Job Reallocation in Two Cases of Massive Adjustment

Štěpán Jurajda
CERGE-EI*
CEPR, IZA, WDI

Katherine Terrell
University of Michigan**
IZA, WDI

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Abstract

This paper uses worker-level data to characterize economy-wide job creation and destruction during periods of massive structural adjustment. We contrast the gradualist Czech and the rapid Estonian approach to the destruction of the communist economy and asses their experience in light of selected theories of reallocation with frictions. We find that gradual job destruction combined with job creation support allows extensive reallocation to concur with low unemployment. Drastic job destruction, on the other hand, need not slow down job creation as long as unemployment benefits are kept very low.

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* A joint workplace of the Center for Economic Research and Graduate Education, Charles University, Prague, and the Economics Institute of the Academy of Sciences of the Czech Republic. Address: CERGE-EI, POB 882, Politických vězňů 7, Prague 1, 111 21, Czech Republic; Tel.:+420-2-24005-139; E-mail: stepan.jurajda@cerge-ei.cz
** Ford School of Public Policy, University of Michigan, Ann Arbor, MI 48109. Tel: (734) 615-4558; E-mail: terrell@umich.edu

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1. Introduction

Less-developed countries frequently experience massive shocks that require major adjustments in their economies and also appear to establish turning points, differentiating between multiple growth equilibria (Pritchett, 2000). What is significant about these restructuring episodes is extensive labor movement (across industries as well as within), as firms are restructuring or closing in low-productivity sectors and firms are growing or being created in high-productivity sectors. Among the causes of such adjustment episodes are brisk trade liberalizations, external shocks (e.g., oil), financial crises and the collapse of soviet regimes.[1]

Unfortunately, reallocation frictions can thwart or even disable the transition process so that the times of adjustment are often times of employment crises. When it is clear which sectors need to be scrapped and which ones need to be built-up, governments can take an active role in affecting the speed of both processes. Governments can also attempt to limit the extent of frictions. In this paper, we contrast two cases of massive reallocation, where governments clearly followed different policies, in terms of both affecting frictions and directly setting the speed of the reallocation process. We compare the experiences of Estonia and the Czech Republic after the collapse of communism and asses their performance in light of macroeconomic reallocation theories.

There are two classes of two-sector models that deal with the policy issue of adjustment in the productive structure. Importantly, they differ in their policy prescription. First, a strand of models that is referred to as the Optimal Speed of Transition (OST) theory studies the reallocation of labor from the inefficient old (state-owned) sector to the efficient new (private) sector (e.g., Aghion and Blanchard, 1994; Castanheira and Roland, 2000).[2] The shared essence of the various OST models is the macroeconomic mechanism that makes the pace of job creation in the efficient sector depend on the speed of job

[1] To give examples consider (i) the abandoning of import substitution policies and the adoption of trade liberalization and other market oriented policies (including considerable privatization) in South Asia in the 1970s and in Latin America in the 1980s, (ii) the oil shocks to the Middle East, (iii) financial crises in Latin America in the 1980s that led to structural adjustment, including downsizing of the state sector, and (iv) the collapse of the soviet rule in Europe and Central Asia in the early 1990s. The adjustment periods in the post-soviet countries, coined as "transition," are different in that they are characterized by the simultaneous adjustments in both economic and political institutions.

destruction in the inefficient sector. The prediction is that both too much and too little destruction slows down creation; hence, a gradual phasing out of the inefficient sector (as opposed to a 'shock' therapy) is advocated as optimal for maximizing the speed of job creation, overall reallocation and the net present value of output.

Caballero and Hammour (1996) – henceforth CH – devise the second type of two-sector model of the reallocation process. They follow the "creative destruction" literature and explore the effects of incomplete contracting in labor and capital markets on the labor reallocation process. In their model, contracting frictions (such as the hold-up problem) impose a cost on job creation and account for the adjustment crises of less-developed countries. The upshot of their analysis is that to attain efficient reallocation governments should not only actively slow down the destruction process when it is extreme (similar to the OST prescription) but also boost job creation. Hence, the distinction between the two theoretical literatures is important for evaluating *gradualism,* traditionally defined as slowing down the scrapping of the inefficient old sector, as an effective way of avoiding high unemployment when there is a major shock to the economy. As Caballero and Hammour (1996) note: "*The real test is whether gradualism can close the wedge between creation and destruction to help redress the transitional employment problem."*

Unfortunately, only limited empirical evidence is available on job reallocation in developing and transition economies undergoing major structural reallocation to substantiate the extensive theoretical literature (Davis and Haltiwanger, 1999). This is in contrast to the vast research documenting job reallocation (and its cyclicality) in the U.S. where empirical stylized facts are available for motivating and evaluating business cycle theories (e.g., Davis, Haltiwanger, and Schuh, 1996). Analysis of economy-wide job flows in periods of radical adjustment is needed to refine theories of structural reallocation and develop the appropriate policy responses. Here, the experience of transition economies provides a fruitful opportunity because it represents an unusually extensive experiment of restructuring. First, there are countries experiencing a similar reallocation process under different policies. Second, drastic job reallocation is not constrained to a particular industry, e.g. steel, or region, but is truly economy-wide, offering a striking case for the

[2] Other examples include Burda (1993), Katz and Owen (1993), Chadha and Coricelli (1997), Atkeson and Kehoe (1996), Rugerone (1996), Brixiova (1997), and Boeri (1999). For a survey, see Roland (2000).

evaluation of macro models of aggregate reallocation mechanisms. Third, comprehensive micro data on job and/or worker flows are available in some of these countries.

In this paper we analyze the *dynamics of economy-wide job reallocation* that followed the collapse of communism in Estonia and in the Czech Republic at the end of 1989. We study the first five years of the transition experience (up to 1996) when massive adjustment was required and when the old- vs. new-sector distinction is clearly defined. These two economies provide a useful comparative case to study. They are both small open economies that applied rapid reforms during early years of the transition in the policy areas of price, wage, and foreign-trade liberalization. However, they operated under markedly different job destruction policies. While the Czech approach to the destruction of the communist economy was gradual, Estonia's early transition was characterized by a rapid scrapping of old state firms. Correspondingly, the Czech unemployment rate remained close to three percent during the first seven years of pro-market reforms while the Estonian unemployment rate reached double digits by 1996.[3] The provision of unemployment insurance and the use of job creation support were also markedly different in these countries. The early-reform policy choices of these two countries thus correspond to some of the policy trade-offs described in the theoretical literature. Furthermore, the two unemployment trajectories differed markedly during late transition as well. While Estonian unemployment remained largely stable, Czech unemployment rose to almost nine percent by 1999, which has been interpreted as being due to delayed transition reallocation.

