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***Abstract***

This article analyses the impact on the labor market of the transition from a state-controlled economy towards a market economy. We consider a dynamic matching-model with a declining and an emerging competitive sector. We show that there are two opposite strategies in the move towards a market economy: a massive decrease in employment or a small decrease in employment in the non-competitive sector. We find that the transition is achieved faster with a big reduction in state employment than with a small one. Surprisingly, the end of transition is also characterized by lower unemployment when there are massive layoffs - because in the short run, the high unemployment implied by the massive decrease makes job creation in the competitive sector more profitable. In fact, this seems to have been the way chosen by most of the CEECs.

JEL Classification: P27, J61, J64

Key Words: Unemployment, Matching models, Transitional economies

# 1 Introduction

Two decades after the fall of the Berlin Wall and the beginning of the transition towards a market economy, it is time to take stock of the process. Recently published papers document a diverging path, and outcome, for transition amongst the group of post-communist countries. According to Berglöf et al. (2010) the new EU member states have now more in common with other EU countries than with the other post-communist countries, even if important transition challenges remain in some sectors. On the other hand, most countries in Central Asia, Eastern Europe and the Caucasus, and South-Eastern Europe (Former Soviet Unions) still face challenges that distinguish them from other countries at comparable income levels. Hence, the question the scholars should address now is why some countries have failed to catch up. Integration into the EU and possession of resources are only partial explanations (EBRD 2009). With regard to the labor market, the transition towards a decentralized economy implies dramatic changes. Most transition countries experience persistant unemployment after the beginning of the reform process. But there are differences across countries. As noticed by Lehmann & Muravyev (2011), the Central and Eastern European Countries (CEECs) have falling employment rates, growing unemployment and some decline in real wages. Whereas the Former Soviet Unions (FSUs) show a limited rise in unemployment, falls in employment and a sharp decline in real wages. Furthermore these differences have been increasing in recent years. We think that the mechanisms underpinning these changes may be responsible in part for the diverging transformation paths. The purpose of this paper is to shed light on the process of reallocating jobs and workers during the process of transition towards a market economy, in order to explain the variability in the performance of transition countries.

A growing literature suggests that the labor market institutions affect the performances of the labor market for developed countries, as well as for transition countries (Lehmann & Muravyev 2011) In particular, Boeri & Macis (2010) showed that unemployment benefits can improve the quality of job reallocation through an improvement of the quality of job matches. But the main prediction of general equilibrium models of the labor market is that higher unemployment benefits decrease the job search intensity and increase the reservation wage of job seekers. This results in a higher unemployment rate and a longer duration of unemployment. Hence, according to Garibaldi & Brixiova (1998) and Boeri & Terrell (2002), the divergent paths between CEECs and FSUs can be explained by differences in non-employment benefits (unemployment benefits, active labor market programs, welfare assistance, disability benefits and sickness benefits). These non-employment benefits are higher in CEECs which causes a lower wage flexibility than in FSUs. According to these authors, this explains the higher level of unemployment

in the CEECs compared to the FSUs. Yet, following this analysis, we would expect the transition to be faster and more successful in the FSUs than in the CEECs, as the labor market institutions are less restrictive. But this is clearly not what the empirical observations show. Lehmann & Muravyev (2011) also conclude that their study leaves untouched several important issues that might have big impacts on labor market dynamics, such as the development of the informal sector. If the labor market institutions are more deregulated in the FSUs than in the CEECs, then it is difficult to understand why the informal sector developed more in these countries. The argument for labor market institutions seems therefore not completely convincing.

In her literature review, Ferragina & Pastore (2008) states that if typical neo-classical models explain why differences can be persistent, the job reallocation models particularly as adaped to the context of post-communist countries -the so-called 'Optimal Speed of Transition (OST) models',- allow us to understand the emergence of diversity. We therefore use this framework in order to discuss why some countries fall into the 'low reform trap' depending on how State Owned Enterprises (SOEs) coped with the severe budget constraint at the beginning of the transformation process. OST models study the link between job losses in the old inefficient state sector and job creation in the new more efficient private sector (for a survey of these models, see Roland 2000). Two schools of thought developed (Godoy & Stiglitz 2006). The first advocated that the faster a transition country become a market economy, the better off the population would be. The second school proposed a more gradual process of reform. Hence, in the seminal paper of Aghion & Blanchard (1994), the government has to select the rate at which the old sector will be destroyed knowing that if it goes too slowly there will be a low unemployment rate which will put upward pressure on wages and hence slow down the growth of the emerging sector. On the other hand if the old sector is destructed too rapidly, it will create high unemployment which will reduce net wage increases. OST models suggest that there is a trade-off between the speed of job destruction in the old sector and the level of unemployment, and advocate a gradual phasing out of the state sector. Hence, as explained by Lehmann & Walsh (1999) the restructuring process should be slowed down so that the new efficient sector can absorb the existing pool of unemployed. Castanheira & Roland (2000) add that a slow speed of closure in the old sector does not lead to lower job creation as long as the wages in this sector are kept low. (State workers will leave for the new private sector even if the rate of job losses in the old sector is too low). Caballero & Hammour (1996) model support the notion of gradualism but differ in their policy implications from traditional OST models. They consider that there is a cost to job creation that affects the level and the timing of reallocation. Hence they advocate job creation incentives in the emergent sector. Jurajda & Terrell (2008) contrast early transition policies and outcomes in Estonia

and the Czech Republic in light of the theoretical prediction of OST and Caballero & Hammour (1996). They confirm the result of Castanheira & Roland (2000). They show also that the Czech support was very effective in dealing with problems.

