Optimal Speed of Transition: Micro Evidence from the Czech Republic

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Abstract

We consider the growing theoretical literature on the optimum speed of transition (OST) and explore its validity using micro data from a transition economy. First, we ask whether the OST theories focus on the empirically most important job and worker reallocation flows. Second, we examine the relationship between these flows suggested by the theory. The empirical evidence from the Czech Republic appears to match the theory's prescriptions. It underscores the main policy implication of the Aghion and Blanchard (1994) model that early support for private job creation is the recipe for a successful transition.

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1. Introduction

The optimal pace of worker and job reallocation in the transition economies is the source of great debate both among policy makers and in the theoretical literature. The gradualist approach to reforms has been advocated for example by Dewatripont and Roland (1995), while, e.g., Murphy, Shleifer and Vishny (1992) analyze the pitfalls of partial reform and are proponents of rapid, "big-bang" reform.

An important and growing strand of theoretical models on transition to a market economy, called the Optimal Speed of Transition (OST) theory, studies the reallocation of labor (and capital) from the state sector to the private sector.[1] The shared essence of the various OST models are economic mechanisms that relate the pace of job destruction (layoffs) in the inefficient old sector to the speed of job creation (hiring) in the new sector. For example, in the Ramsey-type model of Castanheira and Roland (2000), the growth of the private sector is driven by capital accumulation, i.e. savings. Too fast a rate of scrapping of the state sector leads to savings reduction and therefore slows down job creation in the new private firms. On the other hand, if job destruction in the old state sector is too slow, this forces the private sector to pull workers from their old jobs by increasing wages, thereby slowing job creation. The OST literature therefore advocates gradual phasing out of the state sector as optimal. At the optimal speed of transition, or more specifically at the optimal speed of state-sector demolition, significant and long-term unemployment does not arise because jobs in the new sector are being created at a pace that balances the rate of decline of the old sector.

Contrary to this scenario, most transition countries have experienced quickly emerging double-digit unemployment rates, in the presence of significant growth of the new private sector.[2] The only exception to this rule has been the Czech Republic where unemployment rates have stabilized between 3 and 4 percent. This may have been a result of slow restructuring and reallocation, postponing the necessary rise in unemployment for later. Alternatively, a high pace of downsizing in the state sector may have been offset by growth of the new private sector, avoiding considerable unemployment. Did the Czechs experience the optimal speed of transition? If so, was it engineered through the use of various policy instruments? These are some of the questions we will touch on in this paper.

[1] Examples include Burda (1993), Katz and Owen (1993), Aghion and Blanchard (1994), Chadha and Coricelli (1994), Atkeson and Kehoe (1996), Rugerone (1996), Brixiova (1997), Boeri (1999), and Castanheira and Roland (2000). For a survey, see Roland (2000).

[2] Brixiova (1997) addresses this discrepancy using a matching model with on-the-job search of state-sector workers.

The main purpose of our paper is to confront the OST theories with detailed micro-based evidence from a country that may have followed the theory's prescription. We asses to what extent are the main objects of the theory, namely job destruction in the old state sector and job creation in the new sector, the driving forces of job and worker reallocation during the economic transition. Next, we explore the relationships between these job flows (and induced worker flows) suggested by the OST theories.

The plan of this article is as follows: We begin, in Section 2, by highlighting the theoretical work on the optimal speed of transition. In Section 3 we survey the scarce empirical evidence on the OST literature. Our data are described in Section 4, followed by a discussion of our estimation strategy and the complementarity of firm and individual level data in measuring job destruction and creation. Section 5 first provides background on the Czech Republic's transition in order to introduce empirical evidence on the OST theory. We then present both informal empirical tests and those based on statistical inference. Finally, section 6 concludes and discusses extensions for future research.

2. Optimal Speed of Transition Theory

The backbone of the literature on the optimal speed of transition is the paper by Aghion and Blanchard (1994). According to their model, sectoral reallocation implies that labor must be transferred from the old, less efficient state sector, to the new, more efficient private sector. Reductions in the number of state employees are decided by the government. The government engineers the downsizing of the state sector through the reduction of subsidies (push) and the creation of generous unemployment benefits (pull). On the other hand, *increases* in employment in the private sector are decided by market forces[3]; hence, if the cost of labor is high because of high wages and/or taxes, fewer workers are demanded. An important element in the model is that the level of wages is a function of exit rate from unemployment. The government must select the rate at which it will reduce the old sector knowing that if it goes too slowly, there will be low unemployment which puts upward pressure on wages and hence slows down the growth of the new private sector. On the other hand, if it downsizes the old sector too quickly, it will create high unemployment, which will reduce net wage increases. However, as the model suggests, an excess rate of closure tends to reduce the expansion of the tax base out of which unemployment benefits can be financed. The government will then have to raise taxes in order to finance unemployment benefits, hence total wage costs increase, dampening the demand for labor in the

private sector. The model postulates an inverted u relationship between the speed of transition (state sector closure) and the unemployment rate. As the rate of downsizing in the old sector rises, the unemployment rate rises, up to a point where the unemployment rate then feeds back into the system, slowing down the speed of job creation in the new sector.

The dynamics of the economy depend on the initial unemployment level, resulting from an instantaneous drop in state-sector employment and rise in private employment at the outset of the transition. The initial unemployment level determines the level of wages and hence private job creation, which together with the speed of labor shedding from the old sector drive the change in unemployment. Eventually, the economy converges to a stable level of unemployment at which the job destruction in the old state sector equals the job creation in the new private sector; the flows in and out of unemployment are equal. The higher is the initial (instantaneous) increase in unemployment compared to this stable level of unemployment, the longer it takes to converge there. Unemployment then remains at the stable level until the transition is over and the state sector disappears or is restructured.[4]

A large literature has emanated from this model. For example, Castanheira and Roland (2000) have recently developed a general equilibrium model where again the effect of an excessive speed of closure slows down the growth of the new sector, however their feedback mechanisms works via the depression of output and savings (investment) when the unemployment rate is high. In their model, for an overly slow speed of closures to have negative effects, it is necessary to assume that state-owned enterprises have soft budget constraints (so that wage payments can exceed the marginal product of labor). Chadha and Coricelli (1994) model the greater strains on the government budget when the speed of reallocation is faster. Gavin (1993) develops a model that emphasizes the role of congestion externalities in the labor market if sectoral reallocation is too fast.

Boeri (1999), among others, has questioned different aspects of the model. He argues that the direction of labor reallocation during early transition was driven by relatively high levels of non-employment benefits offered to the labor force. These benefits induced workers to leave their jobs before there were a sufficient number of jobs created in the new sector. This is what caused high levels of "stagnant" unemployment in most countries. Hence, while the optimal speed of transition (OST) literature suggests that generous assistance be provided early on to sustain public

[3] Profit per worker drives the change in private employment rather than the level because of adjustment costs and because investment is constrained by earnings.

[4] Aghion and Blanchard (1994) also extend the model to allow for endogenous restructuring (labor shedding) in the old sector. High initial unemployment then makes state workers reluctant to restructure and slows down transition.

support for reforms, the labor supply analysis of Boeri (1999) implies that generous non-employment benefits should be offered only later on, once the initial reallocation has taken place.

3. Existing Evidence

The empirical evidence supporting the OST models is sketchy and does not go, for the most part, beyond discussing macroeconomic aggregates. For example, Aghion and Blanchard (1994) compare the total change in state and private employment between 1989 and 1992 with 1992 unemployment rates in five transition economies. They also compare the average exit rate out of unemployment. They interpret this evidence as broadly consistent with their model. However, the empirical literature on labor reallocation in transition economies is beginning to reveal a pattern that indicates that overall mobility is lower than expected. For example, we find in a companion paper (Jurajda and Terrell, 2000) that the amount of job reallocation as measured by job creation and job destruction is relatively low in the CEE countries as compared with the OECD countries. Except for Germany, there do not seem to have been significant closing down of state owned enterprises and mass-layoffs of workers. Boeri (1999) has found that a substantial part of the outflows from the state sector was due to job leavers, rather than job losers, but there is no evidence indicating whether or not there is a relationship between job creation in the new sector and job destruction in the old sector.

Our conjecture is that useful evidence on the OST can be provided by studying the case of the Czech economic transition. This is because the Czech Republic (CR) maintained very low unemployment throughout the first half of the 1990s with unemployment inflows equal to outflows (see Section 5 for a detailed account of the Czech transition), making it suspect of having followed the optimal transition path. Further, the CR has been, in this respect, an important case among the dozens of countries reforming their centrally planned economies after the fall of communism.

The puzzle of why unemployment was very low in the CR during the early 1990s while it rapidly reached double digits in other, otherwise comparable, Visegrad countries (Poland, Hungary, Slovakia), has been examined from a number of angles (see, e.g., Boeri and Burda, 1996; Ham, Svejnar and Terrell, 1999). However, this literature has not been fully successful in identifying the main cause for the dramatic divergence between the unemployment rates of the Czech Republic and those of the Central and East European (CEE) transition economies during

1991 and 1992.[5] This is likely due to the severe paucity of comprehensive micro-level data covering the first years of transition (see Section 4).