We compare the dynamics of job reallocation in these two countries through the lenses of the OST and CH theories. Although our analysis hardly constitutes a rigorous test, it can shed useful light on the impact of policy choices on the reallocation process and the level of unemployment. Specifically, in Estonia, we ask whether its high unemployment resulted from the process predicted by the OST models: Was job creation slowed down by the dramatic spike in job destruction? The Czech experience, on the other hand, speaks to the feasibility of engineering an optimal gradual adjustment. We therefore ask whether the Czech slow pace of job destruction and low level of unemployment

[3] The Czech unemployment puzzle has been examined from a number of angles (see, e.g., Boeri and Burda, 1996; Ham, Svejnar and Terrell, 1998). 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

corresponded to a lower level of job reallocation compared to the Estonian high-unemployment transition scenario. We also use both theories to consider the importance of the strong job-creation support provided by the Czech government and the low level of unemployment insurance offered by the Estonian authorities.

This exercise also helps in assessing the relevance of the two types of macroeconomic reallocation models for the post-soviet transition experience. Studying only two countries, which is dictated by data scarcity, clearly prevents us from testing the theories in a cross-country regression framework; instead, we ask whether the observed patterns of job reallocation are consistent with the theories, given what we know about the policy parameters.[4] At the end of the paper, we complement the analysis of the Czech and Estonian reallocation paths and policy choices with a brief overview of the experience of other transition countries, using existing measures of job reallocation and evidence on some of the key policy variables.

The plan of this article is as follows: We begin, in Section 2, by briefly describing the two classes of job reallocation theories. Section 3 outlines the reform policies of the Czech Republic and Estonia, with focus on the key variables of the theoretical models. Our data are described in Section 4, followed by the estimation strategy. In Section 5 we present and discuss our findings. Section 6 provides perspective on our findings by discussing the existing empirical job reallocation literature from other transition economies. Section 7 concludes with policy implications and suggestions for future research.

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of the Central and East European transition economies during 1991 and 1992. This is likely due to the severe paucity of comprehensive micro-level data covering the first years of transition.

[4] The dynamic nature of the reallocation models does not easily translate to regression-based tests. Recently, Godoy and Stiglitz (2006) return to the big-bang versus gradualism debate and use updated cross-country data to suggest that high initial speed of privatization in post-soviet economies was not conductive to their long-run economic growth. However, the economic mechanism behind this finding remains unclear. In contrast, our case-study approach can be framed in terms of Topel's (1999) suggestion that a fruitful way to learn about macroeconomic theory is to conduct "detailed empirical studies of the operation of labor markets and the impact of policies and institutions within individual countries."

2. Theoretical Background

2.1 Creative Destruction with Frictions

CH (Caballero and Hammour, 1996) model the implications of contracting difficulties in the formation of production units on the efficiency of reallocation during massive adjustment episodes. They note that when investment specificity gives rise to quasi rents, these can be appropriated by one of the contracting parties (i.e., business partners, employees or governments). For example, in the absence of complete enforceable contracts entrepreneurs may invest less than they would otherwise because some of their sunken investment could be appropriated by the contracting parties. This effective cost to job creation affects both the level and timing of reallocation.

Fig. 1 about here

CH study a two-sector reallocation model where – in the absence of "appropriability" problems – the onset of reallocation is characterized by a tightly synchronized increase in job destruction (JD) and job creation (JC). As the reallocation from the unproductive to the productive sector is nearing completion, JC and JD fall, again synchronously. Such a reallocation pattern, presented in the upper left graph of Figure 1, avoids the waste of resources and political economy problems through excessive unemployment. In contrast, contracting inefficiencies can "decouple" JD and JC and result in an inefficient reallocation, where more unemployment is created with less reallocation.[5] In particular, if JC is thwarted by the cost brought about by transactional difficulties, then the onset of reforms can be characterized by low JC. If the government decides to slow down JD to tame unemployment, this will not increase JC, as shown in the upper right graph of Figure 1. In fact, subsidizing existing employment in the declining sector can increase the opportunity cost of labor and therefore further slow down JC. This core feature of their model leads them to reject gradualism as a sufficient optimal policy, where gradualism is traditionally defined as government support for the collapsing economic sector in order to slow down its demise. Instead, they advocate a policy consisting of a combination of JC incentives in the expanding sector and a gradual phasing out of the inefficient production units.

[5] The integral between JD and JC in Figure 1 where JD > JC (JD < JC) represents the amount of accumulated ("decumulated") unemployment.

2.2 Optimal Speed of Transition

The OST models emulate the post-soviet economies and study the reallocation from the old, less efficient state sector to the new, more efficient private sector.[6] The shared essence of the various OST models is that the pace of JD in the old sector affects the speed of JC in the new sector. Although the CH and OST models both support the traditional notion of gradualism, their policy implications differ: OST prescribes that managing JD is a sufficient condition for optimal reallocation whereas CH also advocates incentivizing JC.

The backbone of the OST literature is the model by Aghion and Blanchard (1994), where the objective is to maximize the net present value of output. Aghion and Blanchard assume an efficiency wage setting mechanism where high levels of unemployment lower wages. Market forces determine increases in employment in the new private sector; hence, if the cost of labor is high because of high wages and/or taxes, fewer workers are demanded. On the other hand, the government engineers the downsizing of the state sector through the reduction of subsidies (push) and the creation of generous unemployment benefits (pull). The government must select the rate at which it will reduce the old sector 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 new efficient sector. On the other hand, if it downsizes the old sector too rapidly, it will create high unemployment, which will reduce net wage increases. As the model suggests, an excessive rate of closures tends to reduce the tax base, out of which unemployment benefits are financed. The government will then have to raise taxes in order to finance unemployment benefits, hence wage costs increase, dampening the demand for labor in the private sector.[7]

Fig. 2 about here

The model postulates an inverted "U" relationship between the speed of job creation in the new sector and the level of unemployment. The dynamics of the economy depend on the initial unemployment level (which determines the level of wages and hence private job creation) and on the speed of labor shedding from the old sector. See Figure 2

[6] Both the OST and CH models study a movement from a two-sector economy to a one-sector economy, similar to traditional economic development models concerned with transition from a modern and traditional sector to a single modern sector (Lewis, 1955) or more recent trade liberalization models that consider import-competing and export-oriented sectors (see Edwards and van Wijnbergen, 1986, for a review).

[7] Similarly, if workers leave the labor force instead of becoming unemployed, pensions and other social benefits are also government financed.

for an illustration: Suppose that the economy starts from a low level of unemployment U_0, which determines the initial level of job creation in the new productive sector to be $JCnew_0$. Suppose further that the government initially sets job destruction in the old inefficient sector to be $JDold_0$. The gap between $JDold_0$ and $JDnew_0$ (denoted as *x* in the graph) leads to an equal increase in unemployment (from U_0 to U_1) which again leads to a rise of JCnew for the next period. As long as the government continues to set JDold above JCnew, unemployment will rise and feed back into the system and slowing down the speed of job creation in the new sector. The economy converges to a stable level of unemployment, which remains in place until the inefficient sector disappears. Clearly, a job destruction rate of JDold* will maximize the speed of reallocation.

