Labor market adjustment in transition economies with on-the-job search

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Abstract

This paper examines the impact of on-the-job search by workers in the state sector on the level and duration of unemployment in transition economies. We derive the optimal speed of state sector closure when workers engage in on-the-job search. © 2000 Elsevier Science S.A. All rights reserved.

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1. Introduction

The literature on transition economies has viewed unemployment as a primary source of labor for the emerging private sector (Burda, 1993; Aghion and Blanchard, 1994). Accordingly, labor market adjustment would be characterized by an inverse relationship between changes in private sector employment and changes in overall unemployment.\textsuperscript{1} Contrary to these predictions, transition economies have simultaneously experienced rapid growth in private sector employment and high unemployment rates (EBRD, 1997). One possible explanation is that firms have tended to hire
workers from the state sector rather than those unemployed. Boeri (1995) and Bilsen and Konings (1998) have provided evidence to this effect.

This note provides a theoretical model consistent with the coexistence of a rapidly emerging private sector and high unemployment in transition economies. The model builds on the framework in Pissarides (1994) by incorporating the impact of the on-the-job search by state sector workers, where relocation from state to private sector requires matching a searching worker with a vacancy. Our work is also related to Burgess (1993) and Boeri (1999) who examine the impact of the on-the-job search on unemployment outflows in OECD economies.²

2. Model

In this model, economic transition consists of labor relocation from the low productivity state sector to the high productivity private sector. We assume that state sector jobs decline over time while new jobs arise in the private sector. Part of the decline of the state sector jobs is due to job destruction at an exogenously given rate λ, and the rest is due to state sector workers leaving for the private sector. Some state sector workers become unemployed and search for work in the private sector while others search for employment while working in the state sector.³

In order to hire workers, firms in the private sector get involved in a costly process of posting vacancies.⁴ Jobs are created by matching a vacancy with a searching worker through a process that depends on the aggregate matching function:

\[ x((U(t) + \mu S(t)), V(t)) = A(U(t) + \mu S(t))^\alpha V(t)^{1-\alpha} \]

(1)

where \( x \) is the instantaneous number of private sector jobs formed for a given level of searching workers, consisting of the unemployed, \( U(t) \), state sector workers conducting an effective job search, \( \mu S(t) \), and the aggregate level of private sector vacancies, \( V(t) \).⁵ Letting \( \theta(t) = V(t)/((U(t) + \mu S(t)) \) be the ratio of job vacancies to job seekers, the rate of finding a job for a searching worker becomes \( h(\theta(t)) = A\theta(t)^{1-\alpha} \) and the rate of filling a vacancy for a searching firm becomes \( d(\theta(t)) = A\theta(t)^{-\alpha} \). The number of workers in the private sector and unemployed workers changes according to:

²We simplify the model in Pissarides (1994) by allowing all state sector workers to search for jobs, while only workers in ‘bad’ jobs search in his model (where bad jobs are endogenously determined by the reservation wage). Furthermore, in contrast to the search models in Pissarides (1994), Boeri (1999) and Burgess (1993) where the focus is on the steady state, we also analyze transitional dynamics.

³The output per worker in the private sector is \( q_p \) and in the state sector \( q_s \), \( q_p > q_s \). Wages in the private and state sector, \( w_p \) and \( w_s \), are fractions of output, i.e. \( w_p = \phi q_p \) and \( w_s = \phi q_s \).

⁴The total cost of vacancy supply is \( k(V(t)) = V(t)^2/2\gamma \) where \( V(t) \) is the aggregate number of vacancies and \( \gamma \) is the coefficient of effectiveness of filling the vacancy. The implication is that first entrants into the market have the easiest time posting vacancies.

⁵Cases when \( 0 < \mu < 1 \) are considered because state workers produce output while searching, and therefore are less effective than the unemployed in searching.
\[ \dot{N}(t) = d(\theta(t))V(t) - \delta N(t) \]  
(2)

\[ \dot{U}(t) = \lambda(1 - N(t) - U(t)) + \delta N(t) - h(\theta(t))U(t) \]  
(3)

Eq. (2) states that the change in the private sector employment is the difference between formation of new jobs, \(d(\theta(t))V(t)\), and the destruction of existing ones, \(\delta N(t)\). The change in the unemployment level in Eq. (3) is equal to the inflow from private and state sectors, \(\lambda S(t) + \delta N(t)\) minus the outflow into the private sector, \(h(\theta(t))U(t)\).

Let \(J_s\), \(J_p\) and \(J_v\) be the values for state job, private sector job and private vacancy, respectively. Suppressing the time subscript, the corresponding Bellman equations are:

\[ rJ_s = q_s - w_s - \lambda J_s - h(\theta)\mu J_s + J_s \]  
(4)

\[ rJ_p = q_p - w_p + \delta(J_v - J_p) + J_p \]  
(5)

\[ rJ_v = -\frac{V}{\gamma} + d(\theta)(J_p - J_v) + J_v \]  
(6)

where \(J_s\) is again the change of the value \(J\) over time.\(^7\)