A natural way to learn about the fundamentals of the Czech transition (and its low unemployment) is to analyze its job and worker reallocation. Furthermore, a natural way to learn about the validity of the OST theory is to analyze the behavior of the theory's main objects of interest: job and worker reallocation. Yet, little is known about job creation and destruction in the Czech Republic, unlike other transition countries. Again, this likely has to do with the lack of suitable data.[6]

Most of the existing empirical evidence related to OST comes from numerous studies measuring the rate of job creation and destruction in transition economies. This empirical literature on job reallocation typically draws on Davis and Haltiwanger (1992) and uses firm-level data.[7] For example, Konings, Lehmann, and Schaffer (1996) analyze large firm-level data for Polish manufacturing and find most job destruction occurring in the state owned firms, while most new jobs are created in the private sector (which includes privatized firms). Bojnec and Konings (1998) study a sample of 100 Slovenian firms and reach similar conclusions, while Faggio and Konings (1999) use a sample of 431 firms from Bulgaria, Hungary, and Romania to identify *de novo* (newly established) private firms as the driving force of job creation during transition. Unfortunately, the firm-level data sets from transition countries are often rather small and/or cover only one sector of the economy (e.g., Bojnec and Konings, 1998; Konings, Lehmann and Schaffer, 1996).

A study of Estonia by Haltiwanger and Vodopivec (1999) does not have information on privatized vs. *de novo* firms, but it is of special interest because it informs us about a country considered a rapid reformer and their study uses data that are similar to the present study. They use a retrospective questionnaire on individuals, administered within the 1995 Estonian Labor Force Survey, to provide descriptive evidence on worker and job reallocation rates during early transition. They show a rapid increase in both worker and job reallocation in the early 1990s with the annual worker reallocation rate exceeding 35 percent by 1993. While at the beginning of

[5] See, e.g., Ham, Svejnar and Terrell (1999) who provide the time evolution of Czech unemployment (and labor force participation) since the beginning of transition as well as a comparison to other CEE countries.
[6] The Czech Labor Force Survey data provide no information on ownership or firm size; hence, there has been no empirical research on job or worker reallocation from the old state sector to the new private sector in the CR. While empirical evidence exists on the extent of worker reallocation across industrial sectors and labor market states (Sorm and Terrell, 2000), it starts only in 1993, after unemployment rates have diverged. By labor market states, we refer to employment, unemployment and out-of the labor force.
[7] Except for Haltiwanger and Vodopivec (1999) and the present paper, which both use job reallocation measures based on individual data. As we explain in Section 4.2, these are complementary to measures based on firm data.

transition, jobs were eliminated at a very high rate, by 1994 more jobs were being created than destroyed. We return to discussing the results from these studies in the concluding section.

4. Data and Measurement Issues

4.1 Data

Our analysis uses data from a survey of 3,157 randomly selected households throughout the 76 districts of the Czech Republic, administered in December 1996. For those individuals who were employed for at least two weeks during the 1991-1996 period, the questionnaire traces the characteristics of all the jobs held by these individuals between January 1991 and December 1996, as well as the characteristics of all non-employment spells. We have continuous labor market histories, with exact records of the monthly durations of employment and non-employment spells and the following characteristics of each job: wage at start and end of employment, occupation, employment status (employer, employee, self-employed, etc.), industrial sector (two-digit), type of firm ownership (at the end of the job), and size of firm (in categories). For those that exited their jobs, we also observe the reason for separation. We have usable data on employment histories of 4,786 individuals who experience 7,926 spells of employment (jobs). We have compared the means and distributions of the major demographic characteristics (i.e., age structure, gender, region of residence and household size) of our sample in 1996 with those from the national Labor Force Survey and we find that our sample is representative in terms of these characteristics.[8]

The data has several advantages for our study: First, no other Czech micro-level data set provides comparable coverage of the early transition years and follows individuals through the most important years of transition. The quarterly Labor Force Survey (LFS) only started in 1993, once the Czech unemployment rate had already diverged from that of the other CEE countries. The Microcensus household survey offers labor force status data for 1988, 1992 and 1996. However, it does not follow individuals over time and does not report the reason for employment separation. Further, neither of these household surveys offers information on employer size or ownership.

[8] See Munich, Svejnar and Terrell (1997) for a description of the survey and sample design as well as the descriptive statistics of the sample relative to the Labor Force Survey data. See also Jurajda and Terrell (2001) for further descriptive statistics of the data.

Although analyses of job creation and job destruction typically use firm level data and the Czech Statistical Office (CSO) has collected employment reports from enterprises with over 20 employees (the Firm Census) for several decades, we do not use these data. We feel they are not reliable because during the first chaotic years of transition, the ability of this reporting scheme to capture changes in firm identity and ownership and to enforce accurate reporting was compromised. This is especially true for firms employing less than 100 employees. Even in the late 1990s, the CSO was unable to accurately capture the number of small firms and their total employment (see Jurajda, 2000). Further, the ownership classification in these data may not be fully reliable and only information on manufacturing firms has been available to researchers.

Moreover, as we show in the next section, we are able to construct measures of job creation and job destruction with the individual data that are similar and complementary to those based on firm level data.

An important advantage of our data lies in its unique ability to distinguish privatized firms from *de novo* private enterprises.[9] The Czech Republic is known for its large-scale coupon privatization of large firms. However, as we also discuss in section 5.1, it is apparent that this privatization program resulted in incestuous creditor-debtor relationships between firms and investment funds owned by semi-state banks, asset stripping, and poor corporate governance of the privatized firms. Privatized firms often restructure less than state-owned enterprises. We therefore differentiate between three main employment sectors: the *old sector* (comprised of jobs in the state owned enterprises, cooperatives, and privatized firms); the *new sector* (including all jobs in *de novo* private firms and the self-employed); and the *public sector* (public administration, health and education).

4.2 Job and Worker Reallocation Rates

Our approach is to study both worker and job flows, relying on the basic identity that

$$\Delta E_t = JC_t - JD_t = H_t - S_t = H_t - (Q_t + L_t) \quad (1)$$

Here, ΔE_t denotes change in employment, JC_t and JD_t are job creation and job destruction in time *t* respectively, H_t and S_t stand for hiring and separation, and Q_t and L_t are quits and layoffs.

We measure the worker hiring in sector *k* at time *t* as:

[9] Respondents are asked about the ownership type of their employer at the end of their employment spell. The choices are, e.g., "newly established private firm", "firm after privatization", "firm in privatization". This is not a perfect measure of ownership. In particular, it is unclear how the respondents consider spin-offs from privatized or state-owned firms. Yet, as we argue above it is the best measure available.

$$H_{tk} = ne_{t,k} + ee_{t,k,} \quad (2)$$

where $ne_{t,k}$ denotes the number of workers who transited from non-employment to employment in sector *k* from time *t-1* to *t,* and $ee_{t,k}$ is the number of workers who transited from one job to another job in sector *k* from *t-1* to *t.* Similarly, separations are counted as

$$S_{tk}= en_{t,k} + ee_{t,k,} \quad (3)$$

where en_{tk} equals the number of workers who transited from employment in sector *k* to non-employment from *t-1* to *t.* Hiring and separation rates are calculated by dividing the relevant counts with E_{t-1k}, the total stock of employment in sector *k* at time *t-1*. We calculate our worker (and job) flow measures monthly, quarterly and/or annually, taking into account all transitions that occurred within a given time interval.

Next, we focus on job reallocation measures. Formally, job creation is the rate at which new jobs (i.e., new positions) are created and job destruction is the rate at which positions are eliminated. An important distinction is between creating job vacancies and matching these vacancies with workers. Our data is limited to observing the latter. We believe this not to be a major drawback to the extent that the relocation form the state sector into the private sector requires matching a worker with a vacancy as in the matching models of Pissarides (1990) and Mortensen (1992).

Job creation and destruction are typically measured with establishment (or plant) and firm level data and they are defined as (Davis and Haltiwanger, 2000, pp. 2716-7):

> Gross job creation in sector *k* at time *t* (JC_{kt}) equals employment gains summed over all business units in sector *k* that expand or start up between *t -1* and *t*.
>
> Gross job destruction in sector *k* at time *t* (JD_{kt}) equals employment losses summed over all business units in sector *k* that contract or shut down between *t -1* and *t*.

Although job destruction and job creation are traditionally measured with firm or establishment level data, they can also be measured from worker flow data (as pointed out by Blanchard and Diamond, 1990, and recently implemented by Haltiwanger and Vodopivec, 1999, with Estonian data similar to ours). With this type of data, job creation can be defined as hires less quits that are replaced, while job destruction consists of layoffs and quits without replacement.

In our questionnaire, we have 13 answers for how someone separated from their job (see Table 1). We define as job destruction (JD) any separations where: 1) the firm was closed down

(by the respondent or another employer) and 2) the separation was part of a mass-layoff.[10] The JD rate is the total number of job destructions at a given time *t*, divided by the number of jobs in *t-1*. It is probably the case that some other separations correspond to job destruction as well. For example, it is possible that some reasons for voluntary separations, such as retirement, may have ended in (been induced by) job destruction; hence, our JD measure is likely to be a lower bound estimate. However, in our data respondents were allowed to provide more than one answer to the employment exit question, making retirement and layoff, for example, a valid answer. Making use of this information should lower the extent of the underestimation of job destruction due to job destruction induced quits or out-of-labor-force transitions. In any case, given that the total separation rate is an upper bound, we can gain some insight into the dynamics of job destruction by comparing the two.

