Housing market regulation and social network*

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Abstract

We study an aspect of the housing market regulation which is the procedural formalism. Why some OECD countries have high level of procedural formalism in the housing market? We provide an explanation based upon the complementarities between the strength of social network and the stringency of procedural formalism. The interest with the social network is that conflict resolution is cheaper than with law. In an area where the local people belong to a social network whereas the foreigners do not, the regulation may facilitate housing search for the locals at the expense of the foreigners. To illustrate this mechanism we build a search-theoretic model of the housing market. The model emphasizes that the support for regulation should increase with the size of social networks, the default probability, the proportion of foreigners and the market tightness.

Keywords: Housing market regulation, social network

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1 Introduction

We study an aspect of the housing market regulation which is the procedural formalism. The aim of this paper is to explain why some countries, within the OECD, support high levels of procedural formalism on the housing market while it generates cost for landlords and tenants. The procedural formalism constrains the landlord to follow several independent procedural actions to solve a conflict with a tenant. It is time consuming and costly. Moreover, as conflicts are costly, landlords ask a higher rent to cover the potential losses and are picky with the future tenant. In a frictional environment, where a match between a tenant and a landlord generates a surplus, the procedural formalism destroys the renting surplus of landlords and tenants.

Then why do we observe, in some countries, political support for legislation that reduces economic surplus?

We propose an explanation based on the complementarities between the strength of social network and the stringency of procedural formalism. The idea is to see the procedural formalism as a way to give

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a comparative advantage to local people belonging to a social network at expense of foreigners without social network. The social network reflects a pool of family and friendship ties between local people. A landlord and a tenant are connected if they belong to the same social network and anonymous if not. To be connected give some comparative advantages to a potential tenant. It is to build the comparative advantage that households demand procedural formalism. In an area where the local people belong to a social network whereas the foreigners do not, the regulation may facilitate housing search for the local applicants at the expense of foreigners. Indeed, a landlord will undertake legal action to solve dispute if the tenant who fails to pay the rent is anonymous. Thus, the cost of dispute depends on procedural formalism. However, if the landlord knows the tenant, he cannot take legal action against him without deteriorating their friend/family relationship (Anderson and Francois (2008)). Therefore, a tenant and a landlord connected can solve the conflict by different ways: a kin of tenant who makes default, can be used as collateral or the tenant can return to live with its parents and to leave the housing quickly or the landlord can give more time to pay. As a consequence, the cost of conflict does not depend on law if the landlord and the tenant are connected. Thus, if conflict resolution is more expensive by law than within the social network, the landlord would prefer to rent its housing to people connected. Therefore, local applicants would benefit from a high level of procedural formalism on the housing market. Firstly, it would enable them to be preferred over people without any social network when they are connected. Secondly, if the social network is strongly developed, local applicants will be affected, only slightly, by the regulation because they will have a high probability to be connected. Consequently, at national level, if there is a majority of local people connected, the procedural formalism is a good instrument to give them a best access to the rental housing.

Our study is motivated by some stylized facts. At macro level, there is a positive correlation between procedural formalism and social network. At micro level, there is evidence that foreigners are discriminated on the rental market in Southern Europe (where regulation is strong):

At macro level, the countries where the social network is the most developed, are also the countries where procedural formalism is the highest. Following David et al (2010) we use the self reported importance of family ties, friendship ties and neighborhood ties to measure the strength of the local social network. We measure the housing market regulation by the procedural formalism index of Djankov et al (2003). In Figure 1, we observe a North-South divide: in the South of Europe (Spain, Portugal and Italy) there is a higher frequency of contacts with friends and neighbours as well as higher levels of regulation on the housing market. The opposite stands in the North of Europe. In Figure 2, we find the same North-South divide with family ties and procedural formalism.

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1 We use European value Survey (EVS), World Value Survey (WVS) and European Community Household Panel (ECHP) to quantify the importance of social network. We measure family ties from the EVS and WVS and friendship ties and neighborhood ties from ECHP as in David et al (2010). See in Appendix A the building of these different measures.
Figure 1: Social ties and Procedural formalism: the figure displays the correlation between two measures of social capital by country and Procedural formalism. Data base: ECHP for friendship and neighborhood ties. The procedural formalism index is from Djankov et al (2003). The sample period is 1994-2001. See Appendix A for more details.

Figure 2: Family ties and Procedural formalism: the figure displays the correlation between a measure of family ties by country and procedural formalism. Data base: EVS and WVS for family ties. The procedural formalism index is from Djankov et al (2003). The sample period is 1981-2004. See Appendix A for more details.

At micro level, there is evidence that foreigners are discriminated on the rental market in Southern Europe. With a field experiment carried out on the Internet, Bosch et al. (2010) show that applicants with a Moroccan sounding name are 15 percentage points less likely to be contacted by the property owner than those with a Spanish name. Similarly, Baldini and Federici (2011) show ethnic discrimination in the
Italian rental market. Bouvard et al. (2009) argue that people of African descent are over-represented in social housing because they have more difficulty to rent in the private rental market. We interpret such results as evidence that landlords prefer to rent their dwelling to local applicants when the regulation on the rental market is strong.

A high level of procedural formalism drives landlords to ask strong guarantees when they do not know the tenant. Indeed, Wasmer (2005) notes that a landlord in Quebec, where the procedural formalism is lower than in France, ask less guarantee than a landlord in France. In Quebec, Landlords cannot ask more than a month of rent in advance whereas in France landlord ask guarantor and security deposit. An investigation of UFC-Que Choisir highlights the excessive seeking of guarantees from agencies for the sole account of landlords. Many landlords require documents that are forbidden to request under the Act of 6 July 1989. On all rental agencies surveyed by UFC-Que Choisir, 62% require at least one document prohibit when they establish a rent. The excessive pursuit of guarantees is also apparent with the requirement of guarantor. The absence of guarantor is a problem in 28% of cases. Consequently, several web site, marieclaire.fr\(^2\), over-blog.com\(^3\) or again commentcamarche.net\(^4\) give as answer, at the question in google how easily find accommodation, to use the social networks. The social network is an easier and faster way than the traditional channel with rental agencies, as landlords require fewer guarantees when they know the tenant. This information can suggest that a landlord is less frightened by the cost of resolution conflict when he knows the tenant. Finally we can note that several french government with several different measures (Garantie Loyers Impayés (GLI), Garantie des Risques Locatifs (GRL) and more recently Garantie Universel des Loyers (GUL)) have tried to implement a system of guarantee without success. Given the high level of procedural formalism, private insurances impose strict condition to benefit of these insurances. In the case GLI, a landlord has to prove that a tenant has a permanent contract (CDI) and has incomes equal to three times the amount of rent. In the case GRL, the condition are less strict but exist also. Consequently, these conditions prevent landlord to use these guarantees in a large number of cases and prove the binding side of procedural formalism. In the case GUL, the tenants do not want to support the cost of this system. It shows that the cost of resolution conflict for a majority of tenant is lower without the system of guarantee than with it and that a majority of tenant escape to the high cost of procedural formalism.

