Unemployment insurance and optimal taxation in a search model of the labor market ☆

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A B S T R A C T

In many search models of the labor market, unemployment insurance (UI) is conveniently interpreted as the value of leisure or home production and is, therefore, treated as a parameter. However, in reality, UI has to be funded through taxation that might be distortionary. In this paper, I analyze the welfare implications of raising funds towards UI benefits through different taxation systems within a directed search model. Since firms "direct" workers to apply to them by posting wages, raising UI funds in a lump-sum manner always distorts the efficient allocation, as it gives firms an incentive to be excessively aggressive in their attempt to maximize the probability of filing up their vacancies. I discuss two ways through which this externality can be internalized and efficiency can be restored.

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1. Introduction

In most search and matching models of the labor market, unemployment insurance (henceforth UI) is interpreted as the value of leisure or home production.[1] This assumption is convenient because it allows authors to treat UI as a parameter of the model. However, in reality, UI has to be funded through taxes, and these taxes may distort the economy's allocations and affect welfare. In this paper, I study a *directed search* model of the labor market, in which unemployment arises as an equilibrium result, and the government wishes to guarantee UI to all unemployed workers. I examine the optimal level of the unemployment benefit and the welfare implications of raising funds towards this benefit through various taxation systems.

In the standard directed search model, firms advertise their wage, and workers can direct their search towards specific wages. Equilibrium unemployment arises because firms have a limited number of vacancies, and workers cannot coordinate their application strategies. Hence, some firms can end up with a number of applications that exceeds their job openings, while others might receive no applications. The directed search model has become popular in the literature because it provides micro-foundations for the determination of the *matching function*, and it allows the study of *competition* among firms within markets that do not perfectly clear. In the core of this model, there is a trade-off between high wages and high matching probabilities. Firms who contemplate opening a vacancy and attracting workers realize this trade-off, thus internalizing the well-known search externality that governs the random search model (Hosios, 1990). Consequently, in the

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[1] See for example Pissarides (2000).

baseline directed search model, the equilibrium allocation is always efficient (for example, see Shimer, 1996; Moen, 1997, and Rogerson et al., 2005).

This paper focuses on the welfare implications of raising funds towards UI benefits under different taxation systems. I show the following result. Under lump-sum taxation, the very ingredient of the directed search model that delivers efficiency in the baseline case, namely *competition* for workers among firms, now generates an externality that distorts the economy and harms welfare. This channel works as follows. In a directed search framework, firms wish to advertise high wages because this guarantees a high probability of filling up their vacancies. Lump-sum taxation makes it cheap for firms to apply an aggressive wage policy because, under such taxation, they realize that their competitors will have to contribute equally to the unemployment that they caused by attracting more workers than they could employ. Of course, in *symmetric equilibrium* (studied in this paper), all firms advertise the same wage and receive the same expected number of applications. However, the aforementioned channel creates an externality that leads to excessively high wages and inefficiently low entry of firms. The paper suggests two alternative systems of raising UI funds that deliver the efficient allocation.

Throughout this paper I consider a static directed search model of the labor market.[2] For simplicity, I assume that firms have only one vacancy, and workers can apply only to one firm.[3] Given that the authorities wish to guarantee a payment z to every unemployed worker, I consider two taxation systems. The first is a lump-sum system, according to which, every firm in the market pays an equal share of the UI bill (the product of z and the number of unemployed workers that arises in equilibrium). The second taxation system is personalized, and it dictates that each firm has to pay taxes that depend on how many applications it received. Since with directed search firms attract workers by posting public advertisements, I also consider a third alternative: I allow firms to advertise not only a wage paid to the employed worker, but also a payment made to workers who apply and do not obtain the job. This third system is based on an idea by Jacquet and Tan (2012), who refer to it as a "wage-vacancy" contract.

Since the focus of this paper is on the efficiency of funding unemployment benefits, rather than the provision of these benefits to workers, I first highlight the most important economic insights of the model in the more tractable case of risk-neutral workers. Under lump-sum taxation, the equilibrium wage is higher than in the model with no taxes, which might be surprising at first. Since in the model with UI firms expect that they will have to pay taxes, one might expect that they would at least promise lower wages. This reasoning turns out to be wrong. With lump-sum taxation firms have an incentive to post high wages in order to attract many workers, and they only have to pay for a small part of this aggressive behavior, since, at the end, all firms share equally the UI bill. Personalized taxes, that are Pigouvian in nature, induce firms to internalize this externality and lead to an equilibrium wage that is lower than in the model with no taxes.

After describing the wage and profits, I consider free-entry of firms. I determine the measure of active firms endogenously, and compare the decentralized equilibrium allocation with the Social Planner's solution. It should be noted that, with risk-neutral workers, the Social Planner's objective is to choose the measure of active firms in order to maximize expected output, net of entry fees. In other words, insuring workers against the possibility of being unemployed does not improve welfare. However, this does not necessarily mean that the authorities might not wish to pay a UI to the unemployed. Perhaps the authorities want to achieve a more fair distribution of the output ex post, i.e. after the uncertainty regarding the workers' state has been resolved. This is especially true since, as I show, the authorities can promise *any* unemployment benefit to the unemployed without harming the economy's welfare.

Under lump-sum taxes, the typical firm's equilibrium profit is hump-shaped in the measure of active firms. Intuitively, a large measure of firms is bad for profits because it implies a low matching probability. At the same time, a low measure of firms is also bad for profits, because it implies high unemployment and few contributors to the UI bill. As a result, two equilibria exist: one with low entry, high per firm taxes, and a high matching probability, and one with high entry, low per firm taxes, and a low matching probability. Regardless of which equilibrium arises, the measure of active firms is always suboptimal. Hence, with lump-sum taxes, the authorities cannot pay benefits to the unemployed without hurting the economy's welfare. Personalized taxes resolve this inefficiency: the equilibrium profits under personalized taxes and under no taxes coincide. Hence, the equilibrium measure of firms is equal to the Social Planner's solution.[4] Under this type of taxation, the authorities can support *any level* of unemployment benefits without affecting the economy's efficiency. Interestingly, the equilibrium allocation is also optimal when the government does not use taxation, but rather requires the firms to post "wage-vacancy" contracts.

Finally, I consider the more empirically relevant case of risk-averse workers. In this case, the Planner's solution entails not only an efficient entry of firms, but also insuring the workers against the possibility of an unsuccessful search. I characterize the unique optimal level of UI, and I show that, under lump-sum taxation, this level can never be achieved as an equilibrium outcome. With personalized taxes, efficiency can be attained, but this requires that the authorities can set the UI level "just right", an assumption that might be questionable. I show that the most straightforward way to guarantee efficiency of the

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