Rental Contracts, Endogenous Turnover and Rent Volatility[0]

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November 1996

Abstract

The paper analysis rental contracts in a two–period model of the housing market with uncertain 'outside option', accounting for non–contractible mobility–cost and consumption indivisibilities. The main findings are: (i) Bilaterally efficient contracts set rents which are less volatile than market rents for vacancies. (ii) Equilibrium–contracts imply a negative relation between turnover and market rents. (iii) Provided that tenants are not too risk loving with respect to future market rents, there will be excess volatility of market rents.

Keywords: long–term contracts, excess volatility, rent–control.
JEL class. D82, R00.

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[0]A previous version of this paper circulated under the title 'long-term rental contracts'. I am grateful for helpful comments from Elmar Wolfstetter, Horst Tomann, Choon Poh Tan and from seminar participants at Harvard University and at the Free University of Berlin.

Rental Contracts, Endogenous Turnover and Rent Volatility

Introduction

Responding to acute housing shortages after World War II governments all over Europe introduced rent controls for residential leases. In marked contrast to the popularity of these measures, economists overwhelmingly rejected them. Commenting on post–war Britain James Meade nicely stated the most basic reason for this rare unanimity within the profession:

> "The present position is grossly inequitable and grossly inefficient. Those lucky occupiers who are protected by rent restriction obtain accommodation exceptionally cheaply and have no incentive to economize dwelling space by living in a smaller dwelling, letting off rooms to lodgers, etc. Those unlucky persons (often ex–servicemen and women attempting to set up home) who are not in this charmed circle cannot find accommodation, largely because the protected 'sitting birds' have little or no incentive to make room for them."[1]

When the cold war ended, the fall of the Berlin wall initiated a boom of rents and property prices in the city, particularly in the commercial sector. Nevertheless, most sitting tenants continued to enjoy their low rent while comparable new leases could only be obtained at about triple that price. Arguably, the hardships of newcomers, and those whose leases came up for renewal, had been aggravated by the lack of incentives to economize on space among the protected 'sitting birds'. This time, however, the situation resulted from private contracts agreed upon beforehand, typically a ten–year lease indexed on

[1] Meade, J. (1948), p.ix. Note, that Meade's argument (similarly Hayek, F. 1931) does not depend on an alleged decline in supply or the particular rationing scheme.

inflation, and no economist claimed it to be 'grossly inequitable and grossly inefficient'.[2]

On both occasions, the 'hot war' and the end of the 'cold war', there were shocks to demand and/or supply largely unrelated to the willingness to pay or the cost of supply whithin established tenancies. For example, housing was extremely scarce in post–war Germany: war damage and the influx of refugees had reduced supply per capita by more than a third of the pre–war level. However, the average out–of–the–pocket cost of providing housing from the remaining stock had declined: mortgages had been wiped out by inflation and cost of repairs benefited from low real wages. Faced with a general decline in living standards, sitting tenants could hardly afford to maintain pre–war housing expenditure. Similarly, the property boom in Berlin was fueled by new entrants eager to be present in the new capital, not by a much increased profitability of the established business. While the 'outside option' deteriorated for the tenant (improved for the landlord) the value of the 'inside option' remained largely unchanged.

According to Meade's critizism the terms of the contract should adjust readily to a change of market conditions to ensure efficient allocation ex post. The experience in Berlin, however, suggests, that ex ante bilateral partnerships will seek insurance against the vagaries of the 'outside option' — and by doing so, make things even worse. We analyse the issue with a two–period model of a competitive rental housing market in which average supply per tenant is stochastic. The immediate impact of the supply shock is confined to the 'active' market — the 'outside option' for those who hold contracts. The model accounts for ex–post indivisibilities and uncertain individual mobility cost as characteristic features in real estate. There are neither future markets nor equivalent rent–insurance available but contracts can be made contingent on future market conditions. They remain, however, incomplete because mobility cost are assumed to be non–contractible and separation penalties

[2] Corresponding examples for the downside of the market could be cited from the '90/91 real estate crash in the U.S.A.