Three of the graphs in Figure 1 plot the evolution of JCnew and JDold predicted from Figure 2 under three scenarios, which all share the assumption of a low initial level of unemployment. The upper left graph follows job reallocation where the government increases JDold up to JDold*. Here, gradualism synchronizes creation and destruction and the JD-JC pattern is the same as for the CH model, when there are no contracting frictions. The bottom left panel illustrates the too-slow-JDold scenario, where JCnew catches up with JDold, but reallocation proceeds at a sub-optimally slow pace. Finally, the bottom right panel plots the evolution of our hypothetical economy where the government raises JDold above the maximum JCnew* level. This leads to a decline in JCnew and an increase in unemployment (the area between JDold and JCnew). In plotting this scenario, we further assume that the government responds to such a rise in unemployment by quickly slowing down JDold. Again, reallocation takes too long and unemployment is too high.

The OST literature is extensive (see Boeri, 1999 and Roland, 2000 for reviews). For example, Castanheira and Roland (2000) use a different mechanism to establish a JD→JC feedback link: investment and the growth of the new sector are restrained by a depression of savings when unemployment is high. In their model, an overly slow speed of closure need not lead to negative JC effects as long as wages in the old sector are kept low. Old-sector firms will then see their workers leaving for the new sector (quitting) even if the rate of scrapping of the old sector (layoffs) is too low. [8]

[8] Allowing for quits is important in light of the Boeri (1999) critique of the OST models, which typically treat labor supply as fixed. Boeri discusses voluntary labor reallocation as well as the discouraged worker

3. Reform Experiences and Theoretical Predictions

Estonia and the Czech Republic are two small open economies that were widely recognized as being among the most market-oriented economies in their regions. The timing of reforms of these two countries were similar in many respects:[9] (i) the price liberalization and wage decentralization process was brisk and started during 1991-1992, (ii) initial inflation was soon dampened, thanks to tight fiscal policy, (iii) the small-enterprise privatization was completed by 1993, when large-firm privatization was started. Despite the similarity in policies, the macroeconomic outcomes differed substantially. Estonia experienced a deeper and longer recession than the Czech Republic, as documented in Table 1. Estonia also faced higher levels of inflation, especially in early 1992, before the introduction of the new Estonian currency (Crown/Kroon). Unemployment – a key variable for our analysis – also followed a very different path in the two economies. During the period under study, the Czech unemployment rate peaked at 4.1 in 1991 and then stabilized at around 3 percent until 1996; the unemployment rate in Estonia continued to rise the entire period, reaching almost 10 percent in 1996.

Tab. 1 about here

3.1 OST Variables

What was the evolution of the parameters of the reallocation theories described above? The OST theory emphasized that government policies will engineer job destruction in old inefficient firms through "push" and "pull" policies. On the "push" side, there was a crucial difference in the implementation of the privatization policies: Estonian privatization included the elimination of subsidies and removal of exit barriers for state enterprises as early as in 1993 (Cornelius, 1995). In contrast, bankruptcy laws were effectively not in place until 1996 in the Czech Republic (Lízal, 2001). Furthermore, Czech banks remained under control of the government and many of the old Czech firms continued to receive subsidies hidden as commercial loans. According to the EBRD, the Czech government subsidized enterprises much more heavily, allocating around 7.4 percent of GDP during

effect from generous unemployment insurance — a popular "pull" factor in the OST literature. In a related line of research Brixiova (1997) shows that the optimal rate of destruction of the old sector can be slower when allowing for on-the-job search, unlike Aghion and Blanchard (1994).

[9] For more details on the Czech transition, see Dyba and Svejnar (1995) or Kotrba and Svejnar (1994); for the Estonian experience see Eamets (2001) or Haltiwanger and Vodopivec (2002). While the timing and sequence of reforms was similar, in Estonia they began in 1992, one year later than in the Czech Republic.

1993-1996, compared to 1.5 percent in Estonia over this period (see Table 1).[10] Certainly, the Czech government was slowing down job destruction in the inherited old sector.

On the "pull" side of the OST policies, the two countries also differed substantially as the Czechs had a more generous non-employment benefit scheme than the Estonians. In 1991, the Czechs were entitled to twelve months of unemployment benefits. As the transition proceeded they tightened the unemployment benefit system, reducing the entitlement period to six months while keeping the replacement rate between 50-60percent of the previous wage. The Estonian unemployed started with a six-month entitlement period and the effective replacement rate was only 7-10 percent.[11] At the end of entitlement for unemployment benefit, all poor Czech households were able to receive welfare indefinitely whereas only Estonian families with three or more children could receive welfare assistance and only for up to three months.

The OST model also stresses that job creation is directly affected by changes in the wage level. The real wage declined more in Estonia than in the Czech Republic during the years of price liberalization and hyperinflation, but followed a similar pattern once the new Estonian currency was introduced in 1992 (see Table 1).[12] Finally, taxation and savings were suggested as possible channels of the OST feedback mechanism from JD to JC. Given the high initial inflation, there was a steep decline in Estonian savings in the early years of transition, while Czech savings as a share of GDP remained stable throughout transition. Comparing the tax environment, Estonia appears somewhat friendlier. As shown in Table 1, tax revenues as a share of GDP were higher in the Czech Republic than in Estonia in early transition.[13]

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[10] Much of this subsidy support was hidden. The largest four semi-state banks had long-standing creditor relationships with the large privatized enterprises and also made equity investment in these firms through their voucher-privatization investment funds (Cull *et al.*, 2001). Lízal and Svejnar (2002) offer firm-level evidence implying that large old Czech firms operated under soft budget constraints.

[11] The level of unemployment benefits was set to 60% of the minimum wage level in 1992 and it was kept at the same nominal level until 1996 despite inflation. In 1995, it amounted to below 10% of the average wage. See Haltiwanger and Vodopivec (2002) for further details.

[12] Since we cannot take into account the degree of suppressed inflation prior to 1990, it is difficult to compare the decline in real wages prior to 1992.

[13] The corporate income tax (CIT) and the tax burden on labor were both lower in Estonia, where the CIT was lowered from a flat rate of 35% in 1992 to a flat rate of 26% in 1995; the Czech CIT was also gradually lowered from 45% in 1993 to 39% in 1996. The total tax burden on labor constituted 80% (62%) of labor costs in the Czech Republic (Estonia) at the end of the 1990s (Riboud *et al.*, 2001).

3.2 CH Variables

What do we know about these two countries' contracting difficulties and the JC policies the CH theory emphasizes? First, with respect to protection of property rights, the Czech environment was apparently very problematic. The Czech Republic's early transition is infamous for its weak legal structure, impotent judicial system, asset stripping ("tunneling" or "looting," see, e.g., Cull *et al.*, 2002), weak collateral rules, financial markets that lack transparency, and poor investment protection.[14] Hence, it would appear that at least in the Czech Republic, contracting frictions were important. Less is known about the Estonian legal environment, which may have been more transparent in early transition. For example, a number of laws governing the business environment were enacted very early in Estonia's transition (Bankruptcy Law, 1992; Law on Competition, 1993).

Fortunately, there is comparable evidence from firm responses in the Business Environment and Enterprise Performance Survey (BEEPS), first undertaken in 1999 by European Bank for Reconstruction and Development (EBRD) and the World Bank Group in 26 former communist countries. Firms were asked to what degree they agreed with the following statement: "I am confident that the legal system will uphold my contract and property rights in business disputes;" their responses were coded: 1=Fully Agree … 6=Strongly Disagree. The mean answers for Estonia and the Czech Republic were 2.7 and 3.7, respectively, pointing to a lower confidence in contract enforcement in the Czech Republic.

