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Abstract

Housing costs can damage labour market outcomes and increase unemployment. Also, an important and related research stream claims that higher homeownership rates are associated with fewer new businesses. Using a search-matching model, this paper investigates the relation between homeownership and entrepreneurship by distinguishing two channels through which homeownership affects the creation of enterprises and jobs. The first channel looks at the job search intensity of homeowners, while the second considers the link between the benefit of being a homeowner and the productivity of a new enterprise. The key result of this paper is that the intrinsic preference for homeownership plays a key role in the establishment of new small businesses, while in general homeownership does not encourage the development of existing enterprises.

Keywords: entrepreneurship; homeownership; job creation; new firms; small businesses.

JEL classification numbers: J63, J64, R21, M13, L26.

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1. Introduction

The current body of literature suggests that high housing costs impair the proper functioning of the labour market, and housing market frictions and inefficiencies (such as housing regulations and taxes) can generate labour market rigidities, thus increasing unemployment (see, for example, van Ewijk and van Leuvensteijn, 2009; Rupert and Wasmer, 2012). Also, an important and related research stream, known as the 'Oswald hypothesis' (Oswald, 1996, 1999; Blanchflower and Oswald, 2013), reports that an increase in homeownership rate leads to a future increase in unemployment rate. According to Heller and Stephenson (2015), however, the 'Oswald hypothesis' omits any potential role for entrepreneurship, and the research on entrepreneurship neglects any potential labour market rigidities arising from homeownership.[1] Actually, this is not exactly true. Besides the well-studied effect on (un)employment operating through home moving and housing costs,[2] Blanchflower and Oswald (2013) suggest that higher homeownership rates are also associated with fewer new businesses. Homeowners care more than renters about the region they live in, hence in regions with a high homeownership rate there may be a negative impact on new businesses (negative housing market externalities) due to the so-called 'Not In My Back Yard' (NIMBY) effect, namely, planning laws and land development laws enforced by local governments (Fischel, 2001; Konecny and Stroukal, 2015). In general, however, very few works, that are largely empirical, within the body of literature have explicitly investigated the link between homeownership and new business startups (Bracke, Hilber and Silva, 2014). Indeed, a theoretical underpinning that is capable of explaining the complex interplay between the housing and labour markets is missing (Blanchflower and Oswald, 2013; Laamanen, 2013).

Following the 'Oswald hypothesis', the present paper combines research on entrepreneurship and labour market outcomes with research on homeownership and unemployment. The connection between homeownership and entrepreneurship is policy-relevant, as homeownership and entrepreneurship are both encouraged and are also related to economic outcomes, such as unemployment rate. Furthermore, entrepreneurship and new businesses are associated with innovation and economic growth. Thus, the question of whether or not policies that

[1] According to these authors, however, the difference is that entrepreneurship for labour market outcomes is more important than any rigidities that are created by homeownership.

[2] The different home moving and housing costs of homeowners and tenants are usually used to explain their different economic outcomes in the labour market (Munch et al., 2006; Rouwendal and Nijkamp, 2010). In general, homeowners have higher moving costs, but lower housing costs (Baert et al., 2014). Recently, in line with earlier empirical micro-econometric research, Kantor et al. (2015) find that homeowners are more likely to leave unemployment than renters. This finding does not support Oswald's thesis about a positive relationship between homeownership and unemployment. However, Oswald's thesis is mainly related to empirical evidence at the macroeconomic level (the discrepancy between the microeconomic and macroeconomic outcomes is, in fact, known as the "Oswald puzzle"). Therefore, Blanchflower and Oswald (2013) suggest an approach that is more fruitful, that focuses on labour market externalities that are generated with long time lags by homeownership.