(‘bonding’) are considered unfeasible in residential housing.

Given these assumptions, long–term contracts with pre–agreed schedules for rent–reviews are chosen to protect the tenant against the exploitation of mobility cost and in order to provide mutual insurance against the vagaries of market rents. First, we characterize contracts which are efficient from the point of view of single landlord–tenant pairs. They provide for incomplete insurance, i.e. contractual rents are contingent on, but less volatile than market rents. In equilibrium there will be a negative relation between the rate of turnover and the market rent for new leases. Second, we ask whether bilaterally efficient contracts are socially optimal. The higher the turnover, the more landlord–tenant pairs share the outside shock, hence, its impact on equilibrium–rent will be less pronounced. The rate of turnover is endogenously determined by the relation between contract rents and market rents. With endogenous participation multiple equilibria are possible. More interestingly, even if unique, equilibrium contracts are not constraint efficient because bilateral agreements ignore the impact of aggregate turnover on equilibrium–rents. Provided that tenants are not too risk loving with respect to market rents, optimal contracts set higher rents in all states. Optimal turnover would be higher and rents less volatile than for equilibrium contracts.

Grenadier (1995) and McConnell & Schallheim (1983) evaluate various lease–contracts in the presence of rent–uncertainty. The impact of lease–contracts on the volatility of rents, however, appears to be largely unexplored. Allen & Gale (1994) analyze the volatility of asset prices in a model with endogenous participation. Their claim of excess volatility rests on the possibility of multiple equilibria. Here, volatility is excessive even if the equilibrium is unique. Regarding the role of contracts, numerous analogies can be found in the literature on risk sharing in labour contracts. Freeman (1977), Harris & Holmström (1982) and Holmström (1983) assume, as it is done here for tenants, that contracts preventing workers from switching to another employer and separation penalties are not feasible. They consider cases in which the workers' propensity to switch, their mobility, is exactly known by the firms — and it is the same for all workers. Here, similar to Carmichael (1983), Berkovitch (1986) and Arnott & Hosios & Stiglitz (1988), it is assumed that tenants differ with respect to their mobility and that mobility cost are not contractible. The uncertainty in labour contract literature emerges 'inside' the contract, the productivity of the worker or of the firm. Here, it is assumed that aggregate demand and supply are subject to real shocks, resulting in an uncertain 'outside option'.

The Framework

Consider a competitive market for (ex ante) homogeneous rental housing. For the sake of simplicity only two periods are considered. In t_0 landlords are endowed with h_0 units of housing per tenant and the two sides negotiate in pairs long–term contracts. At the beginning of the second period, in t_1, a spot market opens on which supply per capita is uncertain. Only tenants who quit their contracts and landlords whose dwellings fell vacant enter the market. Hence, the rate of turnover and the equilibrium rent e are determined simultaneously.

It is assumed that a vacant dwelling can always be resized without cost. The size–structure of the vacant stock will then easily adjust and there is no need to differentiate between dwellings of different sizes within the 'active' market. However, after contracting dwellings are indivisible. If a tenant wants to change his housing consumption, e.g. in response to a change of rent, he has to move. It is rarely possible to change the size of a given dwelling physically and subletting entails a substantial loss of privacy. The assumption of ex post indivisibility captures in a simple manner the vulnerability of a sitting tenant to a change of rent, without forcing the analysis to account for different submarkets.[3]

[3] In the context of a heterogeneous housing market, marginal adjustment cost would be zero while average cost of resizing would be prohibitive. In the active market tenants