Table 1 not only presents the detailed distribution of exits, but also its summary, suggesting that quits were the predominant type of separation, followed by layoffs and transitions out of the labor force. The bottom two panels of Table 1 then imply that a laid off worker or one that reports leaving the labor force at the end of his/her employment spell is substantially more likely to experience a longer non-employment spell following the job exit compared to a worker who quits. Hence, the reported job exits appear to be correlated with economic behavior and we will take them seriously in our analysis.

The calculation of the rate of job creation (JC) uses the simple identity (1), namely that net employment growth (dE) is the difference between job creation and job destruction. Hence, $JC_{tk} = \Delta E_{tk} + JD_{tk}$.[11] Again, this may be considered a lower bound estimate for JC because JD may be underestimated.[12] In particular, when $Q_{tk}>H_{tk}$, the estimated JC_{tk} measure is negative, informing us that the minimum number of quits not replaced is $-JC_{tk}$. Hence, we add the negative of JC_{tk} to our JD_{tk} measure and set JC_{tk} at zero whenever the initial JC_{tk} estimate based on layoffs without replacement is negative. In our final empirical work, we perform this correction at a more detailed level, checking for $JC_{tks}<0$ where *s* denotes one-digit industry and summing up the corrected JD_{tks} across industries within employment sectors *k* to obtain our final estimate of JD_{tk}. This additional level of detail changes the corrected JD measure little, but we view it as more

[10] In an alternative specification, we included all layoffs since the percentage of layoffs that were not mass-layoffs were very small. The results were not materially affected.

[11] This strategy of estimating job creation and job destruction rates relies on random sampling to the extent that when we observe a layoff with replacement (not mass layoff) within a given employment category, it is expected to be compensated by hiring of another worker within our sample into this employment category. Layoffs with replacement constitute only about 2% of all separations.

[12] Note, however, that firm-level studies, e.g. Bilsen and Konings (1998), often also provide only a lower bound estimates on the true job destruction rate due to focusing only on continuing firms.

appropriate. The correction for JC<0 turns out to affect only JD in the old sector: See the appendix Figure A.1, which compares the estimated number of jobs destroyed in the old sector based on layoffs without replacement to the corresponding JD measure corrected for $JC_{tks}<0$. The two series exhibit a similar pattern, but the corrected measure allows us to identify much more JD, especially at the end of each year, when employment contracts typically end in the Czech Republic.

The fact that only the old sector is affected by these corrections comes as no surprise. Underestimation of JD is especially likely in the old firms, where labor shedding is more extensive and where quits may be used as a welcome opportunity to decrease the firm's workforce without the social and political costs of (mass) layoffs. Further, old firms are shedding older workers with obsolete communist human capital; sending workers to retirement generates lower political and social costs compared to sending workers to unemployment insurance rolls. Hence, we also correct for early retirements, which are most likely the result of job destruction. We add all those retiring up to five years prior to the official retirement age to our JD measure. The effect of this correction on the JD measure is negligible, however.

Finally, we calculate gross job reallocation (the sum of JC and JD) and worker reallocation (the sum of H and S) within employment sectors and a cross-sector excess worker reallocation measure, which compares the total number of workers moving between the old and new sector to that needed to accommodate the given net reallocation of jobs from old to new firms.

We work with a (random) sample of workers, rather than their population, and study relatively infrequent transitions. This has consequences for how small data cells (sector x time period) we can work with to secure reliable estimates of the worker or job flows. In our empirical analysis we therefore compare results based on the sector-month data cells to those based on sector-quarter information. Using a longer time period undoubtedly increases the precision of our flow estimates, but leaves us with much fewer degrees of freedom.

The use of worker-level data to examine a firm-level phenomenon results in a measure of gross job flows that is not directly comparable to that of the firm-level studies.[13] Yet, our worker-level data also offer important advantages. In particular, unlike data sets used in the empirical literature on job creation and destruction in transition, our data are based on well-defined random sampling[14], covers all economic activities and all firm sizes in the economy and provides a

[13] Note, however, that our measure will produce the same net job creation as that based on firm data.
[14] In fact, random sampling is crucial for the validity of all of our job and worker reallocation estimates.

continuous coverage of the transition.[15] Many studies on transition countries use small unrepresentative samples of firms or they focus on one industry only. Furthermore, these data often suffer from "survival bias" as the firm samples are typically collected only during mid-transition and therefore include only surviving firms. Survival bias may not only affect state-owned enterprises, but can come from the closure of newly established private businesses during (chaotic) early transition. This "survival bias" can lead to underestimation of the job destruction rates and is not present in our data.

Perhaps most important is the fact that the firm-level approach is not available for medium and large firms during the early years of transition when Czech unemployment diverged from the rest of the CEE countries and little firm-level information exists for small firms in all years. Thus relying on firm data alone would ignore potentially important evidence that one can find using our approach. Our data also allow us to simultaneously consider worker and job flows and our measure of job reallocation captures within firm restructuring, which is not discernible with firm level data. Firm level data contain only the changes in total firm (plant) employment. If firms in a given sector maintain constant employment, but lay off and hire an equal number of workers (into different positions), such restructuring would be ignored in a firm-level data set, but is captured in our data.

5. Evidence on Optimal Speed of Transition

In this section, we first provide background on the Czech Republic's economic transition, with special focus on issues related to our OST inquiry. In the following subsection, we asses to what extent are the main objects of interest of the OST literature, namely job destruction in the old state sector and job creation in the new sector, the driving forces of job and worker reallocation during the economic transition. In the third subsection, we explore the relationships between these job flows suggested by the OST theories.

5.1. Background on Czech Transition

The Czech Republic has awed observers of transition economies since within three years of the "velvet revolution," the government liberalized nearly all prices, privatized much of the economy, decentralized wage setting, and opened the country to world trade while maintaining a relatively

[15] The issue of observing firms of even very small size turns out to be particularly important for the Czech transition. See Jurajda and Terrell (2001) for details.

balanced budget, low inflation, and low unemployment (below 4 percent until 1995).[16] The year of the "big bang", 1991, was characterized by high inflation (56.6% as measured by the CPI) and a drop in real GDP (-14.7%), but already in 1992 average annual rate of inflation fell (to 11.1%) and GDP shrank by less (-6.6%). The following years saw continued improvements in the macroeconomic environment; by 1994 the economy was growing at a rate of 2.5%, and it continued to do so until a recession hit in 1997, after the end of our sampling frame.

The start of the rapid economic reform was in January 1991, which is also the first month of our sampling frame. Note that January 1991 may be interpreted as beginning of transition (t=0) in the models of Aghion and Blanchard (1994) or Castanheira and Roland (2000). At t=0, the (instantaneous) initial shock from closing the most inefficient old firms and opening the first de novo private firms has been realized and from this moment on, the economy should follow the path prescribed by the OST models, conditional on this initial shock. More broadly, the "big bang" year of 1991 may be thought as crucial for determining the initial level of unemployment, which in turn drives the transition path of the economy (and the speed of transition).

Further, the assumption of Aghion and Blanchard (1994) that new sector employment growth (as opposed to employment level) is a function of profit per worker is confirmed for the Czech Republic by Lizal and Svejnar (2000) who find that retained profit is a major determinant of new investment. Another potentially important economic fact is the imposition of wage growth control, in effect from 1991 until the summer of 1995 (see Flek, 1996). It was directed at most medium and large firms (including to a large extent the privatized companies), but little empirical evidence exists on how effective it was.

Unlike the other Vysegrad countries (Poland and Hungary), the Czech Republic started its transition from a position of virtually complete state ownership of the economy. Privatization was initiated in 1990 with the auction of smaller enterprises (less than 100 employees) and beginning in 1992, large enterprises were privatized through voucher (coupon) privatization.[17] The received wisdom from literature that has examined the efficiency gains from different privatization schemes is that the Czech voucher privatization scheme shows particularly disappointing results in terms of restructuring and efficiency gains (see Roland, 2000, pp. 250-64). Clearly, privatization was only one method of creating private sector output. Throughout

[16] See Svejnar (1995, 1999) and Dyba and Svejnar (1995) for details on the Czech transition and the relevant research.

[17] Small-scale privatization ended in 1992. Large-scale privatization distributed company shares to the public in theory, but in practice to investment funds. This program came in two waves. Shares were distributed to new owners in summer of 1993 (first wave) and spring of 1995 (second wave). See Kotrba and Svejnar (1994) for more detail.

this period new private firms were also being created and perhaps producing more efficiently than the privatized enterprises. Hence, in our analysis we differentiate between three main employment sectors: the *old sector* (state owned enterprises, cooperatives, and privatized firms);[18] the *new sector* (*de novo* private firms and the self-employed); and the *public sector* (public administration, health and education).