promote homeownership encourage entrepreneurial activities is very important. Nevertheless, the related literature (on labour market externalities created by housing tenure) has neglected the link between homeownership and entrepreneurship (Bracke, Hilber and Silva, 2014). Consequently, this topic could become a major research area for the next decade or so. In order to investigate the relation between homeownership and entrepreneurship, this paper uses an extended version of the search and matching models and distinguishes two channels through which homeownership affects the creation of jobs and new enterprises. The first channel works by means of *search intensity*, namely, the effort made in searching for a job. In this case, as suggested by the 'Oswald hypothesis', the effect of homeownership rates on labour market outcomes is negative, i.e., there is a positive relationship between homeownership and unemployment rates. As will be clear later in this paper, this result does not depend on the higher moving costs for owners. Rather, it is due to the effect of housing tenure choice on search intensity in the labour market (a kind of housing market externality), since owner occupancy is the best housing tenure choice and employed workers have a greater chance of buying a home. Accordingly, (unemployed) tenants generate a greater effort in searching for a job than do homeowners. As a result, the larger the share of homeowners in the economy, the smaller the aggregate search intensity, and the fewer the number of jobs that are created by existing firms (and, thus, the higher the unemployment rate). The second channel, instead, considers the effect of homeownership on new businesses. In this case, the effect of homeownership rates on labour market outcomes may be positive, i.e., there could be a positive relationship between homeownership and job creation. This effect crucially depends on the so-called "intrinsic preference for homeownership", namely, individuals are willing to pay more to own a particular set of housing characteristics, such as a house, rather than paying rent in this regard (see Linneman and Voith, 1991; Heston and Nakamura, 2009). Precisely, the larger the benefit of being a homeowner, the higher the productivity of a new enterprise that is created by homeowners and, thus, more homeowners would start a firm.[3] This theoretical result is consistent with the empirical finding that housing capital gains encourage transitions into self-employment (Harding and Rosenthal, 2013). Actually, the "intrinsic preference for homeownership" justifies the key assumption of the theoretical model that the best housing tenure choice is owner-occupancy. Finally, we extend the analysis in order to take into account the important distinction between outright homeownership and homeownership with mortgage payments. This extension of the model yields the further result that homeowners with mortgage payments have worse opportunities, than outright homeowners, to become entrepreneurs. Indeed, as noted by Bracke, Hilber and Silva

[3] In Munch et al. (2006, 2008) homeowners have higher labour productivity and, thus, firms have greater incentives to invest.

(2014), homeownership with mortgage payments is associated with fewer new businesses. Precisely, they report the importance of financial constraints. Very likely, a homeowner with mortgage payments will prioritise the payment of the loan rather than start a business; whereas, an outright homeowner has a warranty (the house) that facilitates the access to credit (the house is indeed both a consumer good and an investment asset). Basically, the work by Bracke, Hilber and Silva (2014) provides a theoretical explanation for why mortgage debt diminishes the likelihood that homeowners will start a new business, while we obtain a more general result for the relation among homeownership, job creation and new businesses.

In summary, the intrinsic preference for homeownership fosters the establishment of new enterprises, although homeownership does not encourage the development of existing enterprises. Furthermore, outright homeowners have better opportunities than tenants to become an entrepreneur, while homeowners with mortgage payments have worse opportunities than outright homeowners to start a new business. Eventually, therefore, the main finding of this paper is that outright homeownership encourages the establishment of new small businesses. Hence, we also find a close link between outright homeownership and entrepreneurship, since there is a strong association between entrepreneurship and small businesses (Sahut and Peris-Ortiz, 2014). Indeed, small enterprises constitute one of the broadest fields of entrepreneurial activity (Blackburn and Kovalainen, 2009). A shining example of the general result of this model is given by Italy, where the unemployment rate is among the highest in the European Union (thus, job creation is poor), the homeownership rate is very high (about 80% of Italian households live in their own owned-house) and the production structure is characterised by the presence of small and medium-sized enterprises.[4]

The rest of this paper is organised as follows. Section 2 presents an extended search and matching model where homeownership affects the creation of jobs and new enterprises through the search intensity and the intrinsic preference for homeownership; Finally, Section 3 discusses the results.