Second, in light of the CH theory, it is also important to know whether the destruction of the communist economy was complemented with vigorous assistance for job creation. This is especially important for the Czech Republic, given the prevalent contracting difficulties there. Official statistics indicate that there was more much credit available (at lower lending rates) to support firm restructuring and growth in the Czech Republic than in Estonia.[15] As discussed above, a substantial part of credit in the Czech

[14] As late as 1996 creditors in the Czech Republic had to obtain the permission of the debtor in order to seize the collateral for loans in default. A prime example of Czech contracting problems is the case of a highly profitable commercial TV channel (TV Nova), which was built with funds and know-how provided by a U.S. investor, but later appropriated by a local partner. In 2003, the Czech Republic lost an international arbitrage case for poor investment protection and had to pay over USD 350 million to the U.S. investor.

[15] Our calculations from official statistics indicate that new credit was about 10-12 percent of GDP in the Czech Republic (in 1993-94) whereas it was only 2 percent in Estonia (1994-95). These calculations are

Republic took the form of soft loans for privatized companies. However, much of the new credit also served as JC support as state-owned banks were instructed to provide plentiful credit to both old and starting firms. Survey evidence from Central European countries suggests that credit for newly established firms was particularly abundant in the Czech Republic (Bratkowski *et al.*, 2000; World Bank, 1992). We also know that the relative share of GDP allocated to active labor market policies, another source of financing for startup firms, was far lower in Estonia than in the Czech Republic (0.19 percent vs. 0.08 percent during the 1990s, see Riboud *et al.,* 2001).

In sum, it appears that contracting frictions were a major feature of early transition in the Czech Republic and, to a lesser extent, in Estonia. We also find job creation in the Czech Republic received substantial support during early reforms, certainly much higher than that provided by the Estonian government.

4. Data and Measurement Issues

Our measurements of job reallocation are based on worker-level data sets whereas most of the research on job destruction and job creation is based on firm-level data. We have several reasons for using worker-level data. First, official firm-level census data are sketchy in the early part of transition and do not cover well the newly established private sector we are interested in. After the collapse of central planning firms no longer felt they had to report to the central statistical agencies. Moreover, the statistical offices were not interested in firms with fewer than 20 workers and they were not able to locate most of the newly established firms with more than 20 employees. Second, the existing firm-level surveys were only collected in the mid 1990s and therefore suffer from "survival bias"—they miss any firms, old or newly started, that exited in the first few years of transition. Third, these firm-level data sets typically cover only the manufacturing sector. This is a key issue from the perspective of applying macroeconomic theories of reallocation: the existing literature on transition does not provide a time-consistent coverage of the whole economy (with the exception of Haltiwanger and Vodopivec, 2002).

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corroborated by credit-stock statistics shown in Table 1. Equally importantly, lending rates were substantially lower in the Czech Republic compared to Estonia as attested by Table 1.

We therefore turned to data on workers, but unfortunately, the collection of household labor force surveys started only in the mid-1990s, leaving the first crucial years of transition uncovered. Fortunately, we have located two data sets, one collected in Estonia and the other in the Czech Republic, that have a very similar design and provide *retrospective* information on a representative sample of individuals' jobs since the beginning of the transition that allow one to measure job destruction and creation. We describe these data in Section 4.1, discuss our definition of old and new sector in Section 4.2 and show how one can use individual-level data to construct measures of job creation and job destruction in Section 4.3.

4.1 Data

Our analysis uses data from two similar retrospective surveys covering the early period of the transition. The Czech survey, described in detail in Munich *et al.* (1997), was administered in December 1996 to 3,157 randomly selected Czech households using the sample frame of the official Labor Force Survey. Individuals who were employed for at least two weeks during the 1991-1996 period were asked questions about their employment histories; yielding usable data on 4,786 working individuals who experience 7,926 main jobs. The Estonian survey, described in Eamets (2001), was administered in the first quarter of 1995 to one percent of the adult population randomly selected from the 1989 Population Census. In Estonia, we have usable data on 7,928 individuals with at least one spell of employment; in total they experience 14,465 main jobs. The average number of jobs per person is low at 1.82 in Estonia and 1.65 in the Czech Republic.

The two questionnaires elicited information on employment and wages up to six years before the time of the interview. The Czech survey traces the characteristics of the respondents' jobs and non-employment spells between January 1991 and December 1996 whereas the Estonian survey asks about employment histories from 1989 to the first quarter of 1995. For each spell of employment there is information on the industry of employment and a number of employer attributes. We observe the reason for separation for those that exited their jobs. Whereas in both countries there is information on the

respondents' wage at the beginning and end of each job, in Estonia respondents were also asked to report their earnings in October of each year.[16]

Using data that relies on recollection of labor activities up to six years before the time of the interview raises questions of "recall bias." However, Noorkoiv *et al.* (1997) suggest that rare changes in labor market status (at 1.7 to 1.8 jobs per person during six years) are likely to have been particularly memorable in an economy transiting from a system with many years of steady employment.

4.2 Sector Definition

An important question arises regarding the classification of firms into the old and new sectors. First, we set aside jobs in the public service sector (education, health, and public administration). Second, given the focus of the reallocation theories on the (investment in) newly created firms and jobs, our approach to capturing reallocation in early transition is to define reallocation as the transfer of jobs from the inherited (old, post-soviet) firms to the newly-established (start-up, *de novo*) private firms. Privatized firms are thus kept in the old sector with the state-owned enterprises. This is in accord with both the evidence on the lack of restructuring of Czech privatized enterprises, and empirical studies on firm productivity (e.g., World Bank, 2002).

An important advantage of the Czech data therefore lies in their unique ability among worker-level data sets to distinguish privatized firms from *de novo* private enterprises.[17] However, in the Estonian questionnaire firm ownership is categorized as state, private, or cooperative/collective. Employment spells starting in state-owned firms belong to the old sector. We learn when privatization occurs in such spells and keep privatized spells in the old sector. Similarly, spells starting in a private firm before privatization began in Estonia belong to the new sector. However, for employment spells starting in private firms after 1992, the data do not distinguish jobs in *de novo* private firms

[16] To form monthly labor market histories, we interpolate wages from the available information for both countries. However, wage information in Estonia from the hyperinflation years of 1990-1991 is not usable.

[17] Respondents are asked about the ownership type of their employer at the end of their employment spell. The choices for private employer are, "newly established private firm," "firm after privatization," "firm in privatization." It is unclear how the respondents consider spin-offs from privatized or state-owned firms. However, the number of workers employed in spun-off enterprises is unlikely to be large. Lízal, *et al.* (2001) analyze the process of breakup of old firms in Czech manufacturing and suggest that employment in spin-offs amounts to approximately five percent of all employment.

from those starting in privatized enterprises. We categorize such spells as being in the new or old sector depending on the size of the firm in which hiring occurs. This choice is guided by evidence available in our Czech data, where 90 percent of all new-firm employment is in firms of less than 100 employees (see Jurajda and Terrell, 2003). Therefore, we categorize Estonian employment spells starting in small firms as being in the new sector and assign those employment spells starting in large firms to the old sector. This is the best approximation available to us. Nevertheless, there are two, potentially offsetting sources of measurement error: (i) some of the large private firms that hire workers in Estonia may be newly created private firms, and (ii) some of the hiring in small private firms occurs in privatized firms.