In terms of industrial sector restructuring of output and employment, we know from official statistics of medium and large-scale enterprises that the number employed in agriculture and in manufacturing fell dramatically (48.2% and 20.0%, respectively) between the end of 1989 and the end of 1993. However, these statistics may be compromised by the inability of the Czech Statistical Office to capture growth of small enterprises. According to the Czech Labor Force Survey, based on well-defined random sampling of households and available since 1993, extensive restructuring of employment continued between 1993 and 1998. In particular, the agricultural sector lost an additional 29 percent of its workforce and manufacturing shed about 10 percent. [19] On the other hand employment grew rapidly in construction, wholesale and retail trade, hotels and restaurants, and financial services (Sorm and Terrell, 2000).

Information on flows between labor market states of employment, unemployment and out-of-the labor force indicates that in the early years of transition, flows into unemployment in the Czech Republic were similar to these flows in other transition economies, but that flows out of unemployment were much higher (Munich, Svejnar and Terrell, 1995; Sorm and Terrell, 2000). Hence although the incidence of unemployment was high, the duration of unemployment was low, such that the rate of unemployment at any point in time was low.

However, little is known about the reallocation of workers from the old to the new sector as they change industrial sector or as they flow into and out of unemployment. The finding above of a high outflow from unemployment may be arising from churning among old sector (state and privatized) jobs as a result of soft-budget constraints in the old sector.[20] Aghion and Blanchard (1994) conjecture that the low Czech unemployment rate is a result of large outflows from the labor force and unrecorded private activities.

Below, we provide evidence suggesting that the high outflows from unemployment continued from early transition through 1996 in the Czech Republic. We also find in our data that

[18] We have also chosen to amalgamate the privatized firms with the SOEs because we do not observe any significant differences in their rates of job destruction.

[19] By comparison, the net declines in the stock of jobs in these sectors over a similar period, 1994-97, were much smaller in Bulgaria, Estonia, Poland and Romania (Faggio and Konings, 1999).

[20] For example, OECD (1998) suggests that there has apparently been substantial labor turnover in Russia in the 1990s. However, it is not clear to what extent this turnover has been efficient in reallocating labor to its best use.

inflows into long-term non-employment have been steady throughout the transition, making labor-force outflow an unlikely culprit for the stabilization of Czech unemployment below 4 percent since in 1992. The shadow-economy hypothesis does not appear to be the driving force either according to Johnson, Kaufmann, and Shleifer's (1997) who provide estimates of the unrecorded activity based on electricity-consumption. Their estimates imply that the Czech economy consistently ranked among the Central European countries with the lowest share of the shadow economy on GDP.

5.2. Extent and Nature of Reallocation from the Old to the New Sectors

Our first major empirical endeavor is to establish the degree of reallocation from the old to the new sector during the Czech transition. We then ask how well does the OST theory explain the nature of the reallocation process. For example, the theory focuses on job destruction in the old sector (JDold) and job creation in the new sector (JCnew). How important are these flows for explaining the reallocation process? I.e., is the OST theoretical literature correct in ignoring potential job creation in the old sector (JCold) and job destruction in the new firms (JDnew)? Since our definition of the old sector is a broad one (including privatized firms), as long as privatized firms are producing new jobs, we make it more difficult for the theory to be correct. The potential for a significant level of job destruction in the new sector is perhaps a more serious challenge to OST theory since it is well know that from US data that new firms are likely to fail early on (see e.g., Davis and Haltiwanger, 1999).[21]

Figure 1 shows the number of workers in each of the three main ownership sectors – old (state, privatized, in privatization and coops), new (private firms and self-employed entrepreneurs) and public (health, education and public administration) – in the first month of each quarter of 1991 to 1996.[22] These are the first results available for the Czech Republic on the evolution of the ownership structure of all jobs from the early part of the transition. The story told by this figure is extraordinary: by 1995, within five years of the year of the "big bang," more workers were employed in the new sector than in the old, while the public administration jobs

[21] High uncertainty and chaos characterize initial phases of transition, suggesting that new-firm deaths and JD may be even higher in transition economies. On the other hand, the de novo private firms are likely to locate in the market niches left wide-open by the inappropriate allocation of resources inherited from central planning. We explore this issue in the companion paper (Jurajda and Terrell, 2001) by estimating job-death hazard functions with micro data. In our preliminary estimation, we find no significant differences between the job death hazard in new and old firms, even after conditioning on productivity-related characteristics of the worker and industry classification of the firm.

[22] Total employment in our sample as of January 1991 was 3,275, corresponding to roughly 5 millions of workers in the whole economy.

held a constant fraction on total employment.[23] This reallocation of labor from the old to the new sector is in no way a consequence of reclassification as privatized firms remain in the old sector. Moreover, this is not the result of large flows out of the labor force. We note that total employment is relatively steady and exhibits slow growth over the entire sample period, and flows to and from non-employment of three and more months appears flat over the course of transition (see Appendix Figures A.2 and A.3.)

The second remarkable finding in Figure 1 is that the transfer of jobs from the old to the new sector continued at an approximately constant pace from early 1991 until 1996. This is in accord with the OST literature, e.g. Castanheira and Roland (2000), which suggests that the optimal reallocation should proceed at a stable pace and involve no abrupt changes in employment structure.

Having established the extent of reallocation from the old to the new sector, we now turn to assessing the importance of JCnew and JDold in this reallocation process. In Figure 2 we plot over time the numbers and rates of job creation and destruction in each sector along with the number and rates of all hires and all separations in the old and the new sectors.[24] The upper two graphs present the numbers and the lower two graphs present the rates. The two graphs for the old sector indicate that the number of separations fell, but the rate was constant over time (as the old sector shrank). We also see that almost three-quarters of old-sector separations are job destructions throughout the period and that the number of JDold declines over time in tandem with separations. Finally, it is clear that job creation in the old sector is close to zero throughout the transition; the old firms are therefore hiring only to replace a fraction of separating workers. Hence, JDold is clearly the important part of the reallocation process in the old sector since JCold is nearly non-existent.

The two right graphs of Figure 2 suggest that in the new sector job creation is a very important component in the first two years of the transition and then it begins to fall off dramatically. One also sees that the number of hires rose quickly in the first two years, stabilized and then declined slightly in the last two years of our data. Not surprisingly, the rate of hires appears to decline even more over time as the size of the new sector grows.[25] The two graphs also show that in the new sector job creation and hiring also go in tandem, although the gap widens in

[23] In our companion paper, we show that the growth of the new sector is primarily due to growth of firms employing less than 25 workers. As we discuss there, even legal, visibly run small firms are very likely to escape the official employment statistics.

[24] We do not present the results for the public sector since this is not highlighted in the OST models. Moreover the public sector holds on to a relatively stable workforce and provides a stable fraction of jobs over time.

the last two years as separations increase.[26] Hence, almost all hiring in the early transition years can be attributed to job creation and over time separation and churning increase. We also observe a gradual increase in job destruction in the new sector, which by the end of our sampling frame still remains lower than job destruction in the old sector, despite the fact the new sector is then providing more employment.

Overall, this evidence suggests that indeed the OST models are correct in focusing on job creation in the new sector and job destruction in the old sector: At the beginning of transition, these two job flows appear to be driving the related worker flows: separations from the old and hiring into the new sector. However, as transition proceeds, there appears to be more churning in the new sector as separations and JD rise.

The plots in Figure 2 imply that JCnew and JDold account for the employment patterns seen in Figure 1. However, Figure 2 does not make clear to what extent we actually witness workers moving from an old sector job to a new sector job, as opposed to moving between jobs within the old (or new) sector. To assess the magnitude and direction of worker cross-sectoral reallocation we consider the cumulated number of workers moving from one job to another in our sample. These cumulative statistics, presented in Table 2, indicate that over the entire period, 43% of all workers separating from old sector jobs find employment in the new sector. In comparison, about 28% of the people who left an old sector job and 35% of those who left a public sector job are churning back to jobs in the public or old sector. And about 59% of all workers separating from new sector jobs go to another new sector job (churning). The table also lists the number of workers hired into each sector who have not experienced a preceding employment spell in our sampling frame (fresh hires are most likely to be labor market entrants). More than 50% (685) of new hires enter the new sector. In contrast, over 50% of final separations, that is separations not followed by another job in our sample, occur in the old sector. In summary, Table 2 suggests that worker reallocation occurs in all directions, but that the most important flows are old-new, new-new and that the drop in old-sector employment is to a large extent accommodated by labor-force dropouts while the new sector disproportionately hires labor market entrants.

The Boeri (1999) critique of the OST theories is that they focus too much on push effects of old-sector scrapping decisions as opposed to the pull effects of labor market and government

[25] Our results are based on all observed worker moves within a calendar year and are not based on January-to-January snapshots, unlike those of Haltiwanger and Vodopivec (1999).