2. The theoretical model

This paper uses an extended version of the basic search-matching model to study the effect of housing market externalities on labour market outcomes. Indeed, the approach that focuses on labour market rigidities created by housing market frictions, rather than focusing on home moving

[4] However, cross-sectional studies usually report a positive relation between homeownership and new businesses, but this could not be the "real" relation which can be seen in a panel (see Bracke, Hilber and Silva, 2014).

and housing costs, might be the most suitable with which to study the strong link between the housing and labour markets (Blanchflower and Oswald, 2013; Kantor et al., 2015).

A standard search and matching model is characterised by three key elements: (a) the matching function; (b) the so-called "asset values"; (c) the steady-state equilibrium condition.

The *matching function* $m = m(v, u)$ gives the number of successful job matches (m) per unit of time, given the number of unemployed workers u and the number of job vacancies v. As usual, the matching function is increasing and concave in both inputs and displays constant returns to scale, and the ratio $\theta \equiv \frac{v}{u}$ defines so-called "market tightness" from the firm's point of view, since an increase in market tightness implies an increase in the number of vacancies (more competition on the labour demand side) and/or a decrease in the number of job seekers (less competition on the labour supply side). It follows that $\frac{m(u,v)}{u} = m(1, \theta)$ is the probability of finding a job (increasing in θ); whereas, $\frac{m(u,v)}{v} = m(\theta^{-1}, 1)$ is the probability of filling a vacancy (decreasing in θ).[5] Finally, the job destruction rate (usually constant) is equal to λ. With the labour force normalised to the unit, u and v are also rates, and $(1 - u)$ is the share (the number) of employed workers (the employment).

The present discounted values or "*asset values"* describe the economic condition of workers and entrepreneurs/firms in the labour market and consist of two terms: 1) the income or cost flow (the dividend); 2) the capital gain or loss. When introducing the asset values, it will be very easy to distinguish "the flow" from "the capital" within them. Actually, the capital gain and loss depend on the probabilities of transition from one condition to another (from unemployed to employed, for example), where the probabilities of transition are the job destruction rate (λ) and the matching rates $m(1, \theta)$ and $m(\theta^{-1}, 1)$. The flow is instead the income or cost associated with a particular condition in the labour market (employed or unemployed, for example).

In equilibrium, the so-called *free-entry* or *zero profit condition* allows to obtain the equilibrium value of market tightness θ (we will show this later). Eventually, in the steady state, the equality between job destruction and job creation, viz.:[6]

$\lambda \cdot (1 - u) = m(1, \theta) \cdot u$

gives the steady-state equilibrium unemployment rate (u^*):

$$u^* = \frac{\lambda}{\lambda + m(1, \theta)} \quad (1)$$

[5] Actually, they are "instantaneous" probabilities which can vary, theoretically, from zero to infinity.

[6] The labour force is normalised to the unit; thus, $\lambda \cdot (1 - u)$ is the number of destroyed jobs and $m(1, \theta) \cdot u$ is the number of new employed workers (new jobs).

Obviously, the unemployment rate is decreasing in θ, since $m(1,\theta)$ is increasing in θ. This is the core of the *equilibrium unemployment theory*.

The role of the effort in searching for a job becomes evident when introducing a parameter of search intensity into the standard matching function (see Pissarides, 2000, Chapter 5), $m = m(s \cdot u, v)$, where s is the search intensity of the representative unemployed worker or, equivalently, the market average of search intensity. *Ceteris paribus*, the larger the search intensity in the labour market, the higher the number of job matches per unit of time. Thus, the probability of finding a job $\frac{m(s\cdot u,v)}{u} = m(s,\theta)$ and the probability of filling a vacancy $\frac{m(s\cdot u,v)}{v} = m(s\cdot\theta^{-1},1)$ are both increasing functions of search intensity. This extension of the model gives the key result that the steady-state equilibrium unemployment rate (u^*) is decreasing in the market average of search intensity:

$$u^* = \frac{\lambda}{\lambda + m(s,\theta)} \qquad (1')$$

with $\frac{\partial u^*}{\partial s} < 0$, since $m(s,\theta)$ is increasing in s, while u^* is decreasing in $m(s,\theta)$.