In t_1 some tenants might want to move, e.g. for job related reasons or in order to form (split up) a household. Others might want to stay, e.g. to avoid the financial or psychological cost of a move. The differences in mobility are represented by an additive utility loss/gain $\theta \in \Theta = [\theta^i, \theta^s]$, $\theta^i < 0 < \theta^s$ which a tenant suffers/enjoys if he moves. A negative θ indicates a household which has a strong incentive to move and high values of θ characterize immobile households. Let F denote the probability distribution of θ. It is assumed that all required derivatives of F exist. When negotiating the contract in t_1, both sides know only the distribution F. Thereafter, the tenant learns his particular mobility cost. Since these often depend on private circumstances, it is assumed that contracts contingent on θ are not feasible.[4] Tenants cannot be prevented from terminating the rental contract nor can they be forced to pay a separation fee. In the residential sector bonding is unfeasible for two reasons. The first is institutional; in many countries, courts would not be willing to enforce contracts which deny the tenant the right of termination within some reasonable period of notice. The second is that bonding is not incentive compatible. By deliberately being a nuisance, a tenant can always induce the landlord to give notice to quit on his part.

Given the non–contractability of moving cost and the unfeasibility of bonding, long–term contracts, $c = \{r, R\}$, set an initial rent r and a second period rent R which may be contingent upon the market conditions in t_1. It is anticipated, however, that the relation of contract rent and market rent will govern the tenant's decision to move.

Utility functions are additive in time with the common discount rate δ. The instantaneous payoff to the landlord, denoted V, depends only on rental

could choose from a menu of sizes. Division or combinination of some marginal units would be sufficient to ensure a uniform price per unit accros all sizes. (The replacement of old dwellings would provide further flexibility).

[4]If the mobility of a specific tenant would be public knowledge at the outset, different tenants would negotiate different contracts. If only the tenant knew his θ in advance, a self–selection–problem emerges. Both aspects are beyond the scope of this paper.

income and is concave, $V' > 0,\ V'' \leq 0$. The instantaneous direct utility function of tenants U^d is defined over housing h and a composite good x. It shall be concave in both arguments. For a fixed level of housing consumption, we substitute with the budget constraint $y = rh + x$ and define $U(r) \equiv U^d(y - r \cdot h, h)$. In t_1 the tenant has the choice to stay with his contract, obtaining $U(R)$, or to incur moving cost θ and rent the optimal amount of housing $h(e)$ which provides him with indirect utility (net of moving cost) $\tilde{U}(e, y) \equiv U^d(y - eh(e), h(e))$. Since y is held constant in this analysis it will usually be suppressed in the notation. Note that $U' < 0, \quad U'' < 0, \quad \tilde{U}_e < 0$.

Equilibrium in the Final Period

In t_1 the market is hit by a real shock. The supply per capita is $h_0 + \phi$, where ϕ is a random variable with support $\Phi = [\phi_i, \phi_s]$, $\phi_i < 0 < \phi_s$ and distribution K. While, expressed in per capita terms of the *whole* market, ϕ's immediate impact is confined to the *active* market — the outside–option of the contract holders. Given a contractual rent R, agreed upon in t_0, and a market rent e, a tenant prefers to stay if $U(R) \geq \tilde{U}(e) - \theta$. From this we obtain the marginal mover in terms of mobility cost:

$$\theta^m(R, e) \equiv \tilde{U}(e) - U(R) \tag{1}$$

Every moving tenant releases h_0 to the supply in the active market and adds $h(e)$ to demand. Since only tenants with $\theta < \theta^m$ move, per capita supply in the active market is $h_0 + \phi/F(\theta^m)$. The higher the turnover the more the shock will be dispersed.[5] Equilibrium requires

$$\phi = (h(e) - h_0)F(\theta^m(e, R)) \equiv \psi(e; R) \tag{2}$$

[5]For $F = 0$, the model is no longer defined. If nobody moves we can not speak of per capita supply in the active market. In the following, it is therefore, assumed that an equilibrium with $F > 0$ always exists. We may consider the present model as a reduced form of a more complex analysis. At the cost of some additional notation we could introduce exogenous exits and entries on both sides of the market. This would insure, that a market opens at t_1 even if none of the remaining old tenants would voluntarily move.