[26] As becomes apparent in Figure 5, most hiring and job creation occurs on the first of January of each year. Our data do not allow us to accurately capture job creation and hiring in January 1991, which is likely the reason that job creation is relatively low in 1991, compared to 1992.

policies as the main force of labor reallocation during transition. Hence we ask if we find workers in the Czech Republic leaving the old sector voluntarily vs. being laid off vs. leaving the labor force. To shed light on this issue, we provide (loosely) related evidence in Tables 3 and 4. The first of these tables shows the fraction of sectoral job-to-job moves that occur with less than one month of an intervening non-employment spell.[27] It implies that movements from the old to the new sector were most likely to be realized as quick job-to-job transitions. Table 4 then attempts to shed light on the relative effect of the pull versus push forces in the old-new reallocation process by decomposing the movements out of the old sector into quit, layoff, out-of-labor force. An approximately equal fraction of quits and layoffs from the old sector result in a new-sector job. Only 379 workers leaving the old sector out of the total of 1859 (about 20%) report leaving the labor force and do not find a new job within our sampling frame. While other old-sector leavers also do not find employment in our data, it is less likely that they are truly our of the labor force Cumulatively, movements out of the labor force are therefore a significant, but relatively minor result of old-sector separations. While labor supply decisions appear important (in accord with Boeri's 1999 critique), the magnitude and direction of worker flows appear consistent with the OST theory, which ignores labor supply.

Finally, in Table 5 we return to the main discourse of this paper by considering the net job moves resulting from the gross worker reallocation presented in Table 2.[28] As seen by the net cross-sectoral flows in the center of Table 5, workers were moving in all directions but the net job reallocation occurred almost exclusively in the old-new direction, confirming the findings in Figure 1. Comparing the total employment in each of the three sectors at the beginning of transition to its level 6 years later (first and last columns of Table 5), we find that the privatized and state-owned enterprises shed 40% of their workforce. In stark contrast, the new sector employment grew by a factor of 4.5. The new sector gained by hiring the majority of labor market entrants and robed the other two sectors, primarily the old one, of their jobs.

Our main finding here is that the reallocation from old to new accounts for the lion's share (49%) of all reallocation. Furthermore, a comparison of Tables 2 and 5 reveals that 85% of the gross reallocation of (808) workers from old to new firms resulted in net job reallocation (i.e., job creation in the new sector), suggesting a very low fraction of excess cross-sectoral reallocation.

[27] Our data do not allow for a clear distinction between unemployment and out-of-the labor force. This is a notorious (conceptual) problem in labor economics and we attempt to make the best of it by focusing on long-term non-employment as the appropriate measure of leaving the labor force.

The previous discussion identified the old-new movement of workers as the most important driving force of transition. Note that this is in full accord with the OST theory. Next, we examine this flow in more detail: The graphs in Figure 4 explore different aspects of the movement of workers from the old to the new sector. First, the bottom left graph indicates that the numbers of workers in our data moving from old sector to new sector jobs began at high levels (about 200) and declined steeply between 1992 and 1996 to approximately 50 workers. Note that the OST models would have this number constant over time, as long as there is need for reallocation (transition). This finding may be consistent with the notion that that the transition was nearly complete by 1996 as more workers were employed in the new sector than in the old. Alternatively, it may mean that the Czech transition slowed down after the first three years. We return to this issue below.

The plots in the bottom right quadrant show that most of the worker mobility from old sector to new sector jobs was achieved by quits, although layoffs (job destruction) were important. Again, we find that labor supply decisions were indeed important causes of reallocation (according to Boeri's propositions).

The two upper graphs in Figure 4 yield information on the median wage gains for individuals who made the move from an old sector job to a new sector job (upper left quadrant)[29] and the ratio of the median wage of all workers in the new sector to the median wage of all workers in the old sector (upper right quadrant). The pattern is one of declining gains or wage differentials between the new and old sectors. This information is important in light of the theory which suggests that if old firms face soft budget constraints, the new firms will have to increase wages to pull workers out of the old firms, which will in turn slow down job creation in the new sector and with it the transition (Castanheira and Roland, 2000). It is also important for differentiating between pull and push forces in the old-new reallocation.

We have seen the job creation measure decrease over time in Figure 2 and the rate of old-new reallocation decrease over time in Figure 4. We also see this decline is occurring while the new/old wage ratio is decreasing. One interpretation may be that at the very beginning of transition the new sector had to pay much higher wages in order to induce workers to move over since there were no mass-layoffs (job destruction) at the time. However, as workers left the old

[28] Our data includes multiple job holdings. We keep only those with 4 or more hours of work a day. Multiple job holdings account for about 2 percentage points of the total employment growth over the sample period.

[29] This is expressed as the ratio of the individual's salary at the start of the new job to the salary at the end of the old job. Because of high variability in the ratio and smaller sample size, we present median ratios. Unreported results using wage regressions with a time quadratic interacted with a new-firm dummy fully confirm this finding, even after we condition on the industry classification of employment.

sector, the remaining workers became more productive and hence their wages rose over time, such that the wage differential between the two sectors fell over time.

The decrease in the new/old wage ratio could also correspond to a selection model, where the old-sector workers with the highest potential profits and earnings in the new sector move first. (Recall that our definition of the new sector contains self-employed and small firms where the profit sharing if likely to be high.) Supporting this view is the finding in Table 6 that the new/old wage ratio is larger for quitters, who also enjoy the highest likelihood of a short intervening non-employment. Indeed, both Figure 2 and Table 6 show that the old-new mobility is driven more by quits (pull) than layoffs (push) so that JDold does not tell the entire story.

Finally, the new/old wage ratio might have fallen even faster had there not been any wage growth controls imposed by the government on the old sector. Most medium and large firms in the economy during a period of sizeable inflation, 1991-1995, was affected by wage controls (see Flek, 1996). These may have made pulling labor from old to new sector easier, saving the transition in terms of the Castanheira and Roland (2000) model, which suggests that soft budget constraints in old firms will slow the rate of demolition of the old sector and hence slow down transition. Even if there were soft budget constraints, as long as the wage controls prevented the old firms from sharing the profits with workers, this would enable the transition process.

5.3. Examining the relationship between JDold and JCnew (Time Series Evidence)

In this subsection, we continue to examine how applicable the components of the OST models are to the Czech transition by examining the JDold-JCnew relationship in more detail. Here we ask to what extent are these two measures of reallocation moving together over time in the Czech data and is JCnew being driven by movements in JDold, as predicted by OST theory?

Figure 4 plots the monthly values of JDold and JCnew. Although there is a great deal of volatility, with most action occurring at the beginning of each calendar year, it would appear to the naked eye that the two series move closely together. From the graph in the top left quadrant of Figure 5, which plots the twelve-month moving average of the monthly JCnew and JDold, it appears evident that the two series have a stable long-run relationship, that is they appear co-integrated in the terminology of time series analysis.

In order to test rigorously whether these two series are in fact co-integrated, we must begin by testing whether each series is stationary. Using the Dickey-Fuller (19??) and the Phillips-Perron (19??) tests for non-stationarity, we find that after incorporating a long series of lags, JCnew and JDold are both non-stationary series of unit root, I(1). Given the finding of non-stationarity in

each series, we can then proceed to test whether the two series are co-integrated. Using the Johansen Procedure (19??), we test whether a linear combination of the two series is a stationary series, i.e.:

$$\underset{I(1)}{JC_{New,t}} - \beta \underset{I(1)}{JD_{old,t}} = \underset{I(0)}{\varepsilon_t} \qquad (4)$$

we test if the linear combination of two I(1) series is a stationary series, ε_t = I(0). We find from our data that this hypothesis is supported at the 10% significance level. Hence, we conclude that there is a long-run equilibrium relationship between the two series.

Because we are interested in learning how efficient the reallocation process is, we then test whether β=1, which would indicate that JC in the new sector is absorbing the jobs destroyed in the old sector in each period (month). We find that the H_o: β=1cannot be rejected at the 5% significance level, hence we conclude that in the long run JCnew = JDold + υ. This result can be seen easily in the plot of monthly values of JCnew against monthly values of JCold in Figure 5, where the regression line between the variables is almost a 45^o line.

Finally, we test for the direction of causality (or weak exogeneity) using the Error Correction Model (ECM). Essentially the test is one of running the following regressions and examining if α_1 is significant and α_2 is not, which would mean that JD causes JC. (If the other way around, then JC causes JD.)

$$\begin{aligned} JC_{New,t} - JC_{New,t-1} = & -\alpha_1 (JC_{New,t-1} - \beta JD_{old,t-1}) + \gamma (JC_{New,t-1} - JC_{New,t-2}) \\ & + \eta (JC_{New,t-2} - JC_{New,t-3}) \ldots \varphi (JD_{old,t-1} - JD_{old,t-2}) + \\ & \kappa (JD_{old,t-2} - JD_{old,t-3}) \ldots \end{aligned} \qquad (5)$$

$$\begin{aligned} JD_{old,t} - JD_{old,t-1} = & +\alpha_2 (JC_{New,t-1} - \beta JD_{old,t-1}) + \gamma (JC_{New,t-1} - JC_{New,t-2}) \\ & + \eta (JC_{New,t-2} - JC_{New,t-3}) \ldots \varphi (JD_{old,t-1} - JD_{old,t-2}) + \\ & \kappa (JD_{old,t-2} - JD_{old,t-3}) \ldots \end{aligned} \qquad (6)$$

We find that JDold is weakly exogenous, implying that causality flows from JDold to JCnew. Hence these findings support the OST theory that JDold is in fact driving JCnew in the transition process.