Basically, we introduce three key elements into this framework, thus linking the housing and labour markets: *a*) the distinction between the search intensity of homeowners and tenants; *b*) the benefit of being a homeowner (the so-called "intrinsic preference for homeownership") and the rental price; *c*) the search in the housing market. Precisely, the key assumptions of the model are the following: (1) The effort or intensity in searching for a job is closely related to the housing tenure choice (tenancy or owner occupancy). (2) Owner occupancy is the best housing tenure choice; thus, everyone wants to become owners. (3) Housing tenure choice is affected by the employment status. Precisely, employed workers have a greater chance of buying a home, thus becoming homeowners, since the wage is always higher than the unemployment income. For example, a higher income gives to employed workers a greater chance of getting a mortgage to buy a home. As a result, for tenants there is an *additional gain* from searching for a job, namely, the possibility of becoming homeowners. Finally, (4) tenants and homeowners can act on the supply side of the labour market (as workers), as well as having the responsibility of running a firm, thus acting as entrepreneurs.

2.1 Homeownership and job creation

On the supply side of the labour market, a worker (both tenant and homeowner) can be either employed or unemployed. The steady state asset values related to the employment status are the following (the subscript denotes the housing tenure, with t = tenant and o = homeowner):[7]

[7] As usual, we use the steady-state version of the model, where the variables are not subject to further changes over time.

$$r \cdot U_t = [z - c(s_t)] - p_r + m(s, \theta) \cdot [W_t - U_t] \quad (2)$$

$$r \cdot U_o = b + [z - c(s_o)] + m(s, \theta) \cdot [W_o - U_o] \quad (3)$$

$$r \cdot W_t = w - p_r + \lambda \cdot [U_t - W_t] + \delta(\vartheta) \cdot [W_o - W_t] \quad (4)$$

$$r \cdot W_o = b + w + \lambda \cdot [U_o - W_o] \quad (5)$$

where U_i and W_i are the present values (discounted at the exogenous interest rate $r > 0$) of searching for a job and of being employed, respectively. When searching for a job, a tenant (U_t) enjoys the leisure z, suffers the search cost $c(s_t)$, pays the rental price p_r, and with probability $m(s, \theta)$ she/he becomes an employed worker (W_t). The search cost is, of course, increasing in the search effort or intensity, $\frac{dc(s)}{ds} > 0$. A similar reasoning applies for homeowners, although they do not pay the rental price and have, in addition, the benefit of being a homeowner, namely each potential income flow deriving from the use of the house. Indeed, the "intrinsic preference for homeownership" requires that the benefit of being a homeowner should be positive, $b > 0$. When employed, tenants and homeowners earn the wage (w) and become unemployed with probability λ.[8] Note that $m(s, \theta)$ and $m(s \cdot \theta^{-1}, 1)$ depend on the market average of search intensity s, since they are "aggregate" probabilities; whereas, the search cost depends on the actual search effort made by tenants and homeowners. Obviously, the market average of search intensity s is a positive function of the individual search intensities, $s = s(s_t, s_o)$.

Finally, $[W_o - W_t]$ in Eq. (4) is the tenant's additional gain, where $\delta(\vartheta)$ is the probability of buying a home that depends on the frictions in the housing market ϑ, namely, the ratio between houses for sale and home seekers. As regards ϑ, when putting a house up for sale, the seller must (at least) recover the building and/or maintenance cost Ω. In equilibrium, therefore, the expected proceeds from the sale must be equal to the building and/or maintenance cost. The expected proceeds from the sale are given by the house price P multiplied by the probability of selling a home (filling a vacant house) $\gamma(\vartheta)$.[9] Hence, the ratio $\frac{\Omega}{P}$ allows to pin down the equilibrium value of $\gamma(\vartheta)$ and then ϑ. Intuitively, the probability of buying a home is increasing in ϑ; whereas, the probability of filling a vacant house is decreasing in ϑ, since an increase in ϑ implies an increase in the number of houses for sale (more competition on the supply side of the housing market) and/or a decrease in the number of home seekers (less competition on the demand side of the housing market). As a result, a straightforward comparative static exercise gives $\frac{\partial \vartheta}{\partial P} > 0$, since $\frac{\partial \gamma(\vartheta)}{\partial P} < 0$ and $\frac{\partial \gamma(\vartheta)}{\partial \vartheta} < 0$. In words, when the house price increases, there will be more houses for sale, thus

[8] The housing tenure does not affect productivity of workers. Thus, the wage is the same for both tenants and owners.