where $\psi(e;R)$ is introduced as a short–hand notation. Equation (2) simultaneously determines the rate of turnover and the equilibrium rent. As a point of reference define e^0 by $h(e^0) = h_0$, that is e^0 would prevail if first and second period supply per capita would turn out to be the same ($\phi = 0$). The signs of the partial derivatives of ψ are

$$\psi_e(e^0, R) < 0$$

and

$$\psi_R(e, R) \gtreqless 0 \iff e \lesseqgtr e^0$$

There are two ways of looking at (2). First, we may ask whether the usual assumption of downward sloping individual demand schedules ($h'(e) < 0$) ensures the uniqueness of the equilibrium. Below it is shown, that the optimal R will be a continuous and differentiable function of e. But the slope of ψ cannot be determined without further restrictions on R'. Multiple equilibria are a distinct possibility when participation is endogenous. Consider the case of a decline in per capita supply. A 'high turnover'–equilibrium, with low rent encouraging many tenants to move and thereby to share the shock, might coexist with a 'low turnover'–equilibrium in which a high rent deters most tenants from moving. For $\phi = 0$, however, e^0 is the unique solution to (2). And $d\psi(e^0, R)/de < 0$ for all R with finite R'. Hence, the 'Law of Demand' will hold, provided that the real shock is not too large. In the following it will be assumed that $e(\phi, R)$ is single valued for all relevant ϕ and R.

Second, we may consider R as instrumental in influencing e for any given ϕ. The implicit function theorem gives (2) the status of an identity in $e(\phi, R)$ for some neighbourhood of e^0. From which the slope of e, follows as

$$\frac{de}{dR} = -\frac{\psi_R}{\psi_e} \gtreqless 0 \iff e \lesseqgtr e^0 \tag{3}$$

When supply is low ($\phi < 0$, $e > e^0$) moving tenants give up more space than they demand. Increasing the turnover by raising the rent in existing contracts

The stochastic properties of ϕ would follow from the stochastic properties of the entry and exit processes.

creates an additional supply which helps to keep rents down. For analogous reasons high contractual rents help to keep rents up if supply is high. Hence, the high turnover associated with high rents in existing contracts reduces the volatility of the equilibrium rent.

Bilateral Contract

Now we turn to the contracting problem in t_0. The bilaterally efficient contract c^* maximizes the expected utility of the landlord $\tilde{V}$, subject to the constraint, that the expected utility of the tenant $\tilde{U}$ does not fall below the level provided by competing offers $\bar{c}$:

$$\max_{r,R} \tilde{V}(r,R) \quad \text{s.t:} \quad \tilde{U}(r,R) \geq \tilde{U}(\bar{r},\bar{R})$$

The expected utility of the tenant is:

$$\tilde{U}(r,R) = U(r) + \delta \int_{\Phi} U^+(R,e)\, dK \tag{4}$$

where U^+, denotes the expected utility in t_1 conditional on ϕ:

$$\begin{aligned} U^+(R,e) &= \int_{\theta^i}^{\theta^m} [\tilde{U}(e) - \theta]\, dF + \int_{\theta^m}^{\theta^s} U(R)\, dF \\ &= U(R) + \int_{\theta^i}^{\theta^m} F\, d\theta \end{aligned} \tag{5}$$

The corresponding expressions for the landlord are:

$$\tilde{V}(r,R) = V(r) + \delta \int_{\Phi} V^+(R,e)\, dK \tag{6}$$

$$V^+(R,e) = F(\theta^m)V(e) + (1 - F(\theta^m))V(R) \tag{7}$$

While every landlord cooperates with his tenant with respect to their internal relationship, the market as a whole is non–cooperative. Since no pair can influence aggregated data, the impact of R on e is correctly anticipated in equilibrium, but exogenous to the individual optimization problem.