We proceed in three steps. Section 2 develops a model where procedural formalism drives the landlords to favor local applicants connected. The framework is a static matching model\(^5\) with an urn-ball matching function. Each potential tenant sends one application to one vacant dwellings. Hence, a particular landlord can receive several applications and chooses the best one. Therefore, each applicant is ranked

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\(^2\)http://www.marieclaire.fr/se-loger-les-nouvelles-techniques-pour-trouver-un-appartement.20297.489252.asp

\(^3\)http://www.over-blog.com/Comment_trouver_un_logement_a_Paris_rapidement-1095203869-art80094.html

\(^4\)http://www.commentcamarche.net/faq/37622-comment-trouver-un-logement-sur-internet

\(^5\)Since Wheaton (1990) in the property market and Desgranges and Wasmer (2000) in the rental market, some papers (Mc Breen et al. (2011), Ménard (2009) and Wasmer (2005)) point out similarities between rental market and labor market and the pertinence to analyze the rental market with search theoretic model. Wasmer (2005) : "Housing and labor markets exhibit many similarities. First, information is imperfect. Tenant quality, like worker quality, is unobserved. Second, separation is costly and time consuming. The laws and regulation typically complicate or slow down the termination process of the contractual relationship and make it more costly for firms and landlords to fire an employee/evict a tenant. And finally, there are rigidities in nominal wages and rents."
according to the match surplus. Thus depends on the default rate and the cost of dispute resolution (network or law). Potential tenants with high default rate have low probability to get the lease. Moreover, when the regulation increases, the connected applicants become relatively more attractive compared to the anonymous applicants. Therefore, procedural formalism increases the probability to get a lease for connected tenants and decreases the probability to get a lease for anonymous tenants.

In Section 3, we study the demands for procedural formalism. Firstly, foreign applicants do not want to regulate the rental market because it decreases their match surplus. Secondly, local applicants are confronted with a trade off. Procedural formalism, on the one hand, increases, on average, their probability to get a lease. On the other hand, involves paying a higher rent when they are anonymously matched. Local applicants prefer a regulated market if their social network is sufficiently large. Indeed, asking for a high level of regulation, enables local applicants to increase their probability to get a lease without affecting their match surplus as the probability of an anonymous match is small. Furthermore, we show that the support for high levels of regulation increases with the proportion of foreigners.

In section 4, we determine the preferred level of procedural formalism for local agents. We calibrate the model on the French 2006 Housing Survey and data computed and collected by Djankov et al (2003). Local agents vote under the veil of ignorance, i.e without knowing their default rate for the vote. The support for regulation increases with the size of social networks. The vote under the veil of ignorance induces a redistribution between local agents of different default probabilities. The optimal level of regulation is profitable to the weakest local applicants at the expense of the best agents. Futhermore, the support for regulation increases with the proportion of foreigners in the rental market and the market tightness. A difference of skills between local agents and foreigners modifies the optimal level of regulation. It increases with the skills of foreigners when the network size is strong and decreases when the network size is small.

This paper adds to the growing literature on the positive analysis of Housing market regulation (HMR). As explained by Botero et al (2004), the regulation has three explanations: rent-seeking, legal origins of the judicial system and market failure.

According to the legal origin argument, the regulation of the rental market depends on the fundamental characteristics of the judicial system (Djankov et al (2003)). Common-law judicial systems lower the need for regulation as they are characterized by the importance of decision-making by juries, independent judges, and the emphasis on judicial discretion as opposed to code in civil law countries. However, these differences explain only about 40% of regulation variation between these countries. Our paper takes a complementary approach based upon the complementarities between the strength of social network and the stringency of housing market regulation.

The market failure argument analyses HMR as a way to improve welfare in the context of market imperfection. Transposing labor market arguments, Alesina et al (2010) argue that HMR is a way to reduce the monopsony power of the landlords in a context of depressed rental offers. People with strong family ties like to live near their family and moving away from home is costly. Thus, individuals with strong family ties rationally choose regulated labor markets to avoid moving and limiting the monopsony power of firms. We keep the main idea of Alesina’s paper. People with strong family ties/social network rationally ask for a high level of regulation. However, we present a different approach where the procedural
formalism enables local people to get ahead of foreigners.

The rent seeking argument analyses HMR as a way to maximize the welfare of insiders who benefit from more secure lease. When the regulation is strong, landlords have more difficulties to expel tenants who fail to pay the rent. This protects insiders at the expense of outsiders. Indeed, landlords, to avoid problems and legal cost when the tenants fail to pay the rent, will be more vigilant about individual income. Desgranges and Wasmer (2000) and Wasmer (2005) show that the legislation on the rental market can generate discrimination and some problems between outsiders and insiders. Our paper identifies a different sort of insiders. It shows why some applicants (outsiders in Wasmer) would want to increase the procedural formalism. The procedural formalism enables local applicants to get ahead of foreigners.

This paper contributes to present another aspect of the social network in search-theoretic models. In our paper, the social network is a way for a tenant/worker with social network to get ahead of a tenant/worker without social network in the queue. In the search literature (Mayer (2011), Igarashi (2011), Calvo-Armengol and Jackson (2007) and Calvo-Armengol and Zenou (2005), the social network is a way to open a new ticket window or queue. Indeed, in these papers, workers have two channels to find a work, a "traditional channel" (newspapers, work center) and their social network with for example the word of mouth communication. But at no point in these papers, the social network is a way for the worker/tenant to be preferred by an employer/landlord. The firm chooses the first worker/tenant who presents to it, in one of two queues but does not choose the best worker/tenant between the two queues. Instead, in our paper, there is only one queue but the landlord/firm must choose the best tenant/worker. Furthermore, a tenant/worker belonging to a social network is better ranked and has more chances to be chosen.

2 The model

We introduce a search-theoretic model that defines the probability to get a lease for foreign and local applicants according to the level of procedural formalism and the size of social network. We choose an urn-ball model because it is an easy way to ensure that the landlords choose their tenant within a pool of applicants. We consider a static economy peopled by $V$ landlords, $L$ local applicants and $F$ foreign applicants. We note $F = Tx$ and $L = T(1 – x)$ where $T$ is the number of potential tenants in the housing market and $x \in [0, 1/2]$. Applicants differ in default probability $\delta$, which is distributed according to the cumulative distribution function $H$ on the support $[0, 5]$. A defaulting agent does not pay the rent.

Local agents are embedded in a local social networks whereas foreigners do not. The only interest of the social network is that conflict resolution does not depend on law. For example, the parents of tenant who not pay the rent can be used as collateral, to guarantee the landlord to recover the missing rent. Thus, a landlord having to evict a tenant would pay $D^n$ if the pair belongs to the same social network and $D^m$ if not. This implies that only $D^m$ depends on procedural formalism.

With a probability $n$ the local agent learns that a landlord in his social network rents a dwellings and applies as a connected agent. With complementary probability $1 – n$, it is not the case and he applies as an anonymous agent. The foreigners have no social network and apply as anonymous agents.