[9] For the sake of simplicity, it is assumed that the house price depends on the aggregate conditions in the housing markets, thus being an exogenous value. Hence, a positive real estate cycle implies a rise in the house prices.

decreasing the probability of selling a home.[10] At the same time, therefore, an increase in P rises the probability of buying a home, since $\frac{\partial \delta(\vartheta)}{\partial \vartheta} > 0$. Note that this result strengthens hypothesis (3) of the model, namely, employed workers have a greater chance of buying a home (*ceteris paribus*), since they have a higher income. In short, a higher house price increases the probability of buying a home – through an increase in ϑ – only for employed workers. Intuitively, for the unemployed tenants (U_t), endowed with a lower (or null) income, the increase in price deletes the positive effect of an increase in ϑ. Thus, the home seekers in the model are merely the employed tenants (W_t). In Eq. (2), in fact, there is not the tenant's additional gain. The tenant's additional gain in Eq. (4) is positive, of course, i.e. $W_o > W_t$, since owner occupancy is the best housing tenure choice. Hence, once employed, tenants have an additional gain with respect to the homeowners, namely, the possibility of buying a home, thus becoming homeowners themselves.

A non-trivial equilibrium in the labour market requires that the "job surplus", namely, the difference between the value of being employed and the value of being unemployed, must always be positive; otherwise, there would be no search for a job in the labour market. Thus, $[W_i - U_i] > 0$ for each worker (both tenant and homeowner). The job surplus is:

$$[W_t - U_t] = \frac{w - z + c(s_t) + \delta(\vartheta) \cdot [W_o - W_t]}{r + \lambda + m(s,\theta)}$$

for tenants, and

$$[W_o - U_o] = \frac{w - z + c(s_o)}{r + \lambda + m(s,\theta)}$$

for homeowners. If $s_t = s_o$ and thus $c(s_t) = c(s_o)$, it is straightforward to show that the job surplus is higher for unemployed/tenants than for unemployed/owners:

$$[W_t - U_t] > [W_o - U_o]$$

since $\delta(\vartheta) \cdot [W_o - W_t] > 0$. Indeed, the job surplus is very important in choosing the optimal level of individual search intensity. Intuitively, the higher the "capital gain" deriving from the change in the employment status (the job surplus), the larger the effort of the unemployed workers in searching for a job. Therefore, the effort in searching for a job is also greater for the unemployed/tenants than for the unemployed/owners:

$$[W_t - U_t] > [W_o - U_o] \xrightarrow{yields} s_t > s_o \tag{6}$$

[10] Formally, $\lim_{P \to 0} \gamma(\vartheta) \to \infty$; vice versa, $\lim_{P \to \infty} \gamma(\vartheta) \to 0$. By assuming that the number of new houses for sale in each time period is exogenous and equal to $\varphi > 0$, in the steady state equilibrium the number of new houses for sale must equal the number of (the existing) vacant houses that are sold. It follows that, the ratio $\frac{\varphi}{\gamma(\vartheta)}$ allows to pin down the equilibrium value of houses for sale. Hence, when the price tends to 0, no house is on sale, i.e. all houses are sold (since the probability of selling a home tends to infinity); instead, when the price tends to infinity, no house is sold, i.e. all houses are on sale (since the probability of selling a home tends to zero).

Hence, $c(s_t) > c(s_o)$. Actually, this result strengthens the previous result that the job surplus is higher for unemployed/tenants than for unemployed/homeowners.