This corresponds to the usual assumption of price–taking. Let L denote the Lagrange–function, λ the Lagrange–coefficient for the constraint, and introduce the shorthand notation $H \equiv V^+ + \lambda U^+$ to get:

PROGRAM 1: bilateral contract

$$\max_{r,R,\lambda} L = V(r) + \lambda U(r) + \delta \int_\Phi H(R, e(\phi, \bar{R}))\, dK - \lambda \tilde{U}(\bar{r}, \bar{R})$$

The solution is obtained by pointwise optimization. First order conditions for a maximum require $V'(r^*) + \lambda^* U'(r^*) = 0$ and $H_R(R^*, e(\phi, \bar{R})) = 0 \quad \forall\, \phi$. Substitution yields

$$0 = \frac{F'}{1-F}(V(R^*) - V(e)) + \left(\frac{V'(R^*)}{U'(R^*)} - \frac{V'(r^*)}{U'(r^*)}\right) \tag{8}$$

LEMMA 1 *For some neighbourhood of $e = r^*$ the optimal payment schedule $R^*(e)$ is implicitly defined by* (8)*. It is continuous and differentiable in e.*

PROOF: $R^* = r^*$ is the solution to (8) for $e = r^*$. Because $L_{rr} < 0$ and $L_{rR} = 0$ second order conditions are fulfilled if $L_{RR} < 0$, which requires that $H_{RR} = V^+_{RR} + \lambda U^+_{RR}$ is negative. Substitution with the help of (8), division by $V'(r^*) > 0$ and evaluation at $e = r^*$ (for which $V(R^*) - V(e) = 0$) yields:

$$(1-F)\left(\frac{V''(R^*)}{V'(r^*)} - \frac{U''(R^*)}{U'(r^*)}\right) + F'U'(R^*) < 0 \tag{9}$$

Hence, second order conditions are fulfilled and the implicit–function–theorem applies. □

PROPOSITION 1 *The privately efficient contract c^* provides partial insurance against real shocks. The contractual rent lies between the market rent for vacancies and the first period rent:*

$$r^* \gtreqless e \iff r^* \gtreqless R^* \gtreqless e$$

PROOF: We show that $r^* > R^* \iff R^* > e$. The other cases are analogous. Note that $V'(r)/U'(r) < 0$ is increasing in r. From $r^* > R^*$ it follows that the difference $V'(R)/U'(R) - V'(r)/U'(r)$ in (8) is negative. Hence, $R^* > e$ is necessary to make $V(R^*) - V(e) > 0$, and thereby the first term in (8) positive. The only if part follows from reversing these steps. □

The reason for the partial insurance–property of the bilateral contract can be inferred from the first order condition (8). If mobility cost were prohibitive for all tenants, the first term would vanish and the second term for optimal risk sharing would require $R = r$, $\forall e$. Making the future rent dependent on the fluctuation of the spot rent, would just add randomness to the contract. If mobility differs and is non–contractible, however, a fixed rent would lead to inefficient moves. In good states, tenants would incur mobility cost to avoid high contractual rents — reneging on their contribution to mutual insurance. In bad states, tenants would forego moving gains in order to 'cash in' on low contract–rents. Optimal insurance, requires a deviation from perfect mutual insurance which is proportional to the hazard rate $F'/(1-F)$.

If mobility cost would be known to be zero, it would be impossible to set a rent higher than the market rents for vacancies. Nevertheless, the tenant could be insured against excessive future payments by a rise of the initial rent — paying the premium in advance. He would move in good states to increase consumption, and stay in bad times to enjoy the low contractual rent. The rent schedule would be upwardly rigid in the sense that the tenant would never pay a rent higher than in the first period of the contract. Finally, if both sides were risk neutral, V'/U' would be constant, and (8) would require $R = e \quad \forall e$. The payment schedule of the optimal contract would imitate the spot market. Hence, risk–aversion increases turnover for low market rents and decreases it for high market rents. Since a high turnover raises market rents in good times and lowers them when supply is low, mutual insurance tends to raise future market rents.