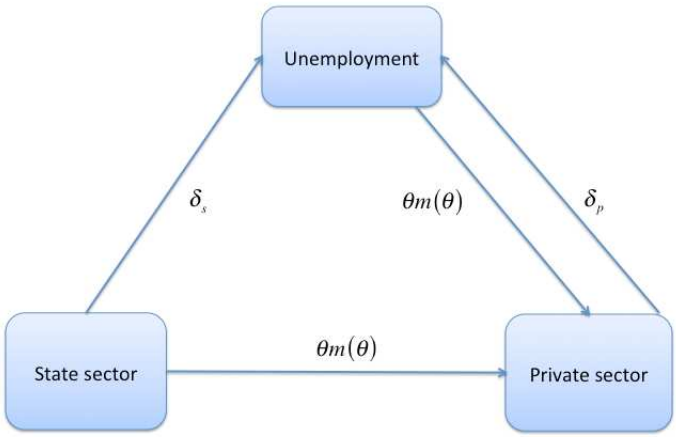
However, these papers do not explain the persistance of high unemployment in most of the transition countries. They do not consider the direct flows from public to private jobs, in which 70 percent of new hires are filled by state workers (Boeri 1997, Blanchard 1997). These direct job-to-job flows could though be responsible for the persistent unemployment with a growing private sector. With a theoretical labor reallocation model, Tichit (2006) showed that how SOEs adjust to the new paradigm is a crucial factor of new private sector development. Faggio (2007) provide an empirical test on the determinants of job creation, job destruction and unemployment in ten transition countries. Among other issues, she concludes that job destruction in the public sector depends on the type of reform of the SOEs, and that the changes in unemployment levels in the 2000's were influenced by what happened in the 1990's. Following these papers and contrary to Godoy & Stiglitz (2006), we believe that the gap between the CEECs and the FSUs can well come from the initial reforms of SOEs. Therefore we analyze the process of transition through labor reallocation. We propose a dynamic matching model in which there are job-to-job flows. We show that countries face two strategies to achieve their transition: massive or small decrease of state employment. The strategy determines the evolution of labor markets, and hence the success or failure of the transition process. We consider macroeconomic reallocation flows, and not just for one sector as is typical in much of this literature. We concentrate not only on early transition but we also assess the transition process two decades after it started.

The first section presents the framework. The second section describes the equilibria according to the different strategies adopted by the SOEs. The third section discusses the dynamics leading to these equilibria. The fourth section proposes simulations of the dynamics and hence an assessment of the length of the transition process. The last section synthesizes the main results and offers some policy implications.

## 2 The model

The labor force ($N$) is constant and normalized to 1. We denote by $S$ employment in the state sector, $P$ employment in the private sector, and $U$ unemployment. The transition process is modeled as the transition from a total public production ($S = 1$ and $P = 0$) to a total private production ($S = 0$ and $U + P = 1$). Hence, transition is the path bewteen these two states.

Figure 1: Flows on the labour market




The closure of public production cannot be immediate, and is planned over time. We assume that a fraction of public activity is destroyed each period, generating a job-loss rate $\delta_s$ per period. There is no new hiring in the state sector as it will be completely destroyed at the end of the transition process. The decline in the state sector leads to the emergence of unemployment. Workers can decide to leave this sector to work in the new private sector (on-the-job search). The growth of the private sector depends on the profitability of job creation. Private firms hire unemployed workers as well as public workers. There is a risk of being dismissed in the private sector, which is denoted by $\delta_p$ per period. Figure 1 illustrates the different flows in the labor market.

The number of job matches taking place per unit of time is given by $M(v, U+S)$, with $v$ is the number of vacant jobs in the emerging sector.[1] This is assumed increasing in both its arguments, concave and homogeneous of degree 1. The rate at which vacant jobs become filled is written $m(\theta)$ where $\theta = \frac{v}{U+S}$ is the labor market tightness.[2] The properties of the matching technology implies $m'(\theta) < 0$. Job seekers move into private employment at rate $\theta m(\theta)$ with $\frac{\mathrm{d}\theta m(\theta)}{\mathrm{d}\theta} > 0$.[3] Then the dynamic Bellman equations for the

[1] As the total labour force is normalized to 1, $v$ is also the vacancy rate and $U$ the unemployment rate

[2] The probability of filling a vacancy per unit of time is $\frac{M(v,U+S)}{v} = M(1, U+S/v) \equiv m(\theta)$

