Labour Economics 19 (2012) 68–75

Contents lists available at SciVerse ScienceDirect

Labour Economics

journal homepage: www.elsevier.com/locate/labeco

Towards a theory of the labor market with a public sector

Ken Burdett *

Department of Economics, University of Pennsylvania, United States

ARTICLE INFO

Article history:
Received 20 November 2009
Received in revised form 7 July 2011
Accepted 17 July 2011
Available online 2 August 2011

Keywords:
Search
Public sector
Labor market equilibrium

ABSTRACT

The object is to specify and analyze equilibrium in a labor market with frictions when there is a significant public sector. In the vast majority of equilibrium studies on labor markets, a public sector has been ruled out by assumption. This seems a strange oversight as about 17% of workers in the US are public sector workers, whereas in western Europe, approximately 22% of workers work in the public sector. The goal in this study is to provide answers to such questions as: what happens to private sector wages if the public sector is increased? If the Government increases the number of public sector jobs, does this crowd out private sector jobs? When will private sector wages be greater (less) than the public sector wage? Reasonably complete answers to these questions (and others) are provided within the context of the model developed.

1. Introduction

There is now a large literature on equilibria in labor markets where frictions are suitably taken into account (see, for example, Mortensen and Pissarides, 1999 for a still useful review). These contributions have added many new insights. All these studies, however, have ignored the possible influence of public sector employment. This seems a strange oversight as about 17% of workers in the US are public sector workers, whereas in western Europe, approximately 22% of workers work in the public sector. Further, there is significant movement of workers between the private and public sector. For example, 13% of public sector workers in the US moved to the private sector in year 2000, whereas 3% of private sector workers moved to the public sector (see Borjas, 2002).

The object of this study is to analyze equilibria in a labor market where there is a significant public sector. I want to address such questions as: what happens to private sector wages if the public sector wages change? If the Government increases the number of public sector jobs, does this crowd out private sector jobs? When will private sector wages be greater (less) than the public sector wage? As will be shown later, reasonably complete answers to these questions, and others, are provided within the context of the model developed.

The basic labor market model used in the study is not standard. Essentially, I construct a model where private sector firms post wages in a manner similar to that considered by Burdett and Mortensen (1998). Unlike Burdett and Mortensen, however, I assume that the number of participating private sector firms is driven by a zero profit condition.[1] This construction allows me to investigate how the size of the public sector determines the number of participating private sector employers.

In the first part of the study I consider labor market equilibria among private sector firms that take as given the decisions made in the public sector. It is assumed that the public sector can be described by a doubleton (x, O_g) where O_g is the number of public sector outlets, and x, the wage paid at public sector jobs. Within the context of the model developed for fixed (x, O_g) (in a certain range) there exists a unique market equilibrium and this can be fully characterized. In the rest of this study I investigate what happens when there are changes in government policy, as well as enquiring about what public sector wage should be offered. There are, of course, many different objectives that a government can have when deciding the number of public jobs and the wages to be paid to public sector workers. In this study, I consider the special case where a government attempts to minimize its costs after it has chosen to employ a given number of public sector workers in a steady-state. For example, suppose a local government wishes to have a given number of employed fire fighters. What wage should it offer and how many vacancies should it post?

The model used here has been kept as simple as possible to reveal the basic logic of the argument. This implies several important issues are ruled out. First, the public sector considered in this study can be thought of as a large firm with many outlets. The private sector consists of many small firms each having a single outlet. This seems a reasonable first step but it, of course, leaves several questions unaddressed. For example, some have argued that public sector jobs offer greater job security, and therefore the public sector jobs can offer smaller wages than private sector employers. Second, I assume throughout that all public sector workers obtain the same wage. It is difficult to ascertain the objective of a government controlling the wages in the public sector, and some objectives may imply it offers a distribution of wages. If, however, the government wants to minimize the costs of hiring workers, it is straightforward to show that

* Tel.: +1 2155466167; fax: +1 2155732057.
E-mail address: Kennethb@ssc.upenn.edu.

[1] A similar in spirit model (with no public jobs) is explored by Mortensen (2000).

0927-5371/$ – see front matter © 2011 Published by Elsevier B.V.
doi:10.1016/j.labeco.2011.07.006

it will only offer one wage. Further, legal restriction may force them to offer a single wage to homogeneous workers. Finally, to keep the analysis as simple as possible it is assumed that the arrival rate of job offers is the same for unemployed workers and employed workers. It has been established beyond reasonable doubt that this is not the case in many countries. Nevertheless, imposing this restriction much simplifies the exposition.

Although there is a significant empirical literature on the size of the public sector and the movements of public sector workers (see Borjas, 2002 for an interesting example), there is little theoretical work on this topic. Indeed, I was unable to find any apart from standard textbook expositions. The work presented here can be thought of as a tentative first step to rectifying this hole in the literature.

2. The model

Suppose there is a fixed unit mass of workers. All are equally productive and live forever. Each private employer has a single outlet and desires to employ one worker. The public sector consists of a single employer – the Government – with many outlets; each outlet wanting to employ a single worker. Each private sector employer posts a wage, w. It pays this per unit of time to anybody it employs. As some private employers may offer a different wage than others, let $F(.)$ denote the distribution of wages posted by the private sector employers. Those employed in the public sector are paid x per unit of time. Any worker who works in the public sector generates revenue p' per unit of time, whereas any worker who works at a private sector job generates revenue p per unit of time ($p \geq p'$).