5.4. Additional Tests of the OST Literature

In future work on this paper we will test some additional features of the OST models. Here we will briefly describe some of our ideas:

- Given that we have established in Section 5.2 that JDnew is an important and growing force in transition, we want to establish that the new sector is in fact able to create enough jobs to absorb the jobs being destroyed in both the new and old sectors. We have in mind testing for co-integration in the first difference of the series presented in Figure 1, i.e.:

  $$\Delta Emp_{new,t} - \Delta Emp_{old,t} = \varepsilon_t$$

  The plot presented in the bottom right graph of Figure 5 seems to confirm our hunch that in fact net employment growth in the new sector is absorbing net employment decline in the old sector. The regression line drawn between these two variables looks almost like the inverse of the regression line in the left bottom quadrant of Figure 5 (for JCnew and JDold) however it is non-linear.
- We also want to test another feature of the Aghion and Blanchard (1994) model. The model states that the change in unemployment (or non-employment) equals the difference between job creation in the new sector and job destruction in the old sector:

  $$\Delta Non\text{–}Emp_{new,t} = JC_{new,t} - JD_{old,t.}$$

  This hypothesis is confirmed in the top right quadrant of Figure 5. Here we plot the quarterly time change in the number (thousands) of registered unemployed in Czech District Labor Offices and compares this official change in unemployment to the difference between JCnew and JDold. The two series are highly correlated: when job creation exceeds job destruction, there is a drop in unemployment. Notice that this comparison also provides external verification for our measures of JD and JC, based on a retrospective sample of workers: our measures are in close (model) relationship with figures based on the official census of registered unemployed.
- In our future work we will further test whether job creation (hiring) in the new sector depends inversely on the private wage level and whether wages depend positively on the exit rate from unemployment. Both relationships are ingredients of the Aghion and Blanchard (1994) model.
- A final test of the Aghion and Blanchard (1994) model is as follows. Let us maintain the model's story of an initial rise in unemployment in time 0 followed by convergence to a stable unemployment level where unemployment inflows equal outflows. According to our reading of the data, the Czech economy enjoyed such a stable unemployment level, corresponding to 3-4% unemployment, between 1992 and 1996. The model predicts that starting from such an unemployment level, an increase in job destruction in the old state

sector will lead to an identical increase in job creation in the private sector and to a smaller increase in unemployment or non-employment - this is due to the concavity of the JC/hiring as a function of unemployment level. We have already verified the first part of this prediction in the previous section. To implement the test of the second prediction, we consider the increase in non-employment longer than 3 months. Our preliminary results confirm a significant effect of job destruction on long-term non-employment inflow and the estimated effect is smaller than one in a statistically significant way.

- One of the conclusions of Aghion and Blanchard (1994) is that high initial unemployment hinders restructuring. We could not consider this prediction with the Czech data, but plan to explore it in our future work with Estonian data similar to ours. Based on the available Estonian estimates by Haltiwanger and Vodopivec (1999) it appears that annual hiring rates are somewhat lower in the Czech Republic where they range between 15 and 20 percent over 1992-1996 compared to the peak of 20 to 30 percent in 1992-1994 for Estonia. Compared to Estonia, the pace of Czech job destruction is also lower: while during the most dramatic period of Estonian economic transition, 1992-1994, about 10% of jobs was destroyed every year, the comparable number for the Czech Republic never reaches 5%. Finally, the evolution of worker and job reallocation is also remarkably different between the two countries. While the Czech labor market appears to be redistributing workers and jobs at a steady pace since 1991, in Estonia, we see a dramatic increase in the rate of worker and job turnover during transition.

9. Conclusions

In our inquiry into the validity of the Optimal Speed of Transition (OST) literature for the Czech transition experience, we conclude that many features of the OST model, as postulated by Aghion and Blanchard (1994) and Castanheira and Roland (2000), are supported. First, we found that the reallocation of labor from the old (state-owned, privatized and coop) sector to the new (private firms and self-employed entrepreneurs) occurred in a steady, gradual fashion, with unemployment remaining low, far below the rates of all other transition economies. Within six years after the "big bang" macroeconomic policies, the new private sector was providing more job opportunities than the old sector and the unemployment rate was below 5 percent for the entire period.

Second, we conclude that OST theory's focus on job destruction in the old sector (JDold) and job creation in the new sector (JCnew) is appropriate for the Czech case: job creation in the

old sector was nill and job destruction in the new sector was very low for the first half of our period, and only began to rise as the economy was in a more mature phase of transition.

Third, using time series analysis, we found that the JCnew and JDold time series are co-integrated and that movements in the destruction of jobs in the old sector are exogenous, implying that causality flows from JDold to JCnew, as the theory predicts.

Fourth, we examine how "efficient" the reallocation process is by analyzing the mobility of workers from old sector jobs to new sector jobs (worker flows) as well as job reallocation. We find that 43% of all workers separating from old sectors jobs find employment in the new sector, only about one-quarter return to old sector jobs and the remainder leaves the labor force. Hence there is some churning but most of the mobility is in the old to new direction. Similarly 49% of all job reallocation is from old to new. Finally, 85% of the gross reallocation of workers from old to new firms results in net job reallocation, suggesting a very low fraction of excess reallocation.

We ask to what extent do the theories focus too much on "push" factors versus "pull" factors in the labor market? We note that quits were a significant part of the story in the Czech Republic; they are more important than layoffs throughout the period. (Nevertheless, we note that an approximately equal fraction of quits and layoffs result in new sector employment, so that the outcome is similar for those who were pushed or pulled out of the old sector.) We also find that movements from the old to the new sector were most likely realized as job-to-job transitions with no or short intervening spells of unemployment, suggesting more pull than push. But there is clearly a fraction that is pushed out of the labor force: one-fifth of the old sector separations resulted in people leaving the labor force and not finding a job during the time of our sample.

Is transition over? We note that the rate of mobility from old to new jobs declined over the period and was very low at the end of the period. Given that by 1996 a larger faction of workers was employed in the new sector, does this indicate the economy is beyond the transition? The fact that we have found the old/new sector wage differential narrowing over time might signal that it is nearly over. Since the narrowing is the result of more rapidly rising old sector wages, it may mean that the workers in this sector are more productive and differences in labor productivity between the old and new sector is being eroded. On the other hand, the transition may have slowed down because of very soft budget constraints. In light of all the presented evidence, we are inclined to bet on the first story, but to provide more definitive evidence, one would have to compare productivity in the old and new sectors at the end of our sampling frame. (This is another planned research project.)

Although this paper is still not finished, our evidence to date suggests that the Czech transition remarkably resembles the OST story. In particular, their main policy implication is that

the government should focus on boosting private job creation at the beginning of transition. In the Czech Republic, private job creation has been high since the very beginning, undoubtedly contributing to the success of its transition.

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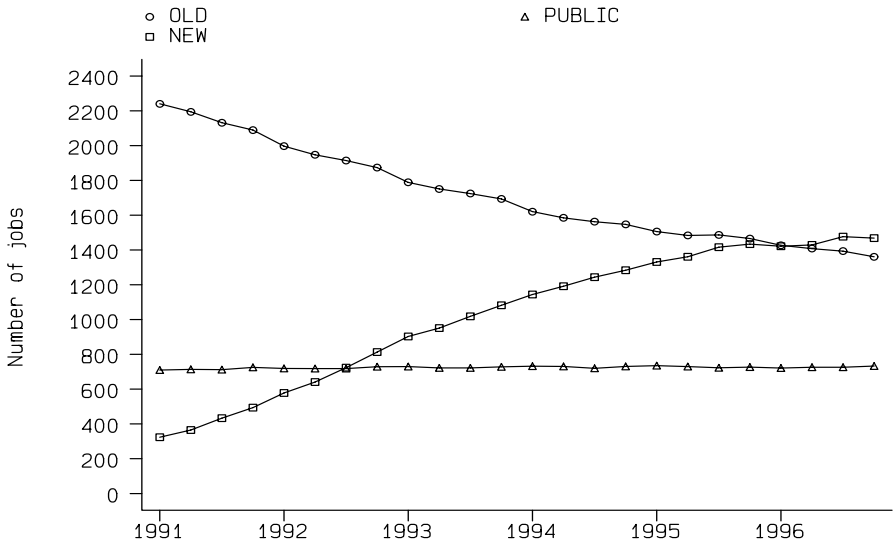