The timing is as follows:
1. All potential applicants send an application to one vacant dwellings.
2. Landlords, when facing several applicants, choose the most lucrative one.
3. The rent is the result of a bargaining process between the landlord and the tenant.

The model is solved by backward induction. Stages two and three make the assumption that landlords observe the default probability of tenant. Such default probability varies along a number of characteristics that are really observed by the landlords: labor contact, sector of occupation, wage. As seen in the introduction landlords do not hesitate to require such information.

i) Bargaining step:
A tenant of type \( i = n \) is connected whilst a tenant type \( i = m \) is anonymous.

A landlord who does not rent his housing has a rental opportunity cost \( C \). A landlord facing a tenant type \( i \) gets the expected payoff:

\[
R (1 - \delta) - \delta D^i + \delta C,
\]

where \( R \) is the rent, \( C \) is the opportunity cost of rental and \( D^i \) is the eviction cost.

A tenant gets the expected payoff

\[
(\alpha - R) (1 - \delta).
\]

With probability \( 1 - \delta \) he pays the rent \( R \) and enjoys housing consumption \( \alpha \). With probability \( \delta \), he does not pay the rent and is evicted. Housing consumption is then normalised to zero. Therefore, a match between a type \( i \) tenant and a landlord generates the match surplus

\[
S^i = (1 - \delta) (\alpha - C) - \delta D^i.
\]

The surplus generated by an anonymous match depends on procedural formalism, whereas the surplus created by a connected match does not. Both surplus \( S^n \) and \( S^m \) negatively depend on the default probability \( \delta \) and on the default cost \( D^i \):

\[
\frac{dS^i}{d\delta} = -(\alpha - C + D^i) \quad \text{(4)}
\]

\[
\frac{dS^i}{dD^n} = -\delta \quad \text{(5)}
\]

The rent is the result of Nash bargaining between the landlord and the tenant

\[
\max_R \left[ ( (\alpha - R) (1 - \delta))^\beta \left( R (1 - \delta) - \delta D^i + \delta C - C \right)^{1-\beta} \right], \quad \text{(6)}
\]

where \( \beta \) represents the bargaining power of tenants. Hence, landlord and tenant type \( i \) negotiate the following rents

\[
R^i = \frac{\beta \delta D^i + \beta C (1 - \delta) + (1 - \beta) (1 - \delta) \alpha}{(1 - \delta)}.
\]

The expected incomes of landlords is

\[
Y^i = C + (1 - \beta) S^i = C + (1 - \beta) \left[ (1 - \delta) (\alpha - C) - \delta D^i \right].
\]

The expected income \( Y^i \) depends on the match surplus \( S^i \). Hence, \( Y^i \) is negatively affected by the default rate \( \delta \) and by cost \( D^i \). At given default probability \( \delta \) a landlord prefers a connected match to an
anonymous matched if \( D^n < D^m \). Moreover, if the expected income is lower than the rental opportunity cost \( C \), landlords prefer not to rent. Therefore, we deduce two threshold values of the default probability above which landlords prefer not to rent.

\[
\delta^i = \frac{\alpha - C}{\alpha - C + D^i}.
\]  

(9)

Then, the regulation can exclude some tenants of the market and reduce the rental market size. In order to simply our analysis we neglect the fact that the regulation can evict some agents of the market\(^6\) and we assume that all tenants have a default rate \( \delta \) below the two threshold values \( \delta^n \) and \( \delta^m \). Therefore \( \delta < \delta^i \) for for all \( D^i \).

i) Selection step:

Each potential tenant sends randomly an application to one landlord. Hence, a landlord may receive several applications. He can receive an application from connected agents as well as from anonymous agent. Therefore, a landlord does not choose only the applicant with the lower default rate but he must also take care of agent type. Then, if a landlord compares a connected and an anonymous agent, the landlord chooses the tenant network matched if \( Y_{ni} \geq Y_{mj} \) \( i.e. \text{if} \; \delta_j \geq \frac{\delta_i(\alpha - C + D^n)}{\alpha - C + D^m} \). Reciprocally, the landlord chooses the anonymous agent if \( Y_{ni} \geq Y_{mj} \) \( i.e. \text{if} \; \delta_j \geq \frac{\delta_i(\alpha - C + D^m)}{\alpha - C + D^n} \). When both agents have the same type, he chooses the agent with the lower default rate.

ii) The probability for an applicant to get a lease.

We compute the distribution function of landlords' expected income:

\[
G(y) = \Pr[i \in \text{network}] \Pr[Y^m \leq y] + \Pr[i \notin \text{network}] \Pr[Y^m \leq y],
\]  

(10)

where

\[
\Pr[i \in \text{network}] = n(1 - x) \quad \text{and} \quad \Pr[i \notin \text{network}] = 1 - n(1 - x).
\]  

(11)

The function \( G(y) \) is the probability that applicant pays less than the expected income \( y \). This covers two cases according two agent types.

If a landlord is network matched, he has an expected income \( Y^n \). Thus, the probability that another applicant, randomly selected, pay less than \( Y^n \) is

\[
G(Y^n) = n(1-x) \left( 1 - H(\delta) \right) + \left( 1 - n(1-x) \right) \left( 1 - H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^m} \right) \right).
\]  

(12)

Indeed, for a connected agent, the probability to be the best applicant is equal to:

- The probability of having the lowest default rate \( 1 - H(\delta) \) if the other applicant is also connected or

- The probability that \( Y^n \) is greater than \( Y^m \), i.e. \( \Pr[Y^m \leq Y^n] = 1 - H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^m} \right) \), if the other applicant is anonymous.

Similarly, if a landlord is anonymously matched, he has an expected income \( Y^m \). Thus, the probability that another individual pays less than \( Y^m \) is

\[
G(Y^m) = n(1-x) \left( 1 - H \left( \frac{\delta(\alpha - C + D^m)}{\alpha - C + D^n} \right) \right) + \left( 1 - n(1-x) \right) \left( 1 - H(\delta) \right).
\]  

(13)

\(^6\)we present an extension where the regulation can reduce the rental market size in Appendix D.
Indeed, for an anonymous agent, the probability to be the best applicant when he is compared to another applicant is equal to:

- The probability of having the lowest default rate \(1 - H(\delta)\) if the other applicant is also anonymous
- The probability that \(Y^m\) is greater than \(Y^n\), i.e. \(\Pr[Y^n \leq Y^m] = 1 - H\left(\frac{\delta(\alpha - C + D^m)}{\alpha - C + D^n}\right)\). If the other applicant is connected.