[3] The probability of finding a private job for a job-seeker per unit of time is $\frac{M(v,U+S)}{U+S} = M(v/U+S, 1) \equiv \theta m(\theta)$. Unlike Tichit (2006), this probability is endogenous which is more

state workers, the unemployed and the private workers are given respectively by:

$$
\begin{aligned}
rV_s &= w_s + \delta_s(V_u - V_s) + \theta m(\theta)(V_p - V_s) + \dot{V}_s && (1)\\
rV_u &= b + \theta m(\theta)(V_p - V_u) + \dot{V}_u && (2)\\
rV_p &= w_p + \delta_p(V_u - V_p) + \dot{V}_p && (3)
\end{aligned}
$$

where $w_i$ (for $i = s, p$) is the wage in the state and private sectors, respectively, $\delta_i$ is the exogenous job-loss rate in the sector $i$, $r$ the discount rate and $b$ the unemployment benefits. We assume that $b < w_s$ and we have $V_u \leq V_s$ and $V_u \leq V_p$. $\dot{V}_i$ is the expected capital gain from changes in the net worth of a worker or a job-seeker during adjustment.

Let again $\Pi_j$ ($j = s, p$) denote the asset value of a filled job (in the old sector and in the new one) and $\Pi_v$ the asset value of a vacant job in the private sector.[4] They are given by:

$$
\begin{aligned}
r\Pi_s &= y_s - w_s - \delta_s\Pi_s + \dot{\Pi}_s && (4)\\
r\Pi_p &= y_p - w_p + \delta_p(\Pi_v - \Pi_p) + \dot{\Pi}_p && (5)\\
r\Pi_v &= -h + m(\theta)(\Pi_p - \Pi_v) + \dot{\Pi}_v && (6)
\end{aligned}
$$

where $y_j$ is the productivity in sector $j$, $h$ the vacant job cost per unit time.

The evolution of mean unemployment, public employment and private employment are given by:

$$
\begin{aligned}
\dot{U} &= \delta_s S + \delta_p P - \theta m(\theta) U && (7)\\
\dot{S} &= -(\delta_s + \theta m(\theta)) S && (8)\\
\dot{P} &= \theta m(\theta)(U + S) - \delta_p P && (9)
\end{aligned}
$$

We assume that the labor force is constant and normalized to 1. The transition process takes place over time. At the beginning of transition, all the labor force is in the state sector $S$, there is no unemployment and the private sector does not exist. At the end of the transition, the state sector has disappeared, which implies $S = 0$ and $U + P = 1$.

Job creation takes place when a firm and a worker meet and agree to an employment contract. All profit opportunities from new jobs are exploited, driving rents from vacant jobs to zero (free entry condition). This implies $\Pi_v = \dot{\Pi}_v = 0$. Therefore equation (6) implies $\Pi_p = h/m(\theta)$. Substituting into (5), we obtain:

$$
\frac{h}{m(\theta)} = \frac{y - w_p + \dot{\Pi}_p}{r + \delta_p} \qquad (10)
$$

realistic

[4]There is no vacant job in the old declining sector and the wage $w_s$ is considered as exogenous

Differentiating equation (10) gives the out-of-steady-state dynamics of labor-market tightness:

$$-\frac{hm'(\theta)}{\big(m(\theta)\big)^2}\dot{\theta} = \dot{\Pi}_p \tag{11}$$

A realized job match yields some pure economic rent. Wages need to share this economic rent (in addition to compensating each side for its costs of creating the job). At the beginning of transition, all the labor force is employed in the old sector ($S = 1$ and $U = P = 0$). We assume that firms in the private sector set the wage such that $V_p = V_s$ in order to attract workers from the state sector. As $V_u \leq V_p$ (and $V_u \leq V_s$), being employed in the private sector is always better for unemployed workers. With equations (1) and (3), we obtain:

$$V_p - V_u = \frac{w_p - w_s}{\delta_p - \delta_s} \tag{12}$$

Note that the condition $V_p - V_u \geq 0$ is satisfied if and only if:

- $\delta_s < \delta_p$ and $w_p \geq w_s$
- or $\delta_s > \delta_p$ and $w_s \geq w_p$

If $\delta_s < \delta_p$, the risk of unemployment is higher in the private sector than in the old sector. Private firms have to compensate for this risk by offering higher wages than in the public sector. On the contrary, when $\delta_s > \delta_p$ the old sector is riskier, and so, state workers are willing to accept a lower wage to work in the less risky private sector. Therefore private firms can offer $w_p < w_s$.

Differentiating equation (12) gives:

$$\dot{w_p} = (\delta_p - \delta_s)(\dot{V_p} - \dot{V_u}) \tag{13}$$

Combining equations (2) and (3) and substituting into (13) gives the out-of-steady-state dynamic of private wages:

$$\dot{w_p} = \Big(r + \delta_s + \theta m(\theta)\Big)w_p - \Big(r + \delta_p + \theta m(\theta)\Big)w_s + (\delta_p - \delta_s)b \tag{14}$$

For given public wages and unemployment benefits, the out-of-steady-state dynamics of wages (equation (14)) is entirely driven by the dynamics of labor-market tightness (equation (11)).