Fig. 1: Employment by Sector during Transition

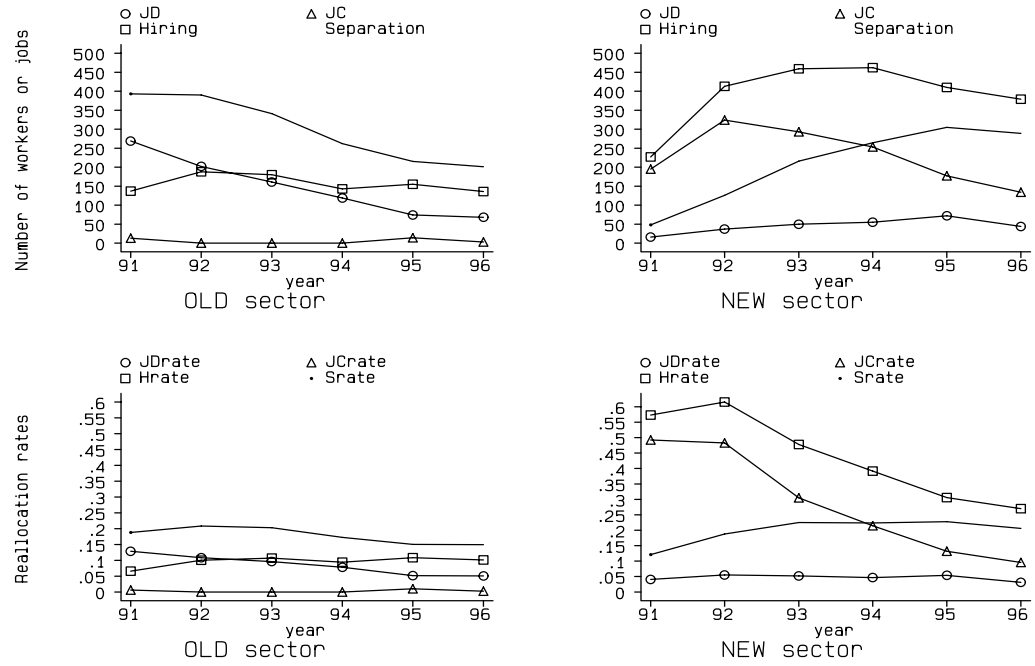


Fig. 2: Worker and Job Reallocation by Sector

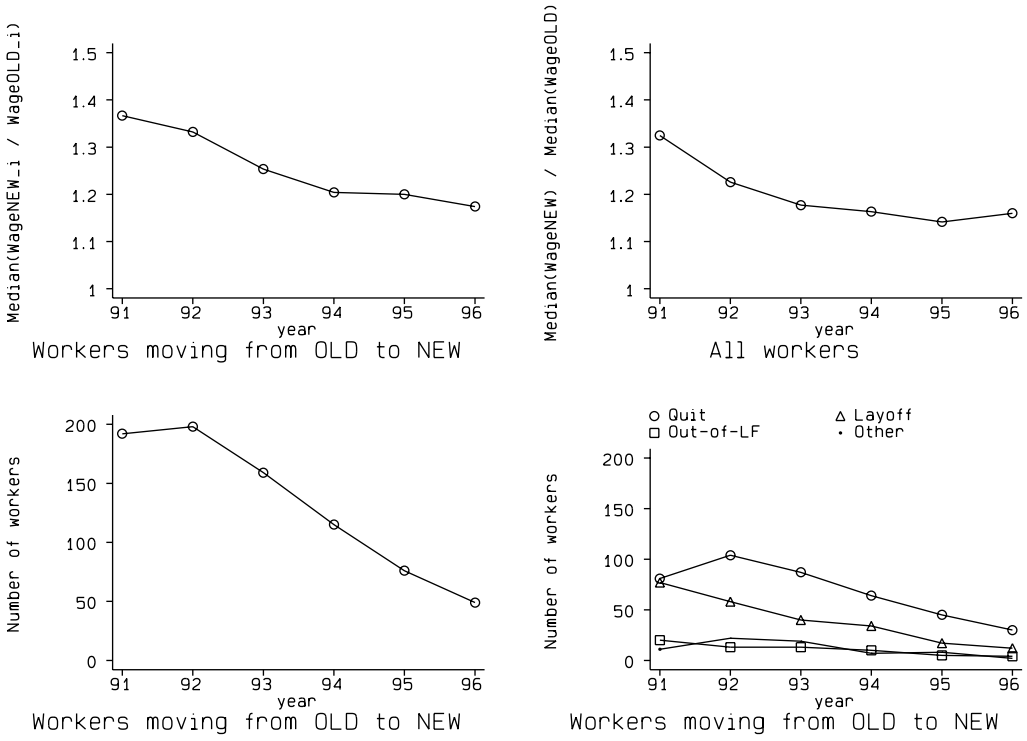


Fig. 3: Reallocation from OLD to NEW

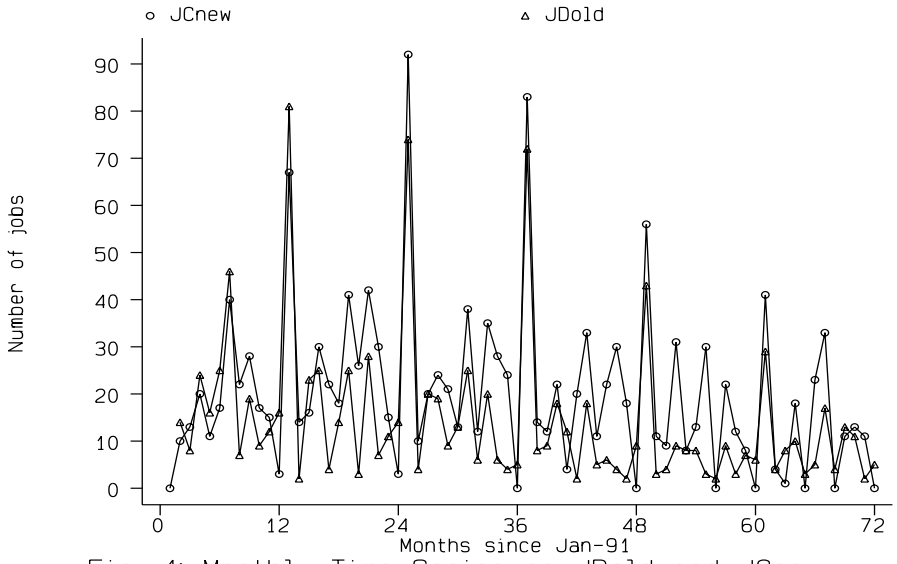


Fig. 4: Monthly Time Series on JDold and JCnew

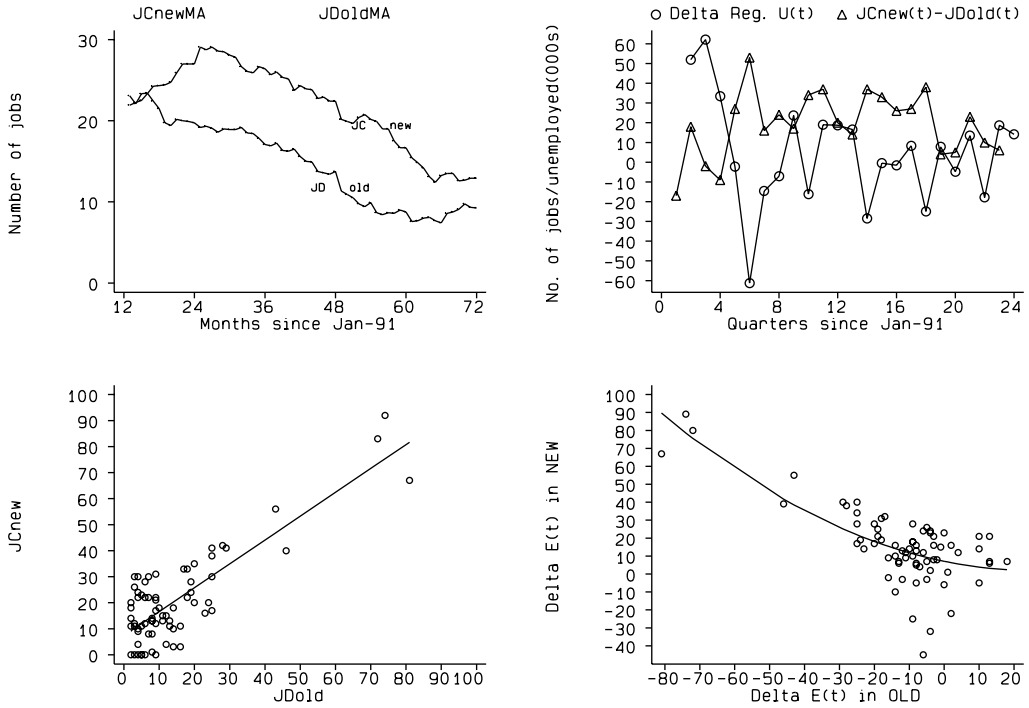


Fig. 5: Relationship between JDold and JCnew

Table 1: Distribution of exits

Sample counts	
Number of workers	4786
Number of spells (jobs)	7924
Number of spells that ended within sampling frame	4010
Number of spells ending with a layoff without replacement	836
Reported distribution of exits	
a. I stopped my business	1.8%
b. My employer stopped his business	11.8%
c. Laid off due to reduction of workforce	7.4%
d. Laid off due to other reasons	2.4%
e. I was not satisfied with my job, or I found a better job	28.9%
f. I quit myself due to personal or family reasons	13.8%
g. I quit on the health ground	5.7%
h. School attendance, study, training	5.4%
i. Army service, civil service	2.0%
j. I moved	0.7%
k. Retirement	10.3%
l. Maternity leave	6.2%
m. Other reasons	10.0%
Total	*106.5%*
A simpler distribution of exits	
Layoff	23.1%
Quit	39.7%
Out of labor force	27.7%
Other	9.6%
Total	*100.0%*
Fraction of transitions resulting in over 3 months of non-employment	
Layoff	25.4%
Quit	7.4%
Out of labor force	23.4%
Other	17.0%
Fraction of transitions resulting in over 1 month of non-employment	
Layoff	32.9%
Quit	13.5%
Out of labor force	25.2%
Other	22.2%

Table 2: Worker Reallocation

		To				
		OLD	PUBLIC	NEW	Final Separations*	Total separations
From	OLD	403 {0.22} (0.42)	108 {0.06} (0.19)	808 {0.43} (0.34)	540 {0.29}	1859 {1.00}
	PUBLIC	35 {0.06} (0.04)	159 {0.29} (0.28)	164 {0.30} (0.07)	189 {0.35}	547 {1.00}
	NEW	125 {0.10} (0.13)	63 {0.05} (0.11)	749 {0.59} (0.31)	325 {0.26}	1262 {1.00}
	Fresh hires**	401 (0.42)	238 (0.42)	685 (0.28)		
	Total hires	964 (1.00)	568 (1.00)	2406 (1.00)		

Notes: {.} denote row fraction of total separations while (.) denote column fraction of total hires.