The landlord can be matched with 0, 1, 2, ..., \(t\) potential tenants among the \(T - 1\) other applicants. Indeed, a landlord may receive several applications. Then, an applicant shall get the lease if he is the best application \(Y^i\) (according if he is network matched or anonymously matched), amongst the \(t\) other potential tenants matched with the landlord. Hence, the probability to get the lease is

\[
P_i = \sum_{t=0}^{T-1} \frac{(T-1)!}{t!(T-1-t)!} \left(\frac{1}{V}\right)^t \left(1 - \frac{1}{V}\right)^{T-1-t} G(Y^i)^t, \tag{14}
\]

where \(1/V\) is the probability to send an application to one particular landlord. Furthermore, if we consider a large economy, so that \(V\) and \(T\) (i.e. \(F\) and \(L\)) go to infinity, we have:

\[
P_i = e^{-\frac{T}{V}(1-G(Y^i))}. \tag{15}
\]

The probabilities to get a lease are negatively affected by the default rate. Indeed, probabilities \(P_n\) and \(P_m\) are decreasing in \(\delta\):

\[
\frac{dP_n}{d\delta} = -\left(\frac{n}{V} T(1-x) \right) \left(\frac{\alpha - C + D^n}{\alpha - C + D^m}\right) \left(1 - n(1-x)\right) \frac{T}{V} P_n \leq 0, \tag{16}
\]

\[
\frac{dP_m}{d\delta} = -\left(\frac{n}{V} T(1-x) \right) \left(\frac{\alpha - C + D^n}{\alpha - C + D^m}\right) \left(1 - n(1-x)\right) h(\delta) P_m \leq 0. \tag{17}
\]

Therefore, agents with high default rates have fewer chances to find a housing. Procedural formalism changes the ranking of applicants. Indeed, the regulation has different effects on the probabilities \(P_n\) and \(P_m\):

On the one hand, we have

\[
\frac{dP_m}{dD^m} = -\left(\frac{n}{V} T(1-x) \right) \left(\frac{\delta}{\alpha - C + D^m}\right) P_m \leq 0. \tag{18}
\]

The impact of procedural formalism on the probability \(P_m\) is negative for almost all \(\delta\) and network size \(n\). The impact is null only for agent with \(\delta = 0\) and \(\delta = \tilde{\delta}\) or when there is no network \(n = 0\).

When \(\delta = 0\), agents are always preferred to other candidates. Their probability of getting a lease is equal to one.

When \(\delta = \tilde{\delta}\), agents are never preferred to other candidates. The only way to get the lease is to be the only applicant. Then, the probability to get a lease is

\[
P_m = e^{-\frac{T}{V}}, \tag{19}
\]

and does not depend on the regulation.
When $n = 0$, the probability to get a lease is the same for all:

$$P = e^{-\frac{T}{H(\delta)}}. \quad (20)$$

Therefore, the probability $P_m$ strictly decrease with the regulation when $n$ differs from zero and $\delta$ differs from zero and $\bar{\delta}$. Thus, a higher procedural formalism decreases the chances to find a dwelling when people are anonymous.

On the other hand, when people are network matched we have that

$$\frac{dP_n}{dD^m} = \frac{T}{V} \frac{\delta (\alpha - C + D^n)}{\alpha - C + D^m} \frac{h}{2} \left( \frac{\delta (\alpha - C + D^n)}{\alpha - C + D^m} \right) P_n \geq 0. \quad (21)$$

The impact of the regulation on the probability $P_n$ is strictly positive for all $\delta$ and for all level of network $n$ different from zero. Thus, a higher procedural formalism increases the chances of getting the lease of a connected applicant.

To summarize, the regulation is a way for a connected applicant to be better ranked. Procedural formalism increases the probability to get a lease if the agent is connected and decreases it if not. The regulation will affect foreigners and local agents differently. In the following section, we analyse how the regulation affects the expected utility of local and foreign tenants and how these differences enable one group of tenants to get ahead of the others.

## 3 Impact of procedural formalism

The section studies the expected payoffs of applicants as functions of the level of procedural formalism and the size of social network.

A foreign applicant has no social network. Hence, we can write the foreign applicant’s expected utility, as the product of the probability $P_m$ and the match surplus $S^m$ weighted by the bargaining power $\beta$:

$$U_f = \beta S^m P_m = \beta [(1 - \delta) (\alpha - C) - \delta D^m] P_m. \quad (22)$$

The foreigner’s expected utility decreases with the default rate $\delta$. Indeed, as we have seen above, both, probability $P_m$ and match surplus $S^m$ are decreasing in $\delta$.

We have seen in the previous section that $S^m$ and $P_m$ are negatively affected by the regulation when $\delta$ belongs to $(0, \bar{\delta})$ and $n \neq 0$. Otherwise, the impact of the regulation on the expected utility is null. Therefore, the impact of procedural formalism, on the foreigner’s expected utility is negative or null

$$\frac{dU_f}{dD^m} = \frac{dS^m}{dD^m} P_m + \frac{dP_m}{dD^m} \beta S^m \leq 0. \quad (23)$$

Procedural formalism has two negative impacts. Firstly, it is more difficult for foreigners to be selected because they become more costly to evict than connected agents. Secondly, the regulation decreases the match surplus. The bargained rent is higher to balance the losses of landlords when a tenant fails to pay the rent. The magnitude of such effects increases with the default probability. Foreign applicants with a default rate equal to zero are not affected by the regulation.
The local applicant’s expected utility is a little more complex because local applicants are embedded in a given social network. They can be connected as well as anonymous. With probability \(1 - n\), local applicant is anonymous and he has the same expected utility as a foreign applicant. However, with a probability \(n\), he is connected and his expected utility is given by the product of \(P_n\) and \(S^n\) weighted by the bargaining power \(\beta\):

\[
U_l = (1 - n) P_m \beta [(1 - \delta) (\alpha - C) - \delta D^m] + n P_n \beta [(1 - \delta) (\alpha - C) - \delta D^n]
\]

The local applicant’s expected utility decreases with the default rate \(\delta\). Indeed, the probabilities \(P_n\) and \(P_m\) and the match surplus, \(S^n\) and \(S^m\) are decreasing in \(\delta\). Tenants with low default rate have a higher expected utility because they have a higher probability to get a lease and they bargain lower rents.

We have seen that procedural formalism has different impacts on the probabilities \(P_n\) and \(P_m\) and on the match surplus \(S^n\) and \(S^m\). Therefore, the regulation has different impacts on the local applicant’s utility depending whether the local applicant is network matched or not. Then, the total impact of the regulation on the potential local tenant’s utility is given by

\[
\frac{dU_l}{dD_m} = (1 - n) \beta \left( \frac{dS^m}{dD_m} P_m + \frac{dP_m}{dD_m} S^m \right) + n \beta S^n \frac{dP_n}{dD^m}. \tag{25}
\]

When he is anonymously matched, the regulation has a negative impact on his expected utility. Indeed, the regulation decreases both the match surplus \(S^m\) and the probability to get a lease \(P_m\). But when the local tenant is network matched, the procedural formalism increases his expected utility. Indeed, the regulation does not decrease the match surplus \(S^n\) and increases the probability to get a lease \(P_n\). As mentioned above, the regulation is a way for a connected applicant to be better ranked than the others.

A local agent is in favor of high levels of regulation, if the total effect of the regulation is positive, i.e. if

\[
\left| n \beta S^n \frac{dP_n}{dD^m} \right| > \left| (1 - n) \beta \left( \frac{dS^m}{dD_m} P_m + \frac{dP_m}{dD_m} S^m \right) \right|. \tag{26}
\]

We can deduce the following proposition.