Using this approximation in Estonia and a direct indicator in the Czech Republic, we therefore distinguish between three main sectors: the *old sector* (state-owned enterprises, cooperatives, and privatized firms), the *new sector* (*de novo* private firms and the self-employed), and the *public sector* (public administration, health and education). Note that the observed growth of the new sector is not due to reclassification of ongoing jobs. Our firm categorization reflects both the reallocation theory and the facts on productivity differences from the transition economies. It also maximizes comparability across the two data sets and allows us to focus on the under-researched employment growth in startup enterprises.

The ability to differentiate between privatized (i.e., inherited) and *de novo* private jobs is indeed a unique feature of early-transition data. The existing worker level data sets from late transition, including the subsequent waves of the Estonian survey used in this paper, no longer provide this distinction and separate only private and state-owned firms.

4.3 Measurement of Job and Worker Reallocation Rates

Job reallocation is typically measured with firm-level data using the following definition (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." However, job destruction and job creation can also be measured from worker flow data using information on type of employment separation as pointed out by Blanchard and

Diamond (1990) and recently implemented by Haltiwanger and Vodopivec (2002). 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 the Czech (Estonian) questionnaire, we have 13 (21) answers for how someone separated from their job (see the Appendix Tables A.1 and A.2). We define job destruction (JD) as any separations where: 1) the firm was closed down and 2) the separation was part of a mass-layoff.[18] The JD rate is the total number of job destructions at a given time *t*, divided by the number of jobs in *t-1*.[19] It is likely the case that some other separations correspond to job destruction as well; hence, our JD measure is likely to be a lower bound estimate.

To measure job creation, we follow the existing literature and use the identity that

$$\Delta E_{tk} = JC_{tk} - JD_{tk} = H_{tk} - S_{tk} = H_{tk} - (Q_{tk} + L_{tk}). \quad (1)$$

Here, ΔE_{tk} denotes the time change in employment in sector *k*, JC_{tk} and JD_{tk} are job creation and job destruction counts in sector *k* in time *t* respectively, H_{tk} and S_{tk} stand for hiring and separation, and Q_{tk} and L_{tk} are quits and layoffs. The simple identity (1), namely that net employment growth (ΔE) is the difference between job creation and job destruction implies that $JC_{tk} = \Delta E_{tk} + JD_{tk}$. Again, this may be considered a lower bound estimate for JC because JD may be underestimated. 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, whenever the initial JC_{tk} estimate based on layoffs without replacement is negative we add the negative of JC_{tk} to our JD_{tk} measure and set JC_{tk} at zero. The correction for $JC<0$ turns out to affect only JD in the old sector, which 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.

The use of worker-level data to examine a firm-level phenomenon results in a measure of gross job flows that is not identical to that of the firm-level studies. Yet, our

[18] We also included early retirements in JD, as these are likely to correspond to restructuring layoffs, but the effect on the JD measure was negligible as only 10 percent of Czech separations to retirement correspond to early retirement (i.e., about 1 percent of all separations). Early retirement is even less important in Estonia.

[19] Unlike Haltiwanger and Vodopivec (2002) who use January-to-January snapshots in their analysis of the Estonian data, we base our results on all observed worker moves within a given time period.

worker-level data also offer important advantages. Most importantly, unlike firm data sets used in the literature on job reallocation in early transition, our two samples cover all economic activities and all firm sizes in the economy and provide a continuous coverage of the adjustment period without any survival bias. Our measure of job reallocation also captures within-firm restructuring, which is not discernible with firm level data that contain only changes in total firm employment. If firms in a given sector maintain constant employment, but layoff and hire an equal number of workers (in different positions), such restructuring would be ignored in a firm-level data set, but is captured in our data.

5. Results

The reallocation theories described in Section 2 provide an anchor for our analysis in that we first empirically describe the variables of this literature: job creation, job destruction and the amount, speed and efficiency of worker reallocation (Section 5.1). We then apply the logic of these models and the evolution of policy parameters discussed in Section 3 to understand the observed reallocation patterns (Section 5.2).

5.1 Basic Findings

Employment Structure

Fig. 3 about here

Our first endeavor is to establish the extent of reallocation from the old to the new sector during the Czech and Estonian transitions. Figure 3 shows the fraction of workers in each of the two main ownership sectors – old (state, privatized, and coops) and new (private firms and self-employed entrepreneurs) in the first month of each quarter of each year. (We do not present the results for the public sector, which holds on to a stable workforce in both countries.) The left graph of Figure 3 presents the share of sectoral employment on the total employment level of 1991, while the right graph uses the concurrent total employment for normalization. The story told by this figure is most extraordinary: within five years of the "big bang" of economic reforms of 1991 more workers were employed in the Czech new sector than in Czech firms inherited from communism. Extrapolating out of our sample, a similar pattern apparently characterizes the Estonian transition as well. This massive reallocation is not a consequence of reclassification as privatized firms remain in the old sector.

Yet, there is a major difference in the evolution of total employment. While early Estonian transition is characterized by a sharp drop in employment, total Czech employment exhibits slow growth over the entire sample period.[20] Correspondingly, the left graph of Figure 3, which uses 1991 employment for normalization, shows a much sharper decline of the old sector in Estonia and a slower rise of its new sector, compared to the Czech Republic. However, conditional on the overall employment decline, the structure of the economies is remarkably similar in the right graph of Figure 3, except for the somewhat higher and stable employment share of the public sector in Estonia.

These results are important for interpreting the "Czech unemployment puzzle." The Czech unemployment rate stabilized between 3 and 4 percent during early transition in presence of significant unemployment inflows. This was the exception to the rule of quickly emerging double-digit unemployment rates in other transition economies. One interpretation of the low Czech unemployment is that it was the result of slow restructuring and worker churning within the old sector. Using the new/old distinction to measure reallocation, Figure 3 suggests that low unemployment occurred simultaneously with extensive reallocation. Even though the fundamental need for reallocation may differ across the two countries, it is remarkable that, conditional on employment evolution, the degree of reallocation is the same and that it occurs at much lower employment costs in the Czech economy.[21]

Job Reallocation in the Old and New Sectors

Fig. 4 about here

Next, it is natural to ask how job reallocation differs by sector. Is there simultaneous job creation and destruction in both the declining old sector and the growing new sector? In Figure 4 we plot the rates of job creation and destruction in each sector over

[20] Our estimate of Estonian employment in 1995 is 10% below its 1991 level. This decline does not include the outflow of native Russians during early transition (Eamets, 2001). On the other hand, we estimate the Czech employment in 1996 to be 5% higher compared to 1991, even after correcting for population growth. The latter finding may appear suspicious given the common wisdom of large employment losses during early transition. However, as we argued in Section 4.1, official statistics relying on firm reporting are likely to miss employment in small newly established firms. Indeed, the employment growth rates based on the Czech Labor Force Survey, which was first collected in 1993, are consistent with our statistics. Similarly, we can match the employment decline of early transition reported in the firm census when we ignore employment in small firms.