## 3 Steady-state equilibrium

We now study the end of the transition process which is given by the steady-state equilibrium (with $S = 0$ and $U + P = 1$). The end of transition is defined by the triple ($U$,$\theta$,$w$) that satisfies the flow condition (7), the dynamic job-creation condition (11) and the dynamic wage equation (14) at the steady state equilibrium. We first determine the ratio of vacancies to job-seekers and the private wage. From (11), a first relationship is obtained between $\theta$ and $w_p$ when ($\dot{\theta} = 0$), which we write as $w_p^{LD}(\theta)$ and is given by:

$$\frac{h}{m(\theta)} = \frac{y - w_p}{r + \delta_p} \tag{15}$$

$w_p^{LD}(\theta)$ (which is the labor demand equation) has the following properties (see proof in appendix):

$$\frac{\mathrm{d}w_p^{LD}}{\mathrm{d}\theta} < 0, \qquad \lim_{\theta \to 0} w_p^{LD} = y, \qquad \lim_{w_p^{LD} \to 0} \theta = m^{-1}\Big[\frac{h(r+p)}{y}\Big] \equiv \theta_{max}$$

Equation (15) defines a monotonic decreasing relation between $w_p$ and $\theta$. Indeed, higher private wages make job creation less profitable, and so lead to a lower equilibrium ratio of jobs to workers.

From equation (14), a second relationship is obtained between $\theta$ and $w_p$ when ($\dot{w}_p = 0$), which we denote by $w_p^{WD}(\theta)$:

$$w_p = w_s + \frac{(\delta_p - \delta_s)(w_s - b)}{r + s + \theta m(\theta)} \tag{16}$$

with the following properties:

- if $\delta_s > \delta_p$

$$\begin{aligned} \frac{\mathrm{d}w_p^{WD}}{\mathrm{d}\theta} &> 0, \\ \lim_{\theta \to 0} w_p^{WD} &= w_s + \frac{(\delta_p - \delta_s)(w_s - b)}{r + \delta_s} \equiv x_A, \\ \lim_{\theta \to \infty} w_p^{WD} &= w_s \end{aligned}$$

- if $\delta_s < \delta_p$

$$\begin{aligned} \frac{\mathrm{d}w_p^{WD}}{\mathrm{d}\theta} &< 0, \\ \lim_{\theta \to 0} w_p^{WD} &= w_s + \frac{(\delta_p - \delta_s)(w_s - b)}{r + \delta_s} \equiv x_B, \\ \lim_{\theta \to \infty} w_p^{WD} &= w_s \end{aligned}$$

We easily obtain that $0 < x_A < w_s < x_B$ and $w_s < y$. If $\delta_s > \delta_p$, the wage curve $w_p^{WD}$ defined by equation (16) is an increasing function with $\theta$. This is a situation where the state sector is riskier (the job-loss rate in the state sector is higher than in the private sector). The higher ratio of vacancies to unemployment increases the probability of finding a job for all job seekers (unemployed and state workers). This increases the asset value of an unemployed ($V_u$) or a state worker ($V_s$) which increases the private wage required to attract state workers. On the contrary, if $\delta_s < \delta_p$, the wage curve $w_p^{WD}$ is a decreasing function with $\theta$. In this case, the private sector is riskier and firms must pay a higher wage to attract state employees. But if the exit rate from unemployment or the state sector to the private sector increases (through an increase in $\theta$), the private wage required to attract state workers decreases. Being in the riskier sector is compensated by an increase in $\theta$.

Steady-state equilibrium values of $\theta$ and $w_p$ are at the intersection of these two functions (labor demand equation $w_p^{LD}$ (15) and wage determination condition $w_p^{WD}$ (16)). Figure 2 describes these two curves in the plane $(\theta, w_p)$. There are two distinct cases. First, it is easy to see that when $\delta_s > \delta_p$, there exists a unique equilibrium $E_A^*$ that gives a unique value of $\theta$ and a unique value of $w_p$ that we write $(\theta_A^*, w_{pA}^*)$. Secondly when $\delta_s < \delta_p$, the equilibrium is defined by two monotonic decreasing functions. Since these two functions have not the same slope and are not parallel, this equilibrium is unique if $x_B < y$. Now if $x_B > y$, there may be one or two equilibria given the convexity of $w_p^{WD}(\theta)$. For the chosen calibration in the next section, there are two equilibria. We denote the first steady-state equilibrium by $E_B^*$ with $(\theta_B^*, w_{pB}^*)$. The other equilibrium denoted by $E_C^*$ in the figure has a value of $\theta$ which is near to 0. In this particular case, we will next show that the unemployment rate is equal to 1. This is a corner solution where all the workers are unemployed and the private sector does not emerge.