* Workers who left their job in the row sector and did not get a new one in the sample frame.

** Workers hired into the column sector without a preceding job in the sample frame.

Table 3: Fraction of Moves with Less than 1 Month of Intervening Nonemployment

		To		
		OLD	PUBLIC	NEW
From	OLD	63%	69%	78%
	PUBLIC	71%	58%	74%
	NEW	65%	60%	71%

Table 4: Worker Reallocation from OLD

From OLD	To OLD	To PUBLIC	To NEW	Final Separations	Total
Quits	173	55	432	66	726
	{0.24}	{0.08}	{0.60}	{0.09}	{1.00}
Layoffs	108	33	243	65	449
	{0.24}	{0.07}	{0.54}	{0.14}	{1.00}
Out-of-LF	75	11	65	379	530
	{0.14}	{0.02}	{0.12}	{0.72}	{1.00}
Other	47	9	68	30	154
	{0.31}	{0.06}	{0.44}	{0.19}	{1.00}

Table 5: Job Reallocation

	Employment in Jan-91	Net sectoral worker moves: OLD	PUBLIC	NEW	Net fresh hires*	Employment in Dec-96
OLD	2241		-73	-683	-139	1346
	{1.00}		{0.03}	{0.30}	{0.06}	{0.60}
PUBLIC	710	73		-101	49	731
	{1.00}	{0.10}		{0.14}	{0.07}	{1.03}
NEW	324	683	101		360	1468
	{1.00}	{2.11}	{0.31}		{1.11}	{4.53}
Total	3275					3545
	{1.00}					{1.08}

Notes: * Workers hired without a preceding job in the sample frame minus workers leaving job without a subsequent one in the sample frame.

{.} denotes row fraction of Jan-91 employment.

85% of the moves from the old to the new sector were net moves.

49% of total job reallocation of occurred as OLD to NEW moves.

1.5% of the 8% increase in total jobs occurred in multiple job holdings.

Table 6: Moves from OLD to NEW

Type of exit	Count	Fraction of all moves	Wage(NEW)/ Wage(OLD)	Intervening non-employment below 1 month
Quit	418	(0.52)	1.57	87.1%
Layoff	246	(0.31)	1.34	65.4%
Out-of-LF	68	(0.08)	1.24	39.7%
Other	70	(0.09)	1.62	82.9%
Total/Average	802	(1.00)	1.44	68.8%

Appendix

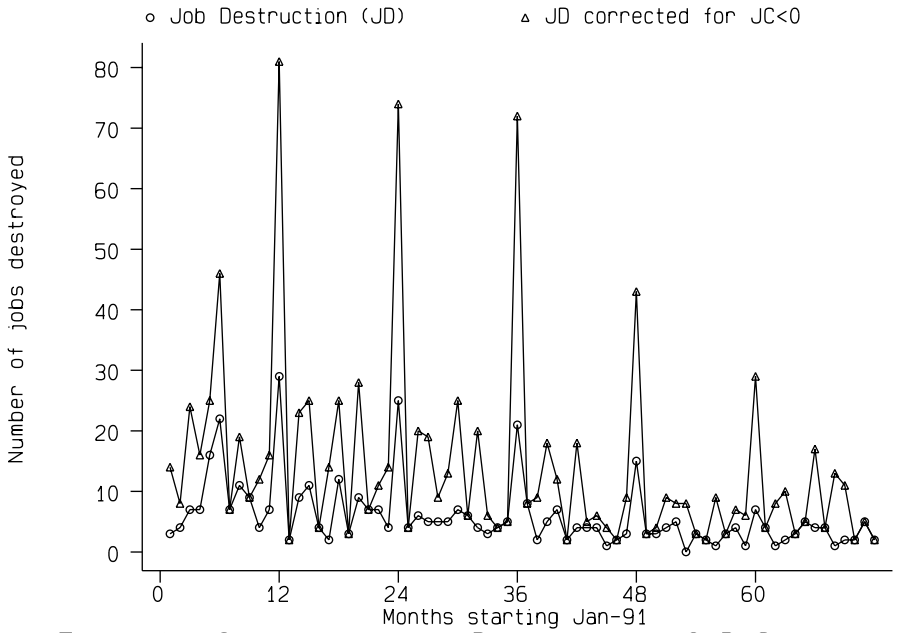


Fig. A.1: Correcting the JD Measure in OLD Sector

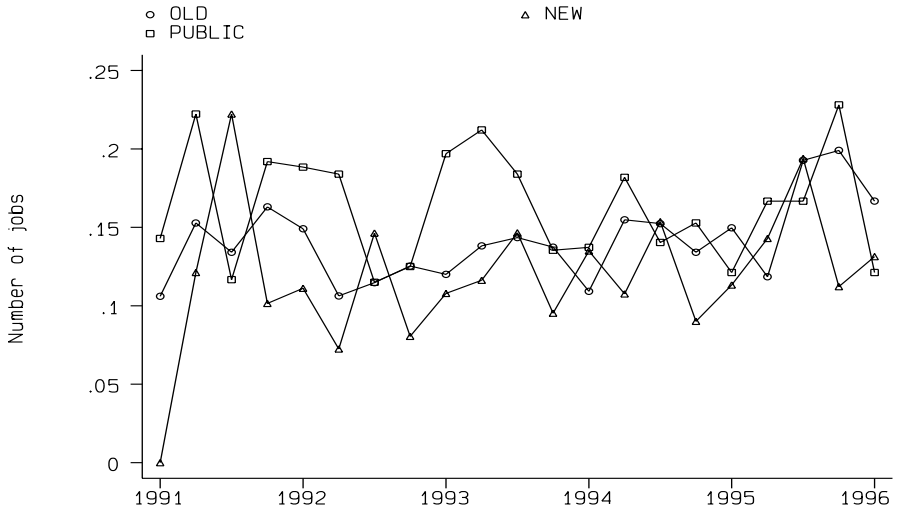


Fig. A.2: Fraction of S(t) resulting in >3 months of non-empl.

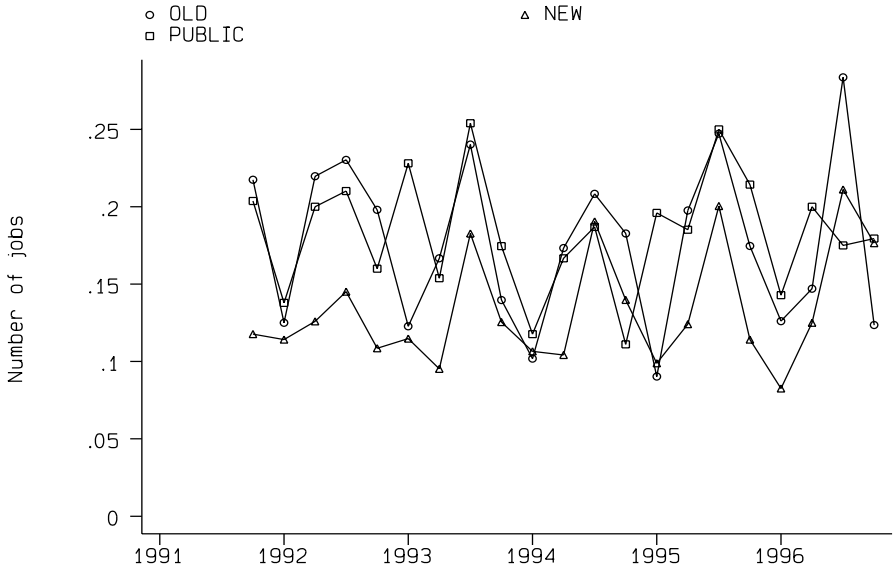
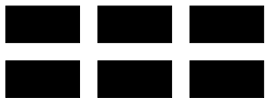


Fig. A.3: Fraction of H(t) from over >3 months of non-empl.



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