From the firm's point of view, the present discounted values of a filled job (J) and of a job vacancy (V) are the following:

$$r \cdot J = y - w + \lambda \cdot [V - J] \quad (7)$$

$$r \cdot V = -k + m(s \cdot \theta^{-1}, 1) \cdot [J - V] \quad (8)$$

where k is the cost of opening a vacancy and y is the job productivity. At the rate λ a productive job is destroyed and becomes a vacancy; whereas, at the rate $m(s \cdot \theta^{-1}, 1)$ a vacancy is filled and becomes a productive job. The usual *free-entry* or *zero-profit condition*, namely, the condition $V = 0$ in Eqs. (7) and (8) allows to obtain the so-called *job creation (JC) equation*:

$$\frac{y-w}{r+\lambda} = \frac{k}{m(s \cdot \theta^{-1},1)} \quad (9)$$

In short, Eq. (9) claims that in equilibrium the discounted net productivity of the firm must equal the expected cost of a vacancy (the ratio between the cost of opening a vacancy and the probability of filling a vacancy). The *JC equation* gives a positive relationship between labour market tightness (job creation) and search intensity:

$$\frac{d\theta}{ds} > 0$$

since $\frac{\partial m(s \cdot \theta^{-1},1)}{\partial \theta} < 0$ and $\frac{\partial m(s \cdot \theta^{-1},1)}{\partial s} > 0$. As a result, job creation is higher in a market where the majority of unemployed workers are tenants, since $s_t > s_o$ and $s = s(s_t, s_o)$. In words, the average search intensity that prevails in a market where the majority of unemployed workers are tenants is higher than the average search intensity that prevails if the majority of unemployed workers are homeowners. Eventually, the equilibrium unemployment rate in Eq. (1') is lower. Therefore, the effect of homeownership on job creation and employment is negative (the unemployment is higher), since homeowners generate a lower effort in searching for a job than do tenants. This theoretical result seems consistent with the 'Oswald hypothesis' that reports, at macroeconomic level, a positive association between the homeownership and unemployment rates.

2.2 Homeownership and new enterprises

In the labour market, however, an individual (both tenant as well as homeowner) can always choose between being an entrepreneur or a worker. Before entering the labour market, therefore, the marginal individual should be indifferent between posting a vacancy and searching for a job:

$$r \cdot U_i = r \cdot V \xrightarrow{yields} U_i = V \quad (10)$$

where $i = (t, o)$ with $t =$ tenant and $o =$ homeowner. In this case, intuitively, the marginal individual (both tenant and homeowner) is the individual endowed with a minimum level of

entrepreneurial ability to start a business.[11] Hence, tenants and homeowners endowed with a lower level of entrepreneurial ability enter the labour market as workers; thus, $U > V$. Instead, of course, if they are endowed with a higher level of entrepreneurial ability, individuals (both tenant as well as homeowner) enter the labour market as entrepreneurs, since $V > U$. Of course, if $U = V$ the individual is indifferent between posting a vacancy and searching for a job.

In order to find the productivity of a new marginal enterprise, we take the limit of condition (10) when the vacancies tend to zero (recall that $\theta \to 0$ when $v \to 0$):

$$\lim_{\theta \to 0}(U_i = V) \tag{10'}$$

In short, we consider the productivity of a new marginal enterprise as the productivity of a firm with zero vacancies, a kind of initial level of productivity. Since $\lim_{\theta \to 0} m(s, \theta) \to 0$, we obtain in a straightforward manner from the Bellman equations for U_t and U_o that:

$$\lim_{\theta \to 0} U_t = [z - c(s)] - p_r$$

$$\lim_{\theta \to 0} U_o = b + [z - c(s)],$$

whereas, by applying *l'Hôpital's rule* to the Bellman equation for V, we get:[12]