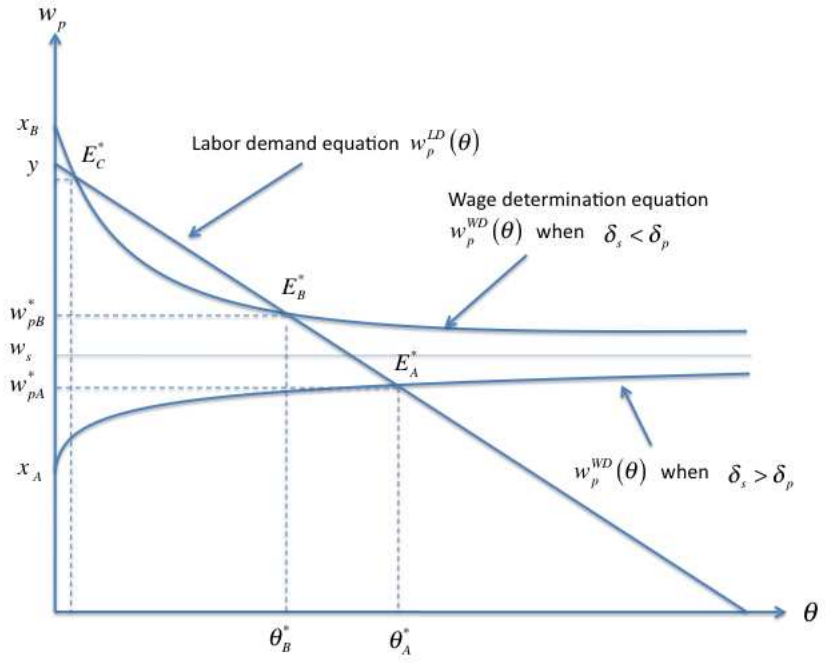
The comparison of these two cases ( $\delta_s > \delta_p$ versus $\delta_s < \delta_p$ is informative. Given the value of $\delta_s$ in comparison to $\delta_p$, the transition process does not end up at the same equilibrium. As a result, it seems that the way of restructuring the public sector plays a prominent role in the process of transition.

**Proposition 1** *At the beginning of the transition, countries face two types of strategy*

- *Strategy A: reduce public employment such as* $\delta_s > \delta_p$
- *Strategy B: keep public employment high enough such as* $\delta_s < \delta_p$

According to the wage determination rule ($V_p = V_s$), we know that if there are massive layoffs in the state sector ($\delta_s > \delta_p$), the private sector wage required to attract workers has to be lower than the public one. This should

Figure 2: Equilibrium wages and market tightness




be true throughout the transition process. This implies that $w_{pA*} < w_s$ is also satisfied at the end of the transition. On the contrary, when state employment is kept high ($\delta_s < \delta_p$), the private sector wage required to attract workers has to be higher than the public one. Again, this condition is also satisfied at the end of transition, $w_{pB}^* > w_s$. Then, this implies that

$$w_{pA}^* < w_{pB}^* \tag{17}$$

Furthermore, using equation (15), we obtain:

$$\begin{aligned} \frac{h}{m(\theta_A^*)} &> \frac{h}{m(\theta_B^*)} \\ \Leftrightarrow \theta_A^* &> \theta_B^* \end{aligned}$$

Finally, plugging the equilibrium value of ratio of vacancies to unemployment ($\theta_A^*$ or $\theta_B^*$) in equation (7) determines steady-state unemployment at the end of the transition process (when $\dot{U} = \dot{P} = \dot{S} = 0$, $S = 0$ and $P + U = 1$):

$$U_i = \frac{\delta_p}{\delta_p + \theta_i^* m(\theta_i^*)} \qquad \text{for } i = A, B \tag{18}$$

Again given the value of $\delta_s$, there are two steady-state equilibria of unemployment that we write as $U_A^*$ when $\delta_s > \delta_p$ and $U_B^*$ when $\delta_s < \delta_p$. It is

easily verified that since $\theta_A^* > \theta_B^*$, we get $U_A^* < U_B^*$. [5] Figure 3 illustrates this point in the job-seekers - vacancy space. Since $\theta_i^*$ is independant of unemployment, it is shown as a line through the origin, with slope $\theta_i^*$. At the end of the transition we know that $S = 0$, the steady-state condition for unemployment is the Beveridge curve and it is convex to the origin by the properties of the matching function. When there are more vacancies, unemployment is lower because the unemployed find jobs more easily. We denote by $E_A^*$ the steady-state equilibrium when $\delta_s > \delta_p$ and by $E_B^*$ when $\delta_s < \delta_p$.

**Proposition 2** *The comparison of the two strategies implies:*

$$w_{pA}^* < w_{pB}^*, \qquad \theta_A^* > \theta_B^*, \qquad \text{and} \quad U_A^* < U_B^*$$

*where A represents the strategy $\delta_s > \delta_p$ and B the strategy $\delta_s < \delta_p$*

The thinking behind this result is quite simple. We know that part of the wages are a kind of premium to compensate the risk of being fired. The required wage to attract workers is lower in the case $A$ where the private sector is less risky. In this case, job creation is more profitable and private firms create more vacancies than in case $B$ ($v_A^* > v_B^*$). This leads to a higher equilibrium ratio of jobs to workers in $A$ than in $B$ ($\theta_A^* > \theta_B^*$). This means that there are more jobs relative to job seekers in case $A$ (or in other words, the rate at which job seekers move into employment is higher in case $A$). As a result, unemployment is lower when there are massive layoffs in the state sector (when state layoffs are greater than private layoffs). Strategy $A$ characterized by a big destruction of public jobs implies in the end low unemployment. Whereas strategy $B$ characterized by a small destruction of public jobs leads to higher unemployment.