Suppose the number of public sector outlets is given by O_g whereas the number of participating private sector outlets (firms) is O_p. Hence, $m = O_g + O_p$ is the total number of participating outlets. The government chooses the number of public sector outlets, whereas the number of private sector firms is determined by the profit motive. At a moment in time any participating outlet is either employing a worker, or posting a vacancy. Of the total number of public sector outlets, O_g let N_g denote the steady-state number of public sector outlets who are employing a worker, and $v_g = O_g - N_g$ is the steady-state number posting a vacancy. Of the total number of private sector employers, O_p, v_p denotes the steady-state number posting a vacancy, and $N_p = O_p - v_p$ employ a worker in a steady-state. Therefore, $v = v_p + v_g$ is the total number of vacancies in a steady-state.

When unemployed a worker receives income flow z per unit of time, where by assumption $p' > z$ From time to time workers receive job offers. Focussing on essentials, assume α_w denotes the Poisson arrival rate of job offers faced by any worker — whether employed or unemployed. Any job offer is fully described by the wage it offers. Search is random in the following sense. Given an offer is received, $\theta = v_g/v$ denotes the probability that it is a public sector job offer, and $((1-\theta))$ is the probability that it is a private sector job offer. If the offer is from a private sector employer, $F(w)$ denotes the probability that the wage offered is no greater than wage w. Any employment relationship is destroyed at exponential rate δ. If a job is destroyed, the worker becomes unemployed. When a private sector firm posts a vacancy it must pay a flow cost, k. Let k' denote the flow cost paid by a public sector firm posting a vacancy. Any firm that pays this cost, faces a Poisson arrival rate of workers with parameter α_f.

Two further elements of the model need to be described to complete the specification. First, I impose what is termed the free entry condition. In particular, as private sector employers are assumed to be capable of freely entering, or leaving, the market, in equilibrium firms posting vacancies expect to obtain zero profit. Second, as the number of posted vacancies is determined in equilibrium, following others in this area, I specify an encounter function that relates the number of outlet/worker encounters to the number of vacancies and the number of searching workers. Keeping things as simple as possible, assume there is a Cobb–Douglas encounter function such that $e = v^{\beta}s^{1-\beta}$, where s the total number of searchers.[2] As the total number of searchers is always 1, we have $e = v^{\beta}$. It follows immediately that as $e/s = \alpha_w$, $v^{\beta} = \alpha_w$. Similarly, as $e/v = \alpha_f$, it follows $\alpha_f = v^{\beta-1}$.

2.1. Steady-states

Workers are assumed to know (x, O_g), and the distribution of wage offers made in the private sector, F. As the arrival rate of offers is the same while both unemployed and employed, it follows immediately that an unemployed worker will accept a job offer if and only if the wage is at least as great as z — the utility flow when unemployed. Further, as it is assumed to be costless to change job when the opportunity arises, a worker currently paid wage w will accept any job offer received that offers a wage greater than w.These facts lead to a complete description of worker behavior and are used to derive four important steady-state objects below.

To determine the expected profit of a firm posting a vacancy four steady-states objects need to be specified — (a) the steady-state number unemployed, u, (b) the steady-state number employed in the private sector, N_p, (c) the steady-state number employed in the public sector, N_g, and (d) $G(.)$, the steady-state distribution of wages received by workers employed in the private sector.

Given (x, O_g, F), it is possible to calculate the relevant steady-states where the inflow of workers into a particular state equals the outflow. To focus on the relevant case, I make two restrictions about the distribution function F. First, I assume that the support of F is contained in the area $[z, p]$.This implies all offers made by private sector firms are acceptable to unemployed workers. If any firm makes an offer unacceptable to unemployed workers, then it obtains no employees — it's a non-firm. Second, I assume that F is continuous. As I will show later both these restrictions must be satisfied in any equilibrium. As the calculation of these objects is mechanical I relegate them to an Appendix.

In the Appendix it is shown that the steady-state number unemployed can be written as

$$u = \frac{\delta}{\delta + \alpha_w}, \tag{1}$$

Further, in the Appendix I also show the steady-state number employed in the private sector, N_p, and the steady-state number employed in the public sector, N_g, can be written as

$$N_p = \frac{\alpha_w(1-\theta)\left[\delta^2 + \alpha_w^2 S(x)[1-F(x)(1-\theta)] + 2\alpha_w \delta S(x))\right]}{(\alpha_w + \delta)[\delta + \alpha_w(1-\theta)S(x))][\delta + \alpha_w(1-\theta)S(x) + \alpha_w\theta]} \tag{2}$$

and

$$N_g = \frac{\alpha_w \delta\theta}{[\delta + \alpha_w(1-\theta)S(x)][\delta + \alpha_w(1-\theta)S(x) + \alpha_w\theta]} \tag{3}$$

where $S(x) = 1 - F(x)$.

The steady-state distribution of wages paid to workers employed in the private sector, $G(.)$, is also be derived. As the expression is long and nasty, it is left in the Appendix.

2.2. Private sector firms

Each private sector firm chooses the wage it will offer, given its beliefs about the search strategies of workers, the public sector (x, O_g), and the distribution of wages offered by other firms, F. This implies

[2] As it will be shown later that not all encounters lead to a match, the encounter function is different (and larger than) a matching function.