Equilibrium–contracts

The housing market described so far can be envisaged as run by an auctioneer in both periods. Though, in t_0 he will announce contracts which solve program 1 for different reservation utilities. To simplify the exposition, the initial rent r is considered to be the only decision variable.[6] Housing demand in t_0, denoted $\tilde{h}(r)$, maximizes discounted expected utility where the parameters of the budget constraints R and e are implicitely given by (8) and (2). Let r^0 denote the equilibrium rent for which $\tilde{h}(r^0) = h_0$.

How does r^0 relate to e^0? Intuition suggests that a sequence of markets should clear for roughly the same price if supply per capita is the same. Unfortunately, a two period model does not provide this kind of structure because markets fundamentally differ at both dates. r^0 clears a market for contracts while e^0 is a spot rent. To obtain more specific results we have to impose this structure by assumption:

ASSUMPTION 1 $r^0 = e^0$,

Assumption 1 imposes a joint restriction on K, U^d and h_0. It implies that $R^*(e^0) = r^0$ and is more restrictive than necessary. The following propositions hold true provided that $|V(R) - V(e)|$ and $|U'(R) - \tilde{U}_e(e)|$ are sufficiently small when evaluated at e^0.

PROPOSITION 2 *The rate of turnover decreases when the market rent increases, $d\theta^m/de < 0$.*

PROOF: Proposition 1 implies $dR^*/de < 1$ at $e = r^*$. Differentiate (1) and evaluate at e^0, for which $\tilde{U}_e(e^0) = U'(R^*)$ by assumption 1, to obtain: $d\theta^m/de = U'(R^*)(1 - dR^*/de) < 0$. □

[6] Rewrite the first order condition of program 1 as an identity in $R(r)$ and differentiate to get: sign dR/dr = sign $(1-F)U'U'' > 0 \;\; \forall \phi$. Hence, an increase of the initial rent r shifts the optimal second period rent schedule upwards.

This feature is supported by the casual observation that rates of turnover tend to fall when the housing market tightens. In a proper multi–period context it could give rise to a negative statistical correlation between duration of tenure and contractual rent. Those tenants who where lucky to enter the contract in 'good times' would benefit throughout the subsequent years and have lower incentives to move. On average, long standing tenants would tend to pay less than those with shorter stays. Such a 'tenure discount' has repeatedly been observed in the regulated European as well as in the less regulated American housing markets.[7]

Optimal Contract

The bilateral contract is optimal from the myopic point of view of a single landlord–tenant pair. The resulting allocation and the induced distribution of future market rents is efficient, if the parternerships cannot improve upon it even if they coordinate their strategies, for example via regulation by a central authority. Since all tenants and landlords are alike at the outset, the optimal contract can be found by letting a representative pair decide upon a standard contract. The corresponding optimization program 2 is identical to program 1 except that R in $e(\phi, R)$ is considered as instrumental.

PROGRAM 2: Optimal Contract

$$\max_{r,R,\lambda} L = V(r) + \lambda U(r) + \delta \int_{\Phi} H(R, e(\phi, R))\, dK - \lambda \bar{U}$$

The first order condition requires

$$H_R + H_e \frac{de}{dR} = 0 \qquad \forall\, \phi \tag{10}$$

with H_R being analog to (8), de/dR as given in (3) and

$$H_e = -F' \tilde{U}_e (V(R) - V(e)) + F \left(V'(e) - \frac{V'(r)}{U'(r)} \tilde{U}_e \right)$$

[7]See however Schlicht (1983), Guasch & Marshall (1987) and Hubert (1995) for alternative explanations of the phenomenon.