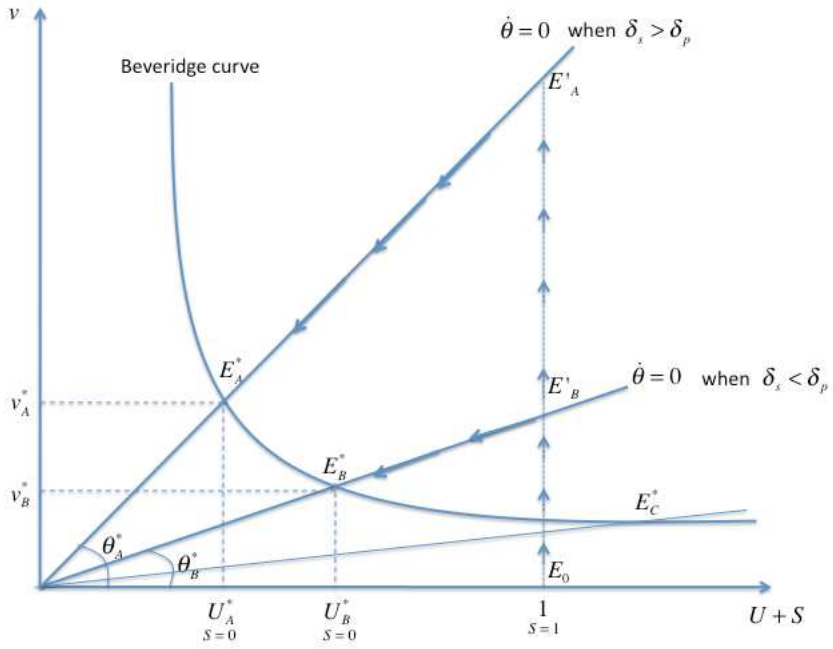
# 4 The transition process

## 4.1 Out-of-steady-state dynamics

Our focus here is on the dynamic behaviour of unemployment and vacancies. Before the transition, the economy must be at point $E_0$ in figure 3 where $S = 1$ and $U = 0$. All workers are employed in the state sector. At the beginning of the transition the state sector 'chooses' to lay off a part of its workers. This implies a decrease in state employment at a rate $\delta_s$ per period, and this creates a labor force pool for the emergent private sector. Both wages and market tightness jump to their equilibrium values. There are no adjustment dynamics for these two jump variables. So, the saddle

[5] Note also that $\lim_{\theta \to 0} U = 1$. Then the equilibrium $E_C^*$ in figure 2 describes a situation where the transition does not take place

Figure 3: Adjustments in vacancy - job seekers space




path is $\theta$-stationary; this is the line through the origin in the vacancy - job seekers space. Initially equilibrium jumps from $E_0$ to $E'_A$ when $\delta_s > \delta_p$ or $E'_B$ when $\delta_s < \delta_p$. Then, adjustment takes place along the saddle-path with $\theta$ constant. Since market tightness has jumped to its equilibrium value $\theta^*_i$ with $i = A, B$, the dynamics of job-seekers is completely defined by:

$$\dot{U} + \dot{S} = -(\delta_p + \theta^*_i m(\theta^*_i))(U + S) + \delta_p \tag{19}$$

Since firms open up more vacancies at the beginning of the adjustment than the number they expect to have in equilibrium, there is an overshooting of vacancies which moves the economy down the job creation path towards steady-state equilibrium $E^*_A$ or $E^*_B$. During adjustment the number of vacancies falls through the matching process and the number of job-seekers increases (because of an increase in unemployment and a decrease in state employment) so as to maintain the $\theta$ ratio constant. Figure 3 illustrates these adjustments. Let us now compare the two cases. If $\delta_s$ is low, there are not enough workers available for the private sector, not enough unemployment to develop a private sector, as in Aghion & Blanchard (1994). Private firms do not create enough vacancies, so market tightness is too low (Note that if $\theta$ is too low, there can be no equilibrium as shown at point $E^*_C$ in figure 3). The higher $\theta$ is, the higher the pool of labor force is for the private sector. This stimulates firms to open more vacancies. This effect is strengthened

when $\delta_s > \delta_p$. The required wage to attract state workers decreases which increases the expected profit on a filled job. Therefore the overshooting of vacancies seem to be higher in case $A$. What can we say about the dynamics of unemployment? Using $U + P + S = 1$ and (7), we obtain:

$$\dot{U} = (\delta_s - \delta_p)S - (\delta_p + \theta m(\theta))U + \delta_p \tag{20}$$

Thus, dynamics of unemployment is affected by three effects: first, the way of reallocating public employment during transition $(\delta_s - \delta_p)S$, second job creation in the private sector $(\delta_p + \theta m(\theta))U$, and third the importance of job losses in the private sector $\delta_p$. Unambiguously, more job creation in the private sector tends to decrease unemployment, all things being equal. Whereas more job losses in this sector, all things being equal, tends to increase unemployment. However, the impact of the restructuring of public employment on unemployment is ambiguous. This restructuring tends to decrease unemployment if $\delta_s$ is lower than $\delta_p$ (strategy $B$), but to increase unemployment in the opposite case. At the very beginning of the transition ($S = 1$), this restructuring effect overcomes the two others. Thus, when $\delta_s < \delta_p$ few workers are laid off. And they are hired by private firms. Consequently unemployment is expected to increase slowly and continuously in the countries which have adopted the strategy $B$. On the contrary, when $\delta_s > \delta_p$, the private sector can not absorb all the dismissed state workers. Unemployment is expected to jump in the first years of transition for the countries that have adopted strategy $A$, and then to decrease toward its steady-state value.