**Proposition 1** Procedural formalism increases the average probability to get a lease for a local applicant.

**Proof.** We know that potential tenants have a default rate between zero and \(\delta\). Therefore, we can define the average probability to get a lease for the foreign tenants and local tenants as follows

\[
\overline{P_f} = \int_0^\delta P_m h(\delta) \, d\delta, \tag{27}
\]

and

\[
\overline{P_l} = n \int_0^\delta P_n h(\delta) \, d\delta + (1 - n) \int_0^\delta P_m h(\delta) \, d\delta. \tag{28}
\]

Moreover, we know that

\[
(1 - x)\overline{P_l} + x \overline{P_f} = \text{constant}, \tag{29}
\]
because the number of applications is fixed. Furthermore, we know that \( \frac{dP_m}{dD_m} \leq 0 \), then we can deduce from equation (27) that \( \frac{dP_m}{dD_m} < 0 \). Finally, from this latter statement and equation (29) we can deduce that \( \frac{dS_m}{dD_m} \geq 0 \). Then, on average, the regulation increases the probability to get a lease for local agents.

Agents are confronted to a trade-off between the probability of getting a lease and the rent. On the one hand, and seen above, the regulation decreases the match surplus when the tenant is anonymously matched (\( \frac{dS_m}{dD_m} < 0 \)). On the other hand, Proposition 1 tells that on average, procedural formalism increases the probability of getting a lease.

The average local applicant’s expected utility \( \bar{U}_l \) is defined by

\[
\bar{U}_l = \int_0^\infty U_l h(\delta)d\delta.
\] (30)

We can deduce the following result:

**Proposition 2** There exist \( n_1 \) and \( n_2 \), \( n_1 \leq n_2 \), such that

i) if \( n \leq n_1 \) then \( \frac{dU_l}{dD_m} < 0 \) for all level of \( D_m \geq 0 \);

ii) if \( n \geq n_2 \) then \( \frac{dU_l}{dD_m} > 0 \) for all level of \( D_m \geq 0 \).

**Proof.**

i) As \( \frac{dU_l}{dD_m} \) is continuous in \( n \) and \( \lim_{n \to 0^+} \frac{dU_l}{dD_m} < 0 \) for all \( D_m \in \mathbb{R}^+ \), there exists \( n_1 \) such that for \( n < n_1 \) we have

\[
(1 - n) \beta \int_0^\infty \left( -\delta P_m + \frac{dP_m}{dD_m} S_m \right) h(\delta)d\delta > n \beta \int_0^\infty S^n \frac{dP_n}{dD_m} h(\delta)d\delta.
\] (31)

ii) As \( \frac{dU_l}{dD_m} \) is continuous in \( n \) and \( \lim_{n \to 1^-} \frac{dU_l}{dD_m} > 0 \) for all \( D_m \in \mathbb{R}^+ \), there exists \( n_2 \) such that for \( n > n_2 \) we have

\[
(1 - n) \beta \int_0^\infty \left( -\delta P_m + \frac{dP_m}{dD_m} S_m \right) h(\delta)d\delta < n \beta \int_0^\infty S^n \frac{dP_n}{dD_m} h(\delta)d\delta.
\] (32)

Hence, when the size of social networks is small, local agent do not want to regulate the rental market. Indeed, the regulation has no (or little) impact on the probability to get a lease but strongly decreases the match surplus. A contrario, if the size of social network is large, local agents want to regulate the market. Asking a high level of regulation enables the local applicants to considerably increase their probability of getting a lease without (or little) affecting match surplus. However, we cannot determine analytically the value of \( n_1 \) and \( n_2 \). Indeed, the social network has two different effects on \( \frac{dU_l}{dD_m} \), of which the total effect is ambiguous and depends on \( G(y) \),

\[
\frac{dU_l}{dD_m\,dn} = -\beta \int_0^\infty \left( -\delta P_m + \frac{dP_m}{dD_m} S_m \right) h(\delta)d\delta + \beta \int_0^\infty S^n \frac{dP_n}{dD_m} h(\delta)d\delta + \frac{\partial U_l}{\partial D_m} (1 - n) \beta \int_0^\infty \left( -\delta P_m + \frac{dP_m}{dD_m\,dn} S_m \right) h(\delta)d\delta + (1 - n) \beta \int_0^\infty S^n \frac{dP_n}{dD_m\,dn} h(\delta)d\delta.
\] (33)
When \( n \) increases, a local agent is more likely to be network matched than anonymously matched. This first effect is positive

\[
-\beta \int_0^\delta \left( -\delta P_m + \frac{dP_m}{dD_m} S^m \right) h(\delta) d\delta + \beta \int_0^\delta S^m \frac{dP_n}{dD_m} h(\delta) d\delta > 0. \quad (34)
\]

However, if the size of social network of one applicant increases, the size of social network of other local agents increases too. This second effect is ambiguous on \( \frac{dP_m}{dD_m} \):

\[
(1-n) \beta \int_0^\delta \left( -\frac{dP_m}{dn} + \frac{dP_m}{dD_m} S^m \right) h(\delta) d\delta + n \beta \int_0^\delta S^m \frac{dP_n}{dD_m} d\delta. \quad (35)
\]

Indeed, it decreases the positive effect of the regulation on the local probability to get a lease \( P_n \):

\[
\frac{dP_n}{dD_m} dn = \frac{T}{V} \left( -(1-x) \right) \frac{\delta(\alpha - C + D^n)}{(\alpha - C + D^n)^2} h \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) P_n + \frac{L}{V} H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) - H(\delta) P_n \leq 0, \quad (36)
\]

and has an ambiguous impact on \( \frac{dP_m}{dD_m} \):

\[
\frac{dP_m}{dD_m} dn = -\frac{T(1-x)}{V} \frac{\delta(\alpha - C + D^n)}{(\alpha - C + D^n)^2} h \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) P_m + \frac{L}{V} H(\delta) - H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) P_m. \quad (37)
\]

Therefore, the total result of the two effects highlighted in equations (34) and (35) is ambiguous and prevents us to conclude that \( \frac{dU}{dD_m} \) is monotonically increasing in \( n \).

Nevertheless, if the size of social network is such that \( n > n_2 \), local agent support an even higher level of procedural formalism when the proportion of foreigners in the rental market is high.

\[
\frac{dU_l}{dx} = \beta n \frac{dP_n}{dx} S^n + \beta (1-n) \frac{dP_m}{dx} S^m \quad (38)
\]

\[
= \beta n^2 \frac{T}{V} \left( H(\delta) - H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) \right) P_n S^n + \beta (1-n) \frac{T}{V} n \left( H \left( \frac{\delta(\alpha - C + D^n)}{\alpha - C + D^n} \right) - H(\delta) \right) P_m S^m \geq 0.
\]

Indeed, the local tenant expected utility is increasing in \( x \) if \( D_m \) is higher than \( D^n \) (i.e when \( n > n_2 \)) for all \( \delta \).

To highlight the different mechanisms seen above, the following section calibrates our model on French data. The objective is to determine the level of regulation that maximizes the local agents’utility.