Since there is free entry into vacancies, (6) implies that in equilibrium \(J_v = 0\) and \(J_p = V/(\gamma d(\theta))\). This along with (5) imply that in equilibrium the marginal cost of posting a vacancy, \(V/\gamma\), equals the expected discounted profit, \(d(\theta)(q_p - w_p)/(r + \delta)\). Substituting into (2) and (3) gives the equilibrium transition path for private sector employment and unemployment, respectively:

\[ \dot{N} = (U + \mu(1 - N - U)) \frac{2^a}{a + 1} \left( \frac{(q_p - w_p)A\gamma}{r + \delta} \right)^{1-a} - \delta N \]  
(7)

\[ \dot{U} = \lambda(1 - N - U) + \delta N - (U + \mu(1 - N - U))^{a-1} \left( \frac{(q_p - w_p)A\gamma}{r + \delta} \right)^{1-a} U \]  
(8)

with the initial conditions \(U(0) = N(0) = 0\). Letting \(K = ((q_p - w_p)A\gamma/r + \delta)^{1-a/(a+1)}\), unemployment duration becomes:

\[ ^{6}\text{Similarly, for workers } E_s, E_u \text{ and } E_v \text{ would denote, respectively, the values of working in the private sector, being unemployed and working for the state. In order for the workers to move from unemployment or the state sector into the private sector, but not from the state sector into unemployment, it must be the case that } E_s > E_u > E_v > 0. \]

\[ ^{7}\text{Eq. (4) states that the rate of return on the state sector job equals the operating profits, } q_s - w_s, \text{ minus the expected loss due to exogenous destruction and workers moving to the private sector, } -\lambda J_s - h(\theta)\mu J_s, \text{ plus the change in the value of a state sector job over time. Eq. (5) states that the return to the private sector firm equals the profit, } q_p - w_p, \text{ minus the loss due to destruction, } \delta(J_v - J_p), \text{ plus the change in the value of a private sector job over time. Eq. (6) states that the return to posting a vacancy is equal to the expected average cost of posting a vacancy plus the expected gain from filling the vacancy plus capital gains.} \]
Eq. (9) indicates that for a given level of private sector employment, \(N\), and unemployment, \(U\), the duration of unemployment increases with the effectiveness of on-the-job search by state sector workers. In addition, (7) shows that for a given level of unemployment and private sector employment, the growth of employment in the private sector is higher with on-the-job search.

The simulations presented below highlight the impact of on-the-job search by state workers for a given rate of state sector closure. We compare the case where job-to-job switching is not possible \((\mu = 0)\) to that where state sector workers can find employment without becoming unemployed first \((\mu = 0.1)\). For each case, we examine the impact of on-the-job-search on private sector employment, unemployment duration and the level of unemployment. As Fig. 1 illustrates, the growth of private sector employment is higher when state workers search on-the-job, yet both the level and duration of unemployment are also higher. This is because some of the state sector workers crowd out the unemployed from the new private sector jobs.

The above framework can address a related policy issue: the optimal speed of state sector closure in the presence of the on-the-job search. An efficient allocation of state and private sector employment and vacancies \([N, S, V]\) maximizes the discounted expected utility of the representative agent. Given the standard assumption in the search literature that agents have risk-neutral preference in consumption, this is equivalent to maximizing the discounted value of output net of the cost of posting vacancies \((q_S + q_pN - V^2/(2\gamma))\) subject to the law of motion for employment in the private sector, \(\dot{N} = A(1 - (1 - \mu)S - N)^{\alpha}V^{1-\alpha} - \delta N\), the initial conditions \(N(0) = 0, S(0) = 1\), and the terminal condition \(\lim_{t \to \infty} e^{-rt} \Phi(t) = 0\), where \(\Phi\) is the shadow value of the private sector employment. The solution to this problem is given by:

\[
V = \gamma A \phi(1 - \alpha) \left(1 - N - (1 - \mu)S\right)^{\alpha} \tag{10}
\]

\[
q_s = \alpha A \phi \left(1 - N - (1 - \mu)S\right)^{a-1} (1 - \mu) \tag{11}
\]

\[
\dot{N} = ((1 - \alpha)\gamma \phi)^{(1-\alpha)} A^{\frac{2}{1+\alpha}} (1 - U - (1 - \mu)S)^{2a - \delta N} \tag{12}
\]

where \(\phi = (q_p - q_s)/(1 - \mu)/(r + \delta)\). Thus, for a given level of private sector employment, the optimal size of the state sector is higher with on-the-job search. Below, we simulate the optimal transition paths for different search intensities: \(\mu = 0.05\) and \(\mu = 0.1\). As Fig. 2 shows, the optimal speed of state sector closure is lower, and both the level and duration of unemployment are lower when workers conduct on-the-job search.

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8The remaining parameters are: \(r\) (the real interest rate) = 0.04, \(\delta\) (rate of destruction of private jobs) = 0.1, \(\alpha\) (the search elasticity of matching) = 0.35, \(\gamma\) (coefficient of the efficiency of filling vacancy) = 0.1, \(q_p\) (marginal product of labor in the private sector) = 2.05, \(q_s\) (marginal product of labor in the state sector) = 1, \(A\) (coefficient of the efficiency of matching) = 0.4, \(\varphi\) (the worker’s share of output) = 0.5, and \(A\) (rate at which state sector workers are laid off) = 0.1. The time period is 1 year.

9All other parameters remain unchanged.
3. Conclusions

This note has studied labor relocation from the state to the private sector where state workers engage in on-the-job search. The implications are consistent with the observed coexistence of high unemployment and rapid private sector employment growth in transition economies.
Fig. 2. Optimal transition paths for different intensities of on-the-job search. (a) State sector employment (share of the labor force); (b) unemployment level (share of the labor force); (c) unemployment duration (years).

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References