### 4.2 The length of transition

We now calibrate the model in order to provide an estimate of the length of the transition process. Official statistics being rare, the parameters of the model are set in the most plausible way relative to others calibrated matching models (see Table 1 for a summary). The unit of time is 1 year. The productivity parameter is set at 0.9. The matching function is a Cobb-Douglas with $m(\theta) = M_0\theta^{-\gamma}$. The elasticity of the matching function $\gamma$ is set at 0.5, which is quite standard, and $M_0$ at 0.2, which is lower than in a market economy (but at the beginning of the transition, we can assume that the matching process is not very efficient). The interest rate is set at the usual value of 5 per cent. The cost of a vacancy $h$ is 0.3. Public wages are set at 0.7. Unemployment benefits are set at 0.5 which represents a replacement ratio of 70 per cent of the public wage. The job loss rate in the private sector is set at 0.1, which represents a typical measure of gross job losses per year in a market economy. The job loss rate in the state sector is the only parameter which distinguishes between the two strategies. We consider that $\delta_s$ is equal to 0.2 in case $A$, whereas it is equal to 0.03 in case $B$.

Table 1: Baseline parameters value

| Parameters | Symbol | Value | |
|---|---|---|---|
| Productivity | $y$ | 0.9 | |
| Cost of posting a vacancy | $h$ | 0.3 | |
| Efficiency of the matching function | $M_0$ | 0.2 | |
| Elasticity of the matching function | $\gamma$ | 0.5 | |
| Unemployment benefits | $b$ | 0.5 | |
| Public wage | $w_s$ | 0.7 | |
| Interest rate | $r$ | 0.05 | |
| Job loss rate in the private sector | $\delta_p$ | 0.1 | |
| Job loss rate in the public sector | $\delta_s$ | 0.2 | strategy $A$ |
| | | 0.03 | strategy $B$ |

Table 2: Implied steady-state values

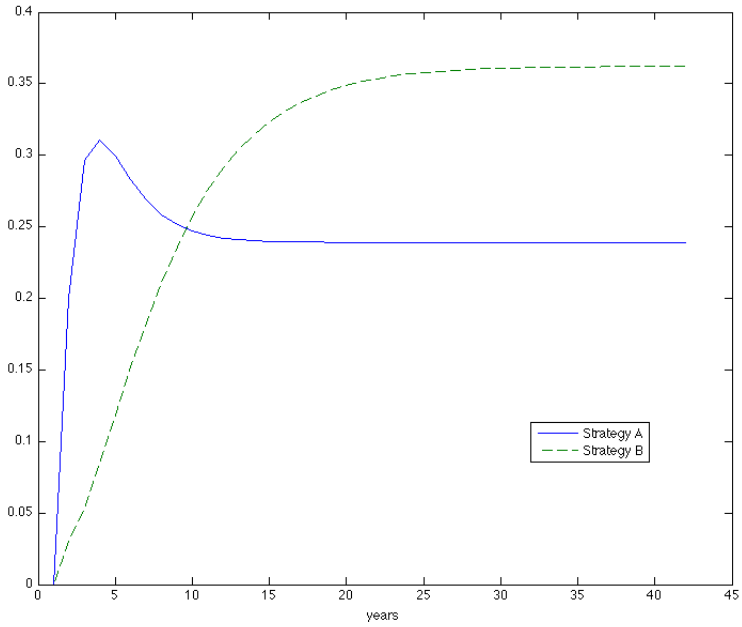
| Variables | Symbol | Value |
|---|---|---|
| Labor market tightness with strategy $A$ | $\theta_A^*$ | 2.53 |
| Labor market tightness with strategy $B$ | $\theta_B^*$ | 0.77 |
| Private wage with strategy $A$ | $w_{pA}^*$ | 0.66 |
| Private wage with strategy $B$ | $w_{pB}^*$ | 0.77 |
| Unemployment rate with strategy $A$ | $U_A^*$ | 0.23 |
| Unemployment rate with strategy $B$ | $U_B^*$ | 0.37 |
| Length of transition in strategy $A$ | | 17 years |
| Length of transition in strategy $B$ | | 36 years |

Using this set of parameters, we can compute the implied steady-state values of the model (see Table 2). Strategy $A$ is associated with a higher labor market tightness with more job creations than strategy $B$. As a result the unemployment rate is lower in countries that have adopted the big reduction of public employment strategy. Furthermore, the transition process is shorter in case $A$, 17 years versus 36 years in strategy $B$.