**4 Which level of regulation ?**

We are interested in the positive analysis of procedural formalism. Regulation always has a negative impact on foreigners. However, foreigners are less numerous than local agents and cannot influence the choice for the optimal level of procedural formalism. Therefore, we focus on local agents. The objective is to determine how the social network size \( n \) and the distribution function \( G(y) \) shape the optimal level of procedural formalism. We assume that local agents vote under the veil of ignorance, i.e without knowing their default rate for the vote. The default rate is revealed when the landlord and the potential tenant
meet on the rental market. This process of vote is particularly interesting. Indeed, it is unlikely that at
the time of voting all potential tenants know the default rate that they will have when they will apply
on the rental market. A lot of event, such as a promotions, change of work or unemployment can modify
the default rate during this interval. Moreover, the vote under the veil of ignorance catch the cohesion
between local agents. It’s equivalent to probabilistic voting when the weight given for the foreigners is
null whereas the weight for the local agents depend to their demographic weight.

To understand the choice for the regulation realized by local people with this process of vote, we
calibrate the model on French 2006 Housing Survey and from data collected by Djankov et al (2003). We
calibrate equation (30) where $\delta$ is distributed according to a uniform distribution.

4.1 Parameters choice

We normalize $\alpha$ to 1 without loss of generality. To set the value of $C$, we suppose that if the market was
without friction, $C$ would be close to $\alpha$. Thus we simulate the model with three values of $C = 0.25$, 0.5
and 0.75. The choice of $\beta$ does not matter (see equation 26). Thus, we set $\beta = 0.5$. Finally we leave $n$
free between 0 and 1, in order to see the impact of the social network on the choice of the optimal level
of regulation.

From the Housing Survey we find there is in France 9,140,000 local tenants $L$ and 1,435,000 foreign
tenants $F$. We name local tenants, tenants of French nationality and foreigner all the others (i.e all tenants
who have foreign nationality or tenants who are stateless or tenants who are French by naturalization,
marriage, declaration or by choice to its majority). We only assume that foreigners do not know any
landlord. We also find that there is approximately 2,000,000 vacant housing. From these data we can
deduce the number of landlord $V$ in our model with the following equation:

$$Ve^{-\frac{10575}{V}} = 2000. \quad (39)$$

Indeed, if there are $V$ landlords in the rental market, the probability for one of them receive an application
from a given agent is $1/V$. However, as there are $T$ potential tenants, the probability for a landlord not
receive any application is $(1 - 1/V)^T$. Finally, if we consider a large economy, so that $T$ and $V$ go to
infinity, this probability is $e^{-T}$. Then, given that there are 2,000,000 vacant dwellings and 10,575,000
tenants in the french rental market, we can deduce from (39) that $V = 7,783,000$.

We examine how the market tightness affects the optimal level of procedural formalism. We simulate
our model with two others alternatives. We set $V$ equal to 10575 to study a case where supply and
demand are equal and we set $V$ equal to 12575 to cover a case where the supply exceeds the demand.

From Djankov et al. (2003), we have information to estimate the cost of conflict resolution. There
is a positive correlation between the index of housing market regulation computed by Djankov et al.
(2003) and the number of days required to evict a tenant who does not pay the rent $^7$. Therefore, we can
estimate the cost of conflict resolution as the product of the opportunity cost of housing $C$ by the number
of months necessary to evict a tenant who does not pay the rent $^8$, $nb_{months}$. Thus $D^m = C \times nb_{months}$.

$^7$See Appendix B.

$^8$See Appendix B, Table 2.
where \( nb_{\text{months}} \in [0;32] \) as the maximum number of months necessary to evict a tenant who does not pay the rent observed in Europe is equal to 32.

By principle, \( D^n \) does not depend on the law. Implicitly, we suggest a low cost \( D^n \) in the countries where the social network is large because people have strong family/friendship ties. Hence, \( D^n \) is the product of the opportunity cost \( C \) by \( nb_{\text{min}} \), the minimum number of months necessary to evict a tenant who fails to pay the rent observed in the data\(^9\). Thus \( D^n = C \times nb_{\text{min}} \).

Given the different values of \( C \) and the number of months necessary to evict a tenant who fails to pay the rent, \( D^m \) varies between 0 and 24 and \( D^n \) between 0.5 and 1.5. Finally given the possible values of parameters \( \alpha, C \) and \( D^m \), \( \delta \) belongs to \([0,0.01]\). Indeed according to the threshold value \( \delta^m \) (see equation (9)), \( \delta \leq \frac{1-0.75}{1-0.75+0.75 \times 32} \approx 0.01 \).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simulation 1</th>
<th>Simulation 2</th>
<th>Simulation 3</th>
<th>Simulation 4</th>
<th>Simulation 5</th>
<th>Simulation 6</th>
<th>Simulation 7</th>
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<td>( L )</td>
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<td>10575</td>
<td>10575(1-0.1)</td>
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<td>7783</td>
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<td>7783</td>
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<td>1</td>
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<td>[0,1]</td>
<td>[0,1]</td>
<td>[0,1]</td>
<td>[0,1]</td>
</tr>
<tr>
<td>( D^m )</td>
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<td>[0,16.5]</td>
<td>[0,16.5]</td>
<td>[0,16.5]</td>
<td>[0,16.5]</td>
<td>[0,16.5]</td>
<td>[0,16.5]</td>
</tr>
<tr>
<td>( D^n )</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>( \delta )</td>
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<td>[0,0.01]</td>
<td>[0,0.01]</td>
<td>[0,0.01]</td>
<td>[0,0.01]</td>
<td>[0,0.01]</td>
<td>[0,0.01]</td>
</tr>
</tbody>
</table>

Table 1: Parameters values

We present in the main text the results with \( C \) equal to 0.5 whereas the results with \( C \) equal to 0.25 and 0.75 lie in Appendix C. Simulation 1 is the baseline. Simulations 2, to 5 enable to study the impact of foreigners. The proportion of foreigners is null in simulation 2 and gradually increases over the next simulations. Simulations 6 and 7 enable to study the impact of the market tightness on the optimal level of procedural formalism.

\(^9\)See Appendix B, Table 2.
4.2 Baseline results

Figure 3: Optimal regulation and the network size. The curve depicts the \( \arg \max \) of equation (30) for each value of \( n \).

The parameters are given by simulation 1 in the table 1.

Figure 3 shows the results of simulation 1. The optimal level of procedural formalism increases with the size of social networks. Local people use the regulation to increase their utilities to get a lease. When the social network is small (less than 0.16) local agents set the regulation to 0. When \( n > 0.16 \), local agents set a level of regulation larger than \( D^n = 1 \) and the preference for procedural formalism grows with \( n \). When \( n \) is sufficiently large, local agents choose the maximum level of procedural formalism. In this reasoning, all people stay in the market. Appendix D examines a complementary case where optimal procedural formalism can be so large that the least stable agents are forced to exit the rental market.

Figure 4: Optimal regulation as a function of individual default rate. The curve depicts the \( \arg \max \) of equation (24).

