, *Science*, 162, 1243-1248.

[6] Makdissi, P., and C. Téjédo (2004), Un effet externe positif à l'embauche: L'amélioration de la connaissance de la qualité des travailleurs, *Revue Économique,* **55**: 93-102.

[7] Miller, R. A. (1984), Job Matching and Occupational Choice, *Journal of Political Economy*, **92**:1086-1120.

[8] McCall, B. P. (1991), A Dynamic Model of Occupational Choice, *Journal of Economic Dynamics and Control*, **15**:387-408.

[9] McClure, K. (2000), The Low-Income Housing Tax Credit as an Aid to Housing Finance: How Well Has It Worked?, *Housing Policy Debate,* **11**: 91-114.

[10] Olson, E. O. (2001), Housing Programs for Low Income Households, National Bureau of Economic Research Working Paper 8208.