$$\lim_{\theta \to 0} V = y - w$$

Intuitively, these mathematical results are straightforward to understand, since for $\theta \to 0$ the vacancy is immediately filled, i.e. it is always a productive job, and the unemployed worker never finds a job, i.e. job-seekers (tenants and homeowners) always remain unemployed. It follows that, in this case the *tenant's additional gain* plays no role since the tenants never buy a home (for $\theta \to 0$ the unemployed/tenants never become employed). Eventually, combining the previous results, condition (10) yields the following initial productivities:

$$y = w + [z - c(s_t)] - p_r \tag{11}$$

for the new entrepreneur/tenant, and

$$y = w + b + [z - c(s_o)] \tag{12}$$

for the new entrepreneur/homeowner. It is straightforward to show that y in Eq. (11) is always lower than y in Eq. (12), since $b > 0$, $p_r > 0$ and $c(s_t) > c(s_o)$. Hence, homeowners have better opportunities than tenants to become entrepreneurs. On the one hand, the largest use of economic resources (the cost of the search and the payment of the rent) increases the opportunity cost of entrepreneurship for tenants, thus reducing the net productivity. On the other hand, the benefit of being a homeowner increases the productivity of a new enterprise, thus reducing the opportunity cost of entrepreneurship for homeowners. Note, in fact, that Eqs. (11) and (12) can also be

[11] For example, in Fonseca *et al.* (2001), there is a threshold value of entrepreneurial ability such that the value of a job vacancy (minus the startup cost) is equal to the value of searching for a job.

[12] Precisely, $r \cdot V = \frac{m(s \cdot \theta^{-1}, 1) \cdot [y - w] - k \cdot (r + \lambda)}{r + \lambda + m(s \cdot \theta^{-1}, 1)}$, since $[J - V] = \frac{y - w + k}{r + \lambda + m(s \cdot \theta^{-1}, 1)}$. Recall that $\lim_{\theta \to 0} m(s \cdot \theta^{-1}, 1) \to \infty$.

expressed in terms of opportunity cost of entrepreneurship, namely, the wage rate (for a given level of productivity):

$$y - [z - c(s_t)] + p_r = w \quad (11')$$

for the employee/tenant, and

$$y - b - [z - c(s_o)] = w \quad (12')$$

for the employee/homeowner. In this case, instead, w in Eq. (11') is always higher than w in Eq. (12'). Actually, this result is consistent with the presence of an additional gain for tenants, that pushes them to a larger effort in searching for a job. Hence, this model is able to frame the housing tenure choice in the occupational choice framework, thus pointing out the effect of housing capital gains (b) and rent (p_r) on the entrepreneur/employee choice.

However, in most cases, people need a mortgage to buy a home. The developed theoretical model can easily be extended to take into account the crucial distinction between outright homeownership and homeownership with mortgage payments. Precisely, it needs to add the steady state values related to the employment status of a homeowner with mortgage payments:

$$r \cdot W_o' = b - m + w + \lambda \cdot [U_o' - W_o'] \quad (3b)$$

$$r \cdot U_o' = b - m + [z - c(s_o)] + m(s, \theta) \cdot [W_o' - U_o'] \quad (5b)$$

where U_o' and W_o' are, respectively, the present discounted values of searching for a job and of being employed for homeowners with mortgage payments, and m is the mortgage payment (a cost flow). Obviously, the steady state values related to the employment status of an outright homeowner remain as in Eqs. (3) and (5). Firstly, note that this important extension of the model does not change the key result of Section 2.1, i.e. the job surplus remains higher for unemployed/tenants than for unemployed/homeowners, since the mortgage payment reduces both the present discounted value of being an employed/homeowner with mortgage payments, $r \cdot W_o'$, and the present discounted value of being an unemployed/homeowner with mortgage payments, $r \cdot U_o'$. Thus, the job surplus of an outright homeowner is equal to the job surplus of a homeowner with mortgage payments, viz. $[W_o - U_o] = [W_o' - U_o']$.