[21] Our evidence of healthy reallocation disproves the conjecture of Aghion and Blanchard (1994) that the low Czech unemployment rate was largely due to large outflows from the labor force. In unreported calculations

time; the upper two graphs present the share of job reallocation on total economy-wide employment and the lower two graphs present the more traditional shares on employment in the relevant sector. A striking result emerges. Using the new/old distinction allows us to effectively separate job creation from job destruction during early transition in the Czech Republic. Old firms are hiring only to replace a fraction of separating workers, as job creation in the old sector is very low. Similarly low is job destruction in the new sector. The sectoral separation of JC and JD is also effective in Estonia up to 1992, but becomes less clear during 1993-94.

Figure 4 also suggests that the two countries followed a very different transition path in terms of their levels of old sector job destruction (JDold) and new sector job creation (JCnew). At the outset of transition, Estonian JDold peaked at an annual rate of 14 percent of all jobs (or almost 25 percent of old sector jobs) in 1992, while the Czech JDold rate reached only about a half of the Estonian level. Thereafter the rates fell in both countries. The level of JCnew as a share on total employment was somewhat higher in the Czech Republic than in Estonia at the outset of transition. The Czech JCnew rate then declined while the Estonian job creation in the new sector was still close to 10 percent of the economy-wide employment in 1994.

Efficiency of Reallocation

Fig. 5 about here

It is traditional to describe reallocation rates by sector. However, reallocation occurs across sectors during adjustment periods. In Figure 5, we therefore consider the size and nature of worker flows from the old sector to the new sector. The goal of economic policy in the reallocation theories of Section 2 is to achieve an efficient reallocation. Given the difference in the JD policies across our two economies, can we detect efficiency differences other than the employment decline in Estonia discussed above?

First, to assess the magnitude and timing of the main reallocation flow, the upper left graph of Figure 5 plots the number of workers moving from the old to the new sector as a proportion of total employment using the time of departure from the old sector to define the timing of the flow. In both countries, there are two years of peak reallocation, followed by a gradual decline. Between 1991 and 1994, Estonia's drastic JD impelled

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using our data, we find that inflows into long-term non-employment were steady throughout 1991-1996,

higher old-new worker flows. However, Estonian JD was less efficient in terms of the chances of workers reaching the new sector as documented in the upper right graph of Figure 5. The fraction of old-sector separations resulting in new-sector hires within six months of the separation was much higher in the Czech Republic during the peak years of reallocation.

The lower two graphs of Figure 5 testify to the different nature of the old-new flow in the two transition regimes. They ask to what extent we find workers leaving the old sector voluntarily (quits) vs. being laid off. They indicate that in the Czech Republic, where JDold rates never reached very high levels, quits outweighed layoffs for all old-to-new sector moves throughout the transition. Hence, transition was carried out by old-sector workers quitting their traditional jobs for the new sector. In contrast, the dramatic Estonian JDold in 1992-93 is manifested by the dominant role of layoffs for Estonian old-to-new flows.[22] However, the difference in the JD policies of Estonia and the Czech Republic did not affect the wage gain for a typical worker moving from the old to the new sector. Figure 6 shows that the realized wage gain follows a very similar pattern in both economies, starting at about 40 percent during the first year of reforms and gradually declining afterwards.

Fig. 6 about here

In sum, the efficiency difference between the two transition paths appears to be concentrated in the lower employment chances of Estonian workers pushed from the their old jobs (compared to Czech workers who leave the old sector voluntarily), not in their wage gain. To the extent that the wage gain serves as a proxy for productivity gains, the two reallocation processes appear similarly productivity enhancing.

Relationship between JDold and JCnew

Fig. 7 about here

Finally, we ask about the nature of the relationship between the two main job flows, JDold and JCnew. This is motivated by the theories that focus on their evolution and potential feedback. Figure 7 presents plots of the contemporaneous values of quarterly JDold and JCnew together with fitted regression lines. The Czech series move closely together: any number of jobs destroyed in the old sector is matched in the same quarter by an equal number of jobs created in the new sector. The R^2 of the linear regression of

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making labor-force outflow an unlikely culprit for the 3-4% Czech unemployment rate at the time.

JCnew on JDold and a constant is 0.67 and the slope coefficient of 0.87 is within one standard error of unity. The picture is different in Estonia, where a quadratic term delivers a fit similar to the Czech linear regression. Estonian quarterly job destruction exceeding 3 percent of employment was not matched by similarly high job creation.

Fig. 8 about here

Given that total Czech employment remains relatively stable, it is not surprising that JDold and JCnew have a stable long-run relationship. This is confirmed in Figure 8, which plots the one-year moving average of the quarterly values of JCnew and JDold. While at the outset of Czech transition the filtered JDold matches JCnew, job creation soon starts to dominate job destruction and both measures gradually decline in parallel for most of the transition. In Estonia, on the other hand, JDold is the dominating force until late into transition. When JDold skyrockets in Estonia, JCnew keeps on growing, albeit at a somewhat declining rate.

5.2 Applying the Theory to the Data

OST Theory

Are our findings consistent with the behavior of model economies of the OST literature? First, we ask whether our results are in accord with the OST theory's basic characterization of a two-sector economy where jobs are only created in the new sector and only destroyed in the old sector. Indeed, the evidence in Figure 4 suggests that the basic premise of OST models is correct since these two job flows appear to drive all of job reallocation at the beginning of transition.[23] We also note that the evidence supports the dynamic properties of the OST predictions in that, as seen in Figure 3, the job transfer in both countries was "organic," without major breaks due to, e.g., mass privatization.

Second, can we rationalize the Estonian experience within the OST models? The theory predicts rising unemployment if the economy is climbing up the inverted "U" curve of Figure 2. That is, JCnew grows but lags behind JDold possibly because the government

[22] The graph does not show the two remaining types of job exit in the data: "out-of-labor-force" and "other".
[23] This success of the theory may be surprising since our definition of the old sector includes privatized firms, which could be producing new jobs. Further, 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 known from U.S. data that new firms are likely to fail early on (see e.g., Davis and Haltiwanger, 1999). Newly emerging small firms can apparently cope with the turmoil of initial transition, probably because they locate in profitable market niches left open by the misallocation of central planning. As one would expect, later on in transition there appears to be more churning in the new sector as separations and JD rise.

is rapidly downsizing the old sector to speed up transition by raising unemployment and lowering wages. This prescription fits early Estonian transition. However, the theory also predicts that either the system converges to the top of the inverted "U" curve, where the economy enjoys an extended time period of equal JCnew and JDold, or, if the scrapping of old firms moves too quickly, we should see a drop in JCnew (bottom right quadrant of Figure 1). In contrast, Estonian JCnew continued to grow even after a dramatic peak in JDold (Figure 8). Given the low level of unemployment benefits, the rise in Estonian JD and unemployment did not translate into tax hikes and decreases in JC as suggested by the Aghion-Blanchard model. On the other hand, if this feedback mechanism was not in place, the OST perspective is that JCnew should catch up with JDold quickly, while in fact it remained below JDold until late into transition.[24]