The parameters are given by simulation 1 in table 1 when \( n = 0.16 \).

The vote under the veil of ignorance redistributes welfare between local agents of different default
probabilities. To see such redistribution we compute the individual utility $U_i$ for different values of $\delta$. Figure 4 depicts the results. The desired level of $D^n$ increases with the default probability. Of course, agents with $\delta = 0$ are not concerned by the regulation. They are sure to obtain a lease any way. All the other agents can benefit from procedural formalism at the expense of foreigners. However, the cost of regulation decreases across $\delta$, and this why high default agents have a stronger preference for regulation.

4.3 Foreigners

![Figure 5: Proportion of foreigners and optimal regulation.](image)

The curves $F_2$, $F_3$, $F_4$ and $F_5$ depict the arg max of equation (30) respectively calibrated with the values of simulation 2,3,4 and 5 in the table 1.

Figure 5 depicts the impact of the proportion of foreigners in the rental market on the preference for regulation. It shows that optimal regulation increases with the proportion of foreigners in the rental market. Moreover, we note that when there is no foreigner in the country, local agents set the level of regulation at 0 for all network sizes. Indeed, when the proportion of foreigners is large the competition to get a lease between local agents and foreigners is harder than when the proportion of foreigners is low. Local agents choose a strict regulation to keep a high probability to get a lease, when the proportion of foreigners in the rental market is large.
The curves depict the arg max of equation (30) with the function $G(y_n)$ and $G(y_m)$ described in section 4.3. The parameters are given by simulation 1 in table 1.

So far, foreigners and local agents have the same distribution of $\delta$. It suppose that foreigners and local agents have the same skills. However foreigners could be on average more or less skilled than local agents. To account the difference of skills, we modify our model as follows. The probabilities $G_n$ and $G_m$ become

$$G(Y^n) = n(1-x) \left( 1 - H(\delta) \right) + (1-n)(1-x) \left( 1 - H \left( \frac{\delta (\alpha - C + D^n)}{\alpha - C + D^n} \right) \right) + x \left( 1 - S \left( \frac{\delta (\alpha - C + D^n)}{\alpha - C + D^n} \right) \right)$$

and

$$G(Y^m) = n(1-x) \left( 1 - H \left( \frac{\delta (\alpha - C + D^m)}{\alpha - C + D^m} \right) \right) + (1-n)(1-x) \left( 1 - H(\delta) \right) + x \left( 1 - S(\delta) \right),$$

where $S$ is the cumulative distribution function with the support $[\delta, \tilde{\delta}]$ and $0 \leq \delta < \tilde{\delta} \leq \overline{\delta}$. We simulate two cases that we compare to the baseline. Firstly, we simulate a case where the foreigners are on average less skill than local agents. Then, the support of the cumulative distribution $S$ is $[0.005, 0.01]$. Secondly, we simulate a case where the foreigners are on average more skill than local agents. Then the support of the cumulative distribution $S$ is $[0, 0.005]$. Figure 6 depicts the impact of a difference of skills between local and foreigner agents on the preference for regulation. The support for regulation increases with the skills of foreigners when the network size is strong and decreases when the network size is small.
4.4 Impact of $V$

Figure 7: Optimal regulation and market tightness.

The curves $\theta_1$, $\theta_2$ and $\theta_3$ depict the arg max of equation (30) respectively calibrated with the values of simulation 1, 6 and 7 in the table 1.

Figure 7 depicts the impact of the market tightness on the preference for regulation. It shows that the optimal regulation decreases with the supply of dwellings. Local agents ask a higher level of regulation when the market tightness is strong. Indeed, when the market tightness is tight the competition to get a lease between potential tenants is tough. Local agents choose a strict regulation to keep a high probability to get a lease, when the market tightness is strong.

So far we have considered the probability $n$ as exogene. However $n$ can be determined endogenously. In a economy, where there is $M$ landlords and $V$ vacant dwellings to rent, the probability that a landlord rents a dwellings is $V/M$. Then, the probability that a landlord does not rent a dwellings is $1 - V/M$. If an agent knows $N$ landlords the probability that he knows a landlord who has a rental is

$$n = 1 - \left(1 - \frac{V}{M}\right)^N. \tag{42}$$

$n$ increases with $V$ and $N^{10}$. The difference when $n$ is determined endogenously is that $n$ does not depend only on the network size but depends also on $V$, the number of vacant dwellings to rent. From the Housing Survey we find there is in France 31.3 millions of dwellings. Then, we set $M = 31300$ and $N = 1$ and we study the impact of $V$ on the optimal regulation when $n$ is endogenous.

\footnote{Consequently, local agents ask a higher level of procedural formalism when $V$ and $N$ increase. See Appendix E.}
Figure 8: Optimal regulation and supply of dwellings.

The curves depict the arg max of equation (30). The parameters are given by simulation 1 where \( n = 0.43 \) for the curves with \( n \) exogenous and where \( M = 31300 \) and \( N = 1 \) for the curves with \( n \) endogenous.

When \( n \) is endogenous, the rise of \( V \) increases the level of procedural formalism asked by local agents whereas it decreases when \( n \) is exogenous. When \( n \) is exogenous the rise of \( V \) decreases the market tightness and consequently the optimal regulation asked by local agents. However, when \( n \) is endogenous, this negative effect is dominated by the fact that \( V \) has a positive impact on the probability \( n \) and consequently on the optimal regulation \( D^m \).

To summarize, the model emphasizes that the support for regulation should increase with size of social networks, the default probability, the proportion of foreigners and the market tightness.

5 Conclusion

This paper addresses a central question in public policy: why do we observe, in some countries, political support for a legislation that reduces economic surplus? The explanation is based upon the complementarities between the strength of social network and the stringency of housing market regulation. The interest of the social network is that conflict resolution does not depend on law. In an area where the local people belong to a social network whereas the foreigners do not, the regulation facilitates housing search for the local applicants at the expense of foreigners.

Our study is motivated by some stylized facts. There is a positive correlation between procedural formalism and local social capital. Moreover, there is evidence that foreigners are discriminated on the rental market in Southern Europe (where regulation is strong). We build a search theoretic model where the regulation enables the connected applicant to be better ranked than the other applicants. We show that local applicants have interest in increasing the regulation on the rental market if their social network is sufficiently developed. Hence, local agents can use the regulation to increase their welfare.

In a second step, we show that the optimal level of regulation increases with the social network size,
with the market tightness and with the proportion of foreigners on the rental market.

Our paper could be extended in various directions. First of all, in our paper, the housing supply is fixed. Therefore it would be interesting to endogenize it. Secondly, we could extend our reasoning to the labor market. Indeed, Decreuse and van Ypersele (2012) show that housing market regulation and employment protection legislation are positively correlated and Kramarz and Nordström Skans (2011) show that strong social ties are an important determinant of where young workers find their first job. Finally, we would like to extend this model to two regions.

