Bargaining with commitment between workers and large firms

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ABSTRACT

I study the efficiency of search equilibrium under decreasing returns to labor in production. Firms can sign long-term contracts with their workers which give them incentives to maximize the joint surplus associated with their relationship. When the firm hires a new worker, the terms of the contract are determined by bargaining over the marginal surplus. Long-term contracts solve the over-hiring problem identified by previous authors. However, the equilibrium is still not constrained efficient because large, low productivity firms search too intensively relative to small, high productivity firms. This potentially provides a novel justification for subsidizing vacancy creation by young, small firms.

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1. Introduction

This paper studies a frictional labor market with the following three features: search is random, wages are bargained, and there are decreasing returns to labor in production. Differently from the existing random-search literature, I assume that firms and workers can commit to long-term contracts at the time of match formation. The resulting model is tractable and is able to incorporate productivity heterogeneity across firms.

The paper sheds light on the necessary conditions for a search equilibrium to be efficient when there are decreasing returns to labor. Two ingredients are required. First, firms and their incumbent workers must be able to act in a jointly privately efficient manner, in the sense of maximizing the size of the 'pie' they can generate together. Commitment to long-term contracts guarantees this occurs, since it means that firms cannot drive down the wages of incumbent employees by hiring additional workers. Second, firms must internalize the congestion externality they face. However, when different firms with different marginal values of hiring search in the same labor market, even the Hosios (1990) condition cannot ensure that the cross-sectional distribution of vacancy posting across firms is efficient. Firms with high productivity grow too slowly and remain too small relative to firms with low productivity. Also, young firms whose jobs are highly productive at the margin post too few vacancies and grow too slowly, while old, large firms whose marginal jobs are less productive post too many vacancies and continue growing to an excessive size. To the extent that the model gives an accurate description of real labor markets, this provides a novel search-based rationale for subsidizing vacancy creation by small, young, fast-growing firms.

The economic environment I study was first investigated by Bertola and Caballero (1994), and is related to those studied by Stole and Zwiebel (1996a, 1996b), Smith (1999), and Acemoglu and Hawkins (in press).[1] In these papers, the equilibrium is inefficient when there are decreasing returns in production. However, in each, the authors impose an exogenous limitation on the contracts available to firms and workers by assuming that bargaining determines only current wages. Lack of commitment generates a hold-up problem between the firm and its incumbent workers. After some workers have already been hired, the firm must decide how intensively to recruit additional workers. If bargained wages fall with the level of employment at the firm, then the firm has an incentive to hire more workers purely in order to drive down the wages of existing employees. If the firm has committed to contracts with its incumbent workers, this effect is not present. However, the current paper shows that even so, the distribution of vacancy posting across firms need not be efficient.

Understanding the efficiency of search equilibrium with decreasing returns to labor is important given the burgeoning literature in this area. Examples include applications to labor hoarding (Bertola and Caballero, 1994), business cycles (Acemoglu and Hawkins, in press), regulation (Delacroix and Samaniego, 2009; Ebell and Haefke, 2009; Felbermayr and Prat, 2011; Maury and Tripier, 2011), and trade (Coşar et al., 2010; Helpman and Itskhoki, 2010; Helpman et al., 2010; Felbermayr et al., 2011). This paper suggests that further work is needed to determine the extent to which policy recommendations in these models arise from deep features of the economic environments they study as opposed to the inability of firms and workers to solve a hold-up problem due to an ad hoc limitation to the set of available contracts.

It is interesting to compare the results of this paper with those of Kaas and Kircher (2013). These authors assume that search is directed (Moen, 1997; Shimer, 1996) rather than random, and find that the equilibrium of their model is constrained efficient. This contrasting result arises for two reasons. First, as is customary in the directed search tradition, Kaas and Kircher assume that firms and workers have full commitment power, which rules out over-hiring as it does here. Second, under directed search, firms with different marginal values of hiring search for workers in different submarkets (which arise endogenously), and in each submarket, the Hosios condition holds. The separation into submarkets rules out the cross-sectional inefficiencies that arise under random search even under the Hosios condition. Taking the results of the random and directed search literature together, this suggests that it is the ability to commit to long-term contracts that ensures *private* efficiency, while, given private efficiency, it is the nature of the search technology which ensures *social* efficiency.[2] Given the evidence that in reality search is at least partially random and wages at least partially bargained (Godøy and Moen, 2012; Hall and Krueger, 2012), the inefficiencies investigated here may be important in real labor markets.

Another interesting comparison is to the work of Bauer and Lingens (in press), who retain the assumption of random search but allow for collective, rather than individual, bargaining. In the absence of search frictions, the classic result when union bargaining governs only wages and not also employment levels is that there is underemployment (McDonald and Solow, 1981). When the labor market is frictional, Bauer and Lingens find that the equilibrium may be constrained efficient, if the over-hiring effect associated with lack of commitment offsets the union's bargaining power. Like commitment to contracts, the presence of a union ties the firm's hands and stops it exploiting its ability to affect bargained wages, but it does so in a very different way.

The remainder of the paper is structured as follows. I describe the economic environment in Section 2, while in Section 3 I introduce my model of bargaining. In Section 4 I characterize and prove the existence of equilibrium. I discuss conditions under which equilibrium allocations are constrained efficient in Section 5. Section 6 concludes briefly.

2. Economic environment

Time is continuous. There are two types of agents, workers and firms. All agents are risk-neutral and discount the future at rate r.

There is a fixed measure 1 of workers, who can at any time be either unemployed (in which case their flow home production is b) or employed by some firm.

There is a large measure of ex ante identical potential entrant firms. At any moment a potential entrant firm has the option of paying an entry cost $k > 0$ and becoming active. When it does so, it learns the value of its idiosyncratic productivity z, which is drawn from a distribution $\Phi(\cdot)$ with support $[\underline{z}, \bar{z}]$ and density $\phi(\cdot)$. Firm-level employment n can take any non-negative integer value. The flow output of a firm with productivity z which employs n workers is denoted by $y(n; z)$. I assume that $y(n; z)$ is strictly increasing and concave in n for each z, strictly increasing in z whenever $n > 0$, and strictly supermodular in (n, z) for $n > 0$. I also assume that $y(0; z) \equiv 0$ and that for any z, $y(n; z) - y(n - 1; z) < b$ for large n; the last assumption ensures that firm size is finite in equilibrium.

A newly active firm initially has no employees. Any active firm at each moment posts some number $v \geq 0$ of vacancies, at a flow cost of $c(v)$. I assume that $c(0) = 0$ and that $c(\cdot)$ is strictly increasing and strictly convex.[3] I also assume that $c(\cdot)$ satisfies the standard Inada conditions that $\lim_{v \to 0} c'(v) = 0$ and $\lim_{v \to \infty} c'(v) = +\infty$.

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[1] I will refer to these papers henceforth as BC, SZ, S99, and AH respectively.
[2] I thank an anonymous referee for suggesting this formulation.
[3] The assumption of convex vacancy posting costs is standard. See Kaas and Kircher (2013) for a justification.