Third, we consider the Czech case in light of the OST theory, which predicts that gradualist JDold should result in an extended period of moderate, but constant reallocation, supported by a stable level of unemployment at which JCnew is able to match JDold. Indeed, this was the case in the Czech Republic, in sharp contrast to the continuous rise of Estonian joblessness (Figures 7 and 8). More importantly, the total reallocation achieved in the Czech Republic was comparable to that observed in Estonia (Figure 3). Hence, it is unlikely that the low Czech unemployment reflects a markedly low level of reallocation. Whether the Czech transition reached the optimal rate of reallocation (upper left quadrant of Figure 1) or remained sub-optimal (bottom left quadrant of Figure 1) is not clear.[25] However, given that the extent of misallocation (and the need for reallocation) was likely to have been higher within the Soviet Union compared to the more independent and more developed central and east European (CEE) economies, we find the similar extent of reallocation in these two economies to be suggestive of a high level of reallocation relative to needs in the Czech case. This notion is further supported by the similar wage premium from moving to the new sector. If we were to observe a very high new-sector wage premium in the Czech Republic, where there were relatively few layoffs from the old

[24] It is difficult to evaluate the role of saving suggested by Castanheira and Roland (2000) for Estonian transition given the effect of hyperinflation on savings. See Section 3.1.

[25] In a previous version of this paper, we used the time dimension of our data to provide an estimate of the relationship between the speed of job creation in the new sector and the level of unemployment or non-employment. Such estimation could suggest whether most of the Czech reallocation occurred at the top of the

sector, and a low premium in Estonia, one might interpret the Czech wage premium as a pull factor necessary to lure workers out of their old jobs, signaling that a sub-optimally low JDold is a bottleneck for Czech reallocation.

The alignment between the Czech experience and the OST theory is surprising, however, because the JD-JC mechanisms proposed in the OST theory were apparently not at work. In the Aghion and Blanchard (1994) model, wages were to be depressed and taxes increased as unemployment rose. Yet, Czech taxes were not raised following unemployment increases and wages rose. Second, in the Castanheira and Roland (2000) model, high unemployment would depress savings. Yet, the savings rate was fairly constant from 1991 to 1996 (Table 1). Finally, the OST models are also at odds with the high initial wage premium we found for those moving to the new sector. The similarity of wage patterns in both countries suggests that the premium could be the result of selection on benefits from moving, where the old-sector workers with high potential earnings in the new sector move first. This highlights the importance of labor supply decisions for transition reallocation stressed by Boeri (1999). In the Czech Republic, quits were indeed the dominant way of transfer from the old to the new sector. On the other hand, we note that this pattern is in accord with the Castanheira and Rolland (2000) model, where old firms are not forced to layoff massively, but keep wages low, i.e., close to the actual productivity level. Such firms will see their workers leaving for the new sector, where wages and productivity are higher.

In sum, we offer some support for the OST theory: The Czech transition resembles many aspects of the Castanheira and Rolland model, with the lesson that efficient reallocation may be achieved even with slow JDold, as long as wages are kept low in the old sector. On the other hand, we do not find evidence for the theory channels of the JD-JC feedback mechanism. Furthermore, at a very basic level, one may be suspicious about the JD→JC feedback prediction because the higher JDold in Estonia (roughly double that of the Czech Republic during 1992-93) coexists with a level of JCnew that is equivalent to that of the Czech Republic (top graphs of Figure 4).

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inverted "U" curve, i.e., whether it was optimal. Unfortunately, the Czech estimates were not informative. Somewhat surprisingly, we found a statistically significant quadratic function in Estonia.

CH Theory

How do the transition experiences of Estonia and the Czech Republic compare to the predictions of the CH model discussed in Section 2.1? Given the presence of contracting difficulties in the Czech Republic, its gradual JD combined with vigorous JC support (Section 3.2) should result in a synchronized JD and JC at high level of reallocation. In contrast, if contracting frictions are present in Estonia, its high JD level and lack of JC support should lead to high unemployment because JC cannot grow sufficiently.

In the case of the Czech Republic, our job reallocation measures indeed show strong synchronization of JC and JD; JC is able to match any JD level (Figure 7). Given the presence of appropriability problems, one can use the CH theory to draw the lesson that the Czech JC support, working primarily through easy access to credit for starting companies,[26] was very effective in dealing with frictions. For Estonia, the job reallocation pattern in Figure 8 reveals "decoupling" of JC and JD, but this decoupling occurs at a relatively high level of job creation. As we noted primarily from the BEEPS data, the early years of Estonian pro-market reforms were relatively free of serious contracting frictions which allowed for the vigorous creation of new jobs, in spite of the lack of JC support. It remains an open question whether, with JC support, the Estonian rate of JCnew would rise much above the rate achieved in the Czech Republic where JC support was vigorous.

6. Existing Evidence on Job Reallocation

In order to supplement our two case studies, we turn to the literature on job and worker reallocation in other transition economies and the U.S. to draw out the most important findings relevant to the OST and CH theories and contrast them with our analysis of early transition policies and outcomes in Estonia and the Czech Republic. Most of the transition job reallocation research is descriptive and does not examine its findings in the light of reallocation theories. Hence, we unfortunately find only limited evidence outside of our two-country case study on the aggregate *evolution* and relationship between job destruction and creation and must report on simpler evidence on JC and JD in Section 6.1. We also

[26] See Boeri and Burda (1996) who argue that active labor market policies, which can also be thought of as job creation support, were also an important part of the Czech success.

extend the analysis based on the CH theory, which can be performed in a cross-sectional setting: In Section 6.2, we assess the extent to which property rights (appropriability) affect job creation in these countries by assembling a simple cross-country comparison of these measures. Finally, in Section 6.3 we contrast our findings to those from the U.S.

6.1 Comparison to Other Transition Countries

The empirical literature on job creation and destruction in transition usually relies on the methodology of Davis and Haltiwanger (1992) and uses firm-level data typically covering only the manufacturing sector.[27] The findings from this literature on where jobs are created and where they are destroyed are consistent with the reallocation theories as well as with our approach and findings. First, in support of the notion that the definition of the "old sector" should comprise privatized and state-owned firms, several studies have found there is little difference between gross job flows of privatized and those of state owned companies in Russia (Acquisti and Lehmann, 2000), Ukraine (Konings *et al.*, 2003), or Bulgaria, Hungary and Romania (Bilsen and Konings, 1998). Conversely, a number of studies have identified *de novo* (newly established) private firms as the driving force of job creation and net employment growth during transition, including Bilsen and Konings (1998) for Bulgaria, Hungary, and Romania, Brown and Earle (2003) for Russia, and Haltiwanger and Vodopivec (2003) for Slovenia. Dong and Xu (2006) use industrial firm-level data from the late 1990s to suggest that job reallocation in China shared these two features with the east European transition.