Neither H_e nor de/dR are generically zero. Therefore the solution of program 2, denoted $\{\hat{r}, \hat{R}\}$, will generally differ from the solution of program 1. To see how and why the optimal contract deviates from the bilaterally efficient contract, we chose $\bar{U}$ to have $r^* = \hat{r} = r^0$ and invoke assumption 1 to obtain:

PROPOSITION 3 *If tenants are not too risk loving with regard to rents for vacancies, the optimal contract has higher contractual rent than the bilaterally efficient contract, except for* e^0. *Formally:*

$$\hat{R} = R^* \quad \textit{and} \quad d\hat{R}/de = dR^*/de \quad \textit{for} \quad e = e^0$$

$$F'\tilde{U}_e + F\left(\frac{V''}{V'} - \frac{\tilde{U}_{ee}}{\tilde{U}_e}\right)\Bigg|_{e^0} \lesseqgtr 0 \qquad (11)$$

$$\Longrightarrow \hat{R} \gtreqless R^* \textit{ for } e \neq e^0$$

PROOF (sketch) : Note that for e^0, $H_e = 0$ and $de/dR = 0$. Hence, $r^0 = r^* = \hat{r} \Longrightarrow R^* = \hat{R}$. Given assumption 1, the sign of the left hand side of (11) equals the sign of H_{ee} evaluated at e^0. Now consider the case of $e < e^0$, with the difference $e^0 - e$ being arbitrarily small. From (3) follows that $de/dR > 0$. If $H_{ee} < 0$ then $H_e > 0$. Hence, the second term in (10) is positive. H_R is zero for R^* and (by lemma 1) decreasing in R. Since H_R is continuous in e, it requires $\hat{R} > R^*$ to fulfill (10). □

The first source of the discrepancy between privately efficient and optimal contracts is related to the expression $F'\tilde{U}_e$ in (11). It is negative, indicating that the optimal contract has higher rent $\hat{R} > R^*$, $\forall e \neq e^0$. When balancing gains from insurance and losses from inefficient moves at the margin, it takes into account that a marginal increase of turnover weakens the reason for inefficient moves. If supply is low, tenants shall be protected against high rents without preventing too many gains from moving to be forsaken. All partnerships like to see the others charging high contract rents. The resulting high turnover would keep market rents down, thereby encouraging tenants to realize moving–gains. If supply is high, tenants are expected to pay their premium. In this case a high turnover, resulting in higher market rent, would allow contract rents be set closer to the full insurance level without inducing too many inefficient moves. Given the non–contractibility of moving cost, there are positive externalities of turnover, which will be taken into account by the optimal contract.

The possibility to influence future rents for vacancies raises the question whether stable or volatile market rents should be pursued. The answer is related to the second term in (11), the sum of the absolute risk–preferences for market rent uncertainty weighted with the probability to enter the market in t_1. While suppliers prefer stable rents, $(V''/V' \leq 0)$, tenants preferences depend on the sign of the second derivative of the indirect utility function with respect to rent. $\tilde{U}_{ee} < 0$ is equivalent to price–risk aversion and would ensure $\hat{R} > R^*$, $e \neq e^0$. If both sides prefer certain market rents, the optimal contract sets a higher rent than the bilaterally efficient contract, resulting in a higher turnover for every state, except for $\phi = 0$ when the quit–rate does not matter anyway. Equilibrium–rents are raised in conditions of affluent supply and dampened when the housing market is tight. Hence the volatility of future market rents is reduced.

However, price–risk preferences of consumers are not determined on apriory grounds. Following Turnovsky & Shalit & Schmitz (1980) $\tilde{U}_{ee}$ can be written as:

$$\tilde{U}_{ee} = \frac{h(e)}{e}\tilde{U}_y[\beta(\rho - \alpha) - \mu]^8$$

[8] This result is obtained by differentiating Roy's Identity $\tilde{U}_e \equiv -h(e)\tilde{U}_y$ with respect to y to get $\tilde{U}_{ye}$ and with respect to e to get an expression for $\tilde{U}_{ee}$.

where

$$\mu = \frac{dh}{de}\frac{e}{h} \qquad \text{the price elasticity of demand}$$

$$\rho = \frac{dh}{dy}\frac{y}{h} \qquad \text{the income elasticity of demand}$$

$$\beta = \frac{eh}{y} \qquad \text{the expenditure share on housing}$$

$$\alpha = -y\frac{\tilde{U}_{yy}}{\tilde{U}_y} \qquad \text{the relative risk aversion with respect to income}$$