Instead, the productivity of a new marginal firm run by a homeowner with mortgage payments is very different and is now given by:

$$y = w + b - m + [z - c(s_o)] \quad (13)$$

since $\lim_{\theta \to 0} U_o = b - m + [z - c(s_o)]$. Hence, in order to derive the opportunities for homeowners with mortgage payments to become entrepreneurs, it is necessary to compare the benefit of being homeowner with the mortgage payment, the rental price and the difference in the search costs. It follows that homeowners with mortgage payments do not necessarily have better opportunities of starting a new business than tenants, since the benefit of being a homeowner, b, can

be higher, lower or equal to $m - p_r - [c(s_t) - c(s_o)]$. In fact, the rental price is usually lower than the mortgage payment (Baert et al. 2014). Also, in the case of a mortgage, the benefit of being homeowner is lower, since there is the risk that the loan is not repaid and then the homeowner with mortgage payments could lose the ownership of the house. This condition constrains the decisions about the use of the house, since the homeowners with mortgage payments do not feel, to all and intents and purposes, as if they are the owners. Precisely, the longer the duration of the mortgage, the lower the benefit of being a homeowner. As a result, it is possible to qualify the previous result of Section 2, namely outright homeowners have better opportunities than tenants to become an entrepreneur, while homeowners with mortgage payments have worse opportunities than outright homeowners to start a new business. Indeed, mortgage debt amplifies risk aversion, thus diminishing the probability that homeowners would start a business (Bracke, Hilber and Silva, 2014).

3. Comments and conclusions

Research on homeownership and labour market outcomes omits any potential role for entrepreneurship, but at the same time, research on entrepreneurship does not seem to give due weight to labour market rigidities arising from homeownership. Thus, this paper aims to combine these two research streams. In doing so, the paper uses an extended version of the search and matching model and distinguishes two channels through which homeownership affects the creation of jobs and new enterprises.

The first channel works by means of job search intensity. The effort or intensity in searching for a job is, in fact, closely related to the housing tenure choice, and owner occupancy is the best housing tenure choice. Also, employed workers have a greater chance of buying a home, since their income is higher than that of the unemployed. For this reason, therefore, unemployed/tenants generate a greater effort in searching for a job than unemployed/homeowners. As a result, given the well-known positive relationship between search intensity and job creation, the effect of homeownership rate on job creation and employment is negative, i.e. the higher the homeownership rate, the lower the creation of jobs, and thus the higher the unemployment rate.

The second channel looks at the effect of homeownership on new businesses. New enterprises are introduced into the model by considering their initial productivity level, i.e. the productivity of a firm that is going to open the first vacancy. In this case, the effect of homeownership rate on job creation depends on the so-called “intrinsic preference for homeownership”, since the latter affects positively the job productivity. Hence, the larger the benefit of being a homeowner, the higher the productivity of a new enterprise that is created by

homeowners, and thus more homeowners start a firm. Empirical findings suggest that housing capital gains provide a source of financing, as well as of risk insurance, that promotes the starting of new businesses (Harding and Rosenthal, 2013).

When introducing the important distinction between outright homeownership and homeownership with mortgage payments, we find that outright homeownership encourages the creation of new businesses, while this may not apply to homeownership with mortgage payments. This theoretical result is consistent with the empirical finding that leveraged homeownership may be associated with fewer new businesses (Bracke, Hilber and Silva, 2014).

Eventually, therefore, we find a negative effect of homeownership on enterprise development, i.e. on the number of jobs created by existing firms (as a function of search intensity), and a positive effect of homeownership on the establishment of new businesses (as a function of the intrinsic preference for homeownership). Furthermore, outright homeowners have better opportunities than tenants to become an entrepreneur, while homeowners with mortgage payments have worse opportunities than outright homeowners to start a new business. As a result, one could conclude that outright homeownership positively affects the creation of new small businesses; while, in general, homeownership does not encourage the development (i.e. the creation of new jobs) of existing enterprises. Furthermore, it is possible to deduce a close link between outright homeownership and entrepreneurship, since entrepreneurship is closely related to small businesses. Indeed, small businesses provide the most conducive environment for entrepreneurship and innovation (Sahut and Peris-Ortiz, 2014).

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