Second, the literature suggests that in most central and east European (CEE) countries, job destruction was leading job creation by a large margin in early transition (Haltiwanger *et al.*, 2003), which underscores the importance of analyzing the unusual Czech case. However, there is little evidence on the relationship between JCnew and JDold available outside of our study. Recently, Dong and Xu (2006) argue that JD and JC was synchronized in China (similarly to the Czech case) thanks to the already larger size of private companies at the time of massive downsizing in the state sector. In the Czech case, small startups were able to absorb the labor gradually shed from large old companies. In the Chinese case, the private sector was allowed to grow in absence of massive layoffs,

which came only later in the transition process.

Similarly, there is little evidence available from other countries on the dynamics of reallocation from old to new sectors. There is a wealth of studies on worker reallocation across industrial sectors, suggesting that in all transition economies the size of the agricultural and manufacturing sectors declined, while employment grew rapidly in construction, trade, services, and finance.[28] This industrial reallocation corresponds to the cross-industry part of the reallocation from "old" to "new." However, Faggio and Konings (2003), Konings *et al.* (2003) and Jurajda and Terrell (2003) suggest that most (old-new) job reallocation occurs within industrial sectors and regions, rather than across them, much in accord with the evidence on excess job reallocation from developed economies (e.g., Davis and Haltiwanger, 1999). The extensive industrial reallocation evidence is therefore not closely linked to the macroeconomic reallocation flows that we study in this paper.

There is particularly little cross-country evidence on the productivity enhancing effect of transition reallocation; yet, such evidence is needed in order to provide a full assessment of the alternative reallocation policies. The only available evidence is based on the 1999 BEEPS survey, which suggests that new companies are more productive than inherited firms in countries as diverse as Hungary and Ukraine.[29] These productivity gaps are consistent with our findings on wage gaps between the new and the old sector. Unfortunately, the BEEPS survey design makes it impossible to measure the share of new enterprises in each country and to assess the effects of reallocation (World Bank, 2002). We therefore cannot form useful cross-country comparisons of gains from reallocation and to match these with the job reallocation policy choices of transition countries.

On the question of whether or not high unemployment is necessary for reallocation, Boeri (1999) suggests that job-to-job movements were the primary form of worker reallocation from the old to new sector not only in the Czech Republic, but also in Hungary

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[27] Among the exceptions are Haltiwanger and Vodopivec (2002) who use the worker-level Estonian data we use, and Haltiwanger and Vodopivec (2003) who analyze Slovenian matched employer-employee data.

[28] See Sorm and Terrell (2000) for the Czech Republic, Noorkoiv *et al.* (1997) for Estonia and Boeri and Terrell (2002) for other countries.

[29] A number of related studies estimate the productivity gap between state-owned v. private (*de novo* as well as privatized) firms in the manufacturing sector, e.g., Brown *et al.* (2006) and Sabirianova Peter *et al.* (2005), and find domestic privately owned firms to be more productive. Clearly, the productivity gains of reallocation from "old "to "new" sector occur on top of productivity-enhancing reallocation within the inherited "old" sector. For example, Brown and Earle (2006) suggest that job reallocation in "old" Ukrainian manufacturing firms in the 1990s was productivity enhancing.

and Slovakia. It is clear that the level of social assistance was much greater in these CEE countries than in the former commonwealth of independent states (CIS) countries (Boeri and Terrell, 2002). On the other hand, both Slovakia and Hungary experienced higher unemployment than the Czech Republic in early transition. Here, we stress that the new-old wage gap was comparable in the Czech and Estonian case, despite the difference in welfare provision, suggesting that generous benefit replacement ratios do not lead to costly wage hikes in the new sector as long as wages in the old sector are kept low.

6.2 Rule of Law and Reallocation Levels

In this section, we probe further into the existing literature on the relationship between job reallocation and rule of law in light of CH theory predictions. To provide more evidence on this issue, we assemble cross-country measures of job creation estimated in the literature with measures of appropriability and other contracting frictions highlighted in the CH theory. The data in appendix Table A3 indicate that the differences in the rule of law, as measured by the BEEPS, were large across transition countries. The holdup problem was perhaps most severe in the eastern CIS countries as seen with the BEEPS data and also confirmed by the EBRD Legal effectiveness index, which reached the highest level of 4 for both Estonia and the Czech Republic by 1998, while it was still at 2 in Ukraine and Russia.

Fig. 9 about here

Next, we contrast available measures of job creation for early transition with the extent of appropriability problems across countries where such measures are available.[30] The patterns of the data in the two graphs in Figure 9 clearly support the CH prediction, a question we could not effectively answer within a two-country study. The graphs indicate a negative convex relationship between job creation and appropriability using two measures – confidence in the legal system and percent of sales paid for protection of property – from the BEEPS data.[31]

[30] Ideally, we would like to contrast JCnew with the extent of both appropriability and job creation support across these countries to assess the effectiveness of JC subsidies in addressing the appropriability problem. Unfortunately, it is difficult to find measures of JC support that exclude subsidies aimed to slow down JDold. Both the EBRD subsidy index (see Table 1) and the amount of credit in the economy reflect not only support for JCnew but also for JDold. Hence, we must limit our analysis to relationship between appropriability and JCnew. Furthermore, as most of the existing literature does not effectively differentiate the *de novo* sector, we rely on measures of JC capturing the entire economy. However, given that the literature suggests that most JC occurs in the new sector, this measure is likely to reflect cross-country differences in JCnew.

[31] We would also like to know whether JDnew was also related to the rule of law, as suggested by Konings *et al.* (2003) and Acquisti and Lehmann (2000) in the context of Ukraine and Russia, respectively. They

6.3 Comparison to U.S.

Finally, we conclude the discussion of our empirical results on job flows during an unusually deep structural recession with a comparison to the stylized facts from the U.S. literature on the cyclicality of job reallocation.[32] First, the U.S. job reallocation is large-scale and incessant — on average one job in ten is being created and destroyed every year. Perhaps surprisingly, given the shock to the system, the reallocation rates in the early years of transition were smaller than those found in the U.S. economy. This could be related to the gap between the U.S. and transition economies in terms of rule-of-law/appropriability. Second, in the U.S. there is a negative correlation between JC and JD over the business cycle, at least in the manufacturing industry. In contrast, we see co-movement of JD and JC over the transitional recession of the early 1990s. It is likely that the U.S. reallocation corresponds to aggregate shocks affecting productivity in all sectors in the same direction (Mortensen and Pissarides, 1994), while the transition reallocation corresponds to a dispersed shock affecting the new and old sector differently. Third, small firms apparently create *and sustain* most jobs during transition (at least in countries with good rule of law), unlike in the U.S., where they exhibit high destruction rates (Davis, Haltiwanger and Schuh, 1996). This is likely due to these firms filling in highly profitable market niches left open by inefficient central planning.

7. Final Remarks

This study sheds light on the process of reallocating jobs and workers during economy-wide structural adjustment in two transition economies that differed markedly in their reallocation policies—Estonia and the Czech Republic. We contrast their patterns of job creation and job destruction in light of the theoretical predictions of two models of reallocation—the gradualist theories motivated by transition from central planning and the creative-destruction-with-frictions theoretical work