Appendix

A Data

The friendship ties and neighborhood ties variables are obtained from ECHP as in David et al (2010). The sample period is 1994-2001 except Finland (1996-2001), Sweden (1997-2001), Austria (1995-2001) and Luxembourg (1994). In the ECHP, individuals are asked about i) the frequency of relationships with neighbors, ii) the frequency of contacts with friends and relatives outside the household. We transform answers into a daily frequency to simplify the exposition. Indeed, the answers are as follows: 1. On most days; 2. Once or twice a week; 3. Once or twice a month; 4. Less often than once a month; 5. Never. Therefore, David et al (2010) built the following index measure that we have use in Figure 1:

\[ Z_{i,t} = I [X_{i,t} = 1] + I [X_{i,t} = 2] \frac{2}{7} + I [X_{i,t} = 3] \frac{2}{30} + I [X_{i,t} = 4] \frac{1}{60} + I [X_{i,t} = 5] 0 \]

where \( Z_{i,t} \) is the index value for individual \( i \) at time \( t \) and \( X_{i,t} \) the answer to the question. \( I[.] \) is an indicator function that takes value 1 if the expression in brackets is true and 0 if it is not.

The family ties variable is obtained from the EVS and WVS survey. The question is: "Would you consider important to teach your children to leave your home?". The answer to the question is yes/no and is attributed the value 1 or 0. We attribute 0 for the answer yes and we attribute 1 for the answer no. Therefore we obtain an index value of family ties between 0 and 1. Van de Velde (2008) and Reher (1998) explain that when family ties are strong in a country, young people, by their education and their culture, become independent later than young people in countries where family ties are weak.

B Housing market regulation
Figure 9: Correlation between Procedural formalism and number of months to evict a tenant. Data source: Courts, Djankov et al.

<table>
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<th>Country</th>
<th>Number of days to evict a tenant</th>
<th>Number of months to evict a tenant</th>
</tr>
</thead>
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</tr>
<tr>
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</tr>
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<td>12.5088</td>
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<td>Austria</td>
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<td>17.9924</td>
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<td>20.7232</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1003</td>
<td>32.9934</td>
</tr>
</tbody>
</table>

Table 2: Number of months to evict a tenant in Europe.
C  Impact of $C$ on the optimal regulation

In this Appendix, we examine the sensitivity of $D^n$ with respect to $C$. We argue that the desired level of regulation decreases with the opportunity cost of Housing $C$.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simulation 8</th>
<th>Simulation 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L$</td>
<td>9140</td>
<td>9140</td>
</tr>
<tr>
<td>$F$</td>
<td>1435</td>
<td>1435</td>
</tr>
<tr>
<td>$V$</td>
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<td>7783</td>
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<td>$\alpha$</td>
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<tr>
<td>$C$</td>
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<td>$\beta$</td>
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<td>[0, 1]</td>
</tr>
<tr>
<td>$D^m$</td>
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<td>[0, 16.5]</td>
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<tr>
<td>$D^n$</td>
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<td>1</td>
</tr>
<tr>
<td>$\delta$</td>
<td>[0, 0.01]</td>
<td>[0, 0.01]</td>
</tr>
</tbody>
</table>

Table 3: Parameter calibrations for simulation 8 and 9.

We know that $D^m = C.n_{b\text{months}}$, where the number of months belong to $[0, 32]$. We also know that $D^n = C.n_{b\text{min}}$, where $n_{b\text{min}} = 2$. Then, given that the maximum number of months to evict a tenant in Europe is equal to 32, we can see that the maximum value of the regulation that local agent can choose when $C$ is equal to 0.25 is 8, whilst it is of 24 when $C$ is equal to 0.75. $C$ changes the scale of the optimal regulation.

![Figure 10: Impact of $C$ on the optimal regulation.](image)

The curves $C_8$, $C_1$ and $C_9$ depict the arg max of equation (30) respectively calibrated with the values of simulation 8, 1 and 9.
When $C$ is low, local agents set a more stringent regulation than when $C$ is high. Indeed, when $C$ is low, local agents set the maximum level of regulation for a lower network size. Therefore, increasing the regulation has more impact when $C$ is low. Furthermore, we know that the housing cost opportunity is low when the frictions on the market are strong. Hence, increasing the regulation has more impact when the friction on the rental market are strong.

D Accounting for market eviction

So far, we neglect the fact that the regulation can evict some agents of the market. To account this phenomenon, we modify our model as follows. The probabilities $P_m$ and $P_n$ become

$$P_n = e^{-L \frac{C}{a-C+D_m}} + F \frac{H(\frac{a-C}{a-C+D_m})}{H(\frac{a-C}{a-C+D_n})} \left(1 - n \frac{L H(\frac{a-C}{a-C+D_m})}{L H(\frac{a-C}{a-C+D_n}) + F H(\frac{a-C}{a-C+D_n})} \left(1 - H \left(\frac{\delta(a-C+D_n)}{a-C+D_m}\right)\right)\right)$$

and

$$P_m = e^{-L \frac{C}{a-C+D_m}} + F \frac{H(\frac{a-C}{a-C+D_m})}{H(\frac{a-C}{a-C+D_n})} \left(1 - n \frac{L H(\frac{a-C}{a-C+D_m})}{L H(\frac{a-C}{a-C+D_n}) + F H(\frac{a-C}{a-C+D_n})} \left(1 - H \left(\frac{\delta(a-C+D_m)}{a-C+D_m}\right)\right)\right)$$

The distribution $G(y)$ is modified: the agents non profitable for the landlord (i.e. local applicants with a default probability $\delta$ larger than the threshold value $a$ and foreign applicants with a default probability larger than the threshold value $\delta^m$) stay out of this distribution. Moreover we know that $\delta^n > \delta^m$ if $D^m > D^n$. Then, the simulated model becomes

$$U_l = \int_0^{\delta_m} \left((1-n)\beta S_m P_m' + n\beta P_n' S_n\right) h(\delta) d\delta$$

We calibrate this model with the parameters values of simulation 1, where we let $D^m$ free and set $n$ to 0.99. Then, we obtain the Figure 11.
Figure 11: Average local utility and regulation.

The curve is calibrated with the parameter values of simulation 1 with \( n = 0.99 \).

In Figure 11, the average local people’s utility decreases directly from the point on where the regulation evicts some local applicants of the market. This means that local people choose the highest level of regulation before the regulation evicts some local applicant of the market. Indeed, given the threshold value \( \delta^m \) equal to \( \frac{1 - 0.5}{1 - 0.5 + D^m} \) (see equation 9) and that \( \delta \) belongs to \([0, 0.01]\), some local potential tenants can be evicted out of the rental market when \( D^m \geq 52 \). In fact \( \frac{1 - 0.5}{1 - 0.5 + 52} < 0.01 \).

E Optimal regulation and \( n \) endogenous

Figure 12: Optimal regulation and \( n \) endogenous.

The points depict the \( \arg \max \) of equation (30) where \( n \) is endogenous. The parameters are given by the simulation 1 and by the simulation 2.
Figure 12 depicts the impact of $V$ and $N$ on the preference for regulation. Local agents ask a higher level of procedural formalism when $V$ and $N$ increase.
References