The dynamics of unemployment in the two cases are illustrated in figure 4. Countries that have adopted Strategy $A$ suffer from an overshooting of unemployment in the first years of the transition process. This is due to the high losses in state employment. There are not enough job creations in the private sector to hire all the dismissed state workers, but this creates a labor force pool for the emergence of the private sector. Job creations become profitable for firms because the probability of filling a vacancy increases. Subsequently the growth of the private sector leads to a decrease in unemployment, 5 years after the beginning of the transition. In strategy $B$, there are not 'enough' unemployed workers. The probability of filling a vacancy is too low which makes job creation less profitable. As a result, the unemployment rate increases continuously, and the private sector

does not really emerge. As the destruction of the state sector is slower, the transition process lasts longer. These predictions are similar to the paths experienced by the transition countries. At the beginning of the transition, all post-communist countries had similar macroeconomic problems, especially as regards the emergence of unemployment. However, in Central and Eastern European Countries (CEECs) the official unemployment rate grew quickly at the very beginning of the transition while it increases slowly in the Former Soviet Unions (FSUs). The dynamics generated by Strategy $A$ may describe accurately the transition observed in most of the CEECs (in particular Bulgaria, Poland, Hungary, Slovakia, Slovenia and Albania). Indeed, in this region the state-owned entreprises generally adjusted by a cut in employment rather than in salary (see Basu et al. 2000, Boeri & Terrell 2002). Unemployment thus has grown up very quickly, but at the same time the new private sector has developed substantially. The evolution generated with Strategy $B$ may correspond to the transition observed in most of the FSUs, in particular in Belarus, Kazakstan, Tadjikistan, Turkmenistan, Ukraine and Uzbekistan. The official unemployment was very low in these countries at the beginning of transition, but the development of the private sector is stagnant. The statistics show that the economic revival only began with the increase in official unemployment, after 6-7 years of transition (EBRD 2009). Indeed, it has been established by numerous authors (see Foley 1997, Broadman & Recanatini 2001) that in the FSUs, the state-owned enterprises adjusted to the output contraction more by a cut in wages and hours worked than by layoffs. Therefore, it seems reasonable to consider that in the FSUs, the dismissal probability was very low in the public sector in the short term. What the model predicts in this case is a small change in the official unemployment rate, coupled with a limited development of the private sector. This may explain why the FSUs countries experienced periods of negative growth with low unemployment rates. Moreover, since the end of the 1990s, unemployment has tended to increase, but the take-off of the private sector is far from certain. These countries seem to be trapped in a vicious circle, leading - in the long term - to a low development of a formal private sector. Obviously, the official unemployment will probably not reach very high double digit levels. As already highlighted in the introduction, a lot of former public workers leave their jobs voluntarily or are involved in the unofficial sector, especially in the FSUs countries. Part of the simulated evolution of the official unemployment rate in the model will in fact be shadow employment.

Figure 4: The dynamics of unemployment




# 5 Concluding remarks

In this paper we propose a theoretical analysis of labor reallocation in transition countries. Using a dynamic matching model we find evidence that the choice oof the initial strategy used by state-owned enterprises for reducing their labor forces can have dramatic consequences on the transformation process. We solve our model analytically and numerically. The analytical solutions lead us to consider two different strategies. In Strategy A, public enterprises decide to reduce their labor forces quite quickly. According to our results and simulations, with this strategy the transition is achieved in 17 years. There is an overshooting of unemployment in the first years of the transition and the unemployment at the end of transition is around 23 percent. On the other hand, when public enterprises opt to reduce their labor force more gradually, the transition lasts longer (about 36 years) and is characterized by a higher unemployment rate (37 percent) at the end of the transformation. Hence our model has some policy implications. Whenever a government plans to destroy a whole sector of the economy in order to achieve a systemic transformation, it should not do it too slowly, as it could be more costly in terms of unemployment and activity in the long run. Of course we are aware that this conclusion does not take into account the social consequences of the reform, nor the question of financing the unemployment benefits. Nevertheless, we think that our work contributes to a better under-

standing of the economic evolution after a major structural reform. In this simple model we consider that the state workers who can't find a job in the formal new private sector are officially unemployed. Of course, in practice, they will partly move into the informal sector, so that the official unemployment rate will never reach very high double digit levels. A full explanation of the importance of the informal sector needs further research. We intend to adapt Boeri & Garibaldi (2007) to our framework. Although we are aware that this extension will significantly increase the complexity of the model, we think that this could help to understand further the diverging evolutions of the labor markets in the different transition countries.

# Appendix

### Labor demand

$$-hm'(\theta)[m(\theta)]^2\frac{\mathrm{d}\theta}{\mathrm{d}w_p} = -\frac{1}{r+\delta_p} \tag{21}$$

As $m'(\theta)$ is decreasing, we have $\frac{\mathrm{d}\theta}{\mathrm{d}w_p} < 0$. The labor demand is a monotonic decreasing relation $\frac{\mathrm{d}^2\theta}{\mathrm{d}w_p^2} = 0$

### Wage curve

$$\frac{\mathrm{d}w_p}{\mathrm{d}\theta} = -[m(\theta)+\theta m'(\theta)](\delta_p-\delta_s)(w_s-b)[r+\delta_s+\theta m(\theta)]^{-2} \tag{22}$$

We obtain that $\frac{\mathrm{d}w_p}{\mathrm{d}\theta} > 0$ if $\delta_s > \delta_p$ whereas $\frac{\mathrm{d}w_p}{\mathrm{d}\theta} < 0$ if $\delta_s < \delta_p$

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