For most goods a preference for price–risk appears to be the adequate assumption implying $\tilde{U}_{ee} > 0$. If preference for price risk is sufficiently strong to dominate the other effects, optimal rents would be lower than in the bilaterally efficient contract. In the case of housing, however, low (uncompensated) price elasticities and moderate income elasticities, together with its large expenditure share make a strong preference for risky rents rather implausible. Bearing this qualification in mind we tend to conclude that equilibrium long–term contracts in residential housing are likely to cause excess volatility of rents.

Concluding Remarks

Given the assumptions of this paper, a long–term contingent contract is preferred to a sequence of short–term contracts which allows for termination of tenure and renegotiation of rent at the beginning of each period. It provides mutual insurance against the uncertainty of future rents whose impact on the tenant's welfare is aggravated by the fact that adjustment of the quantity consumed is not possible without moving. In addition, by stipulating the landlords' responsibilities concerning the rent adjustments before becoming 'locked in', long–term contracts protect immobile tenants against being exploited ex post. However, as far as empirical evidence on (unregulated) contracting in the housing market is concerned, there is no clear indication of whether long–term or short–term contracts are preferred. In Europe long–term contracts had apparently been common even before comprehensive tenure laws made them obligatory.[9] In the United States, however, residential leases are typically short–term contracts. Commercial leases appear to be more uniform. They are often long–term contracts with a constant real rent and a fixed duration. Usually the agreement binds both sides and separation penalties have to be paid in case of early contract termination.

Obviously long–term contracts are more demanding to write and to enforce than a series of short–term contracts. Rights and obligations have to be stipulated for many contingencies ex ante and evidence must be provided to a third party acting as arbitrator in the case of a breach of contract ex post. Presumably these complexities will increase with the duration of the contract.[10] While the features of equilibrium contracts will depend on the particular assumptions on the nature of losses and gains from increased duration, it appears unlikely that bilateral contracting will be efficient. Assume there is a duration T^*, at which the private gains from increased duration equate the private cost of increased complexity at the margin and ignore the possibility of premature termination. The equivalent to the equilibrium condition (2) would be $\phi = (h(e) - \bar{h})/T^*$, where $\bar{h}$ indicates the average space per lease coming up for renewal. A slight reduction of T^* would increase turnover and reduce the volatility of market rents. However, isolated partnerships fail to account for this effect.

To motivate the paper we argued that well established criticism of war–style rent controls could apparently also be raised against 'free market contracts'. How is this puzzle resolved in the light of the preceding analysis? Were contracts in freshly united Berlin efficient? Probably not. When the outside

[9] For some reference on this poorly documented matter see: International Labour Office (1924).

[10] Cost of complexity are not the only disadvantage of long duration. A shorter term may also be beneficial when other aspects, besides of mobility cost, are not contractible, e.g. the quality of the landlord's service, as in Farrel & Shapiro (1989), or the tenants care as in Homburg (1993) and Hubert (1995).

option deteriorated for tenants, bilaterally efficient contracts provided for too much insurance within the contract. Unresponsive contract rents and a low turnover due to long durations left rents for new leases soaring. As a result, some low profit business which ought to have left the market could stay in place, while other more rewarding business could not enter or was closed upon contract–renewal.

Was the criticism of rent controls justified? Given the rigidity of the controls at that time, probably yes. Though, this cannot be inferred from the mere fact that the protected 'sitting birds' were better off. Efficiency requires a partial insurance of sitting tenants in order to avoid an excessive decline of (residual) income for those whose mobility cost are high. In this sense, the preceding analysis might also be seen as a contribution to the 'revisionism on rent control' (Arnott 1995). Arguably, the state was providing protection in a situation which was too exceptional to be accounted for in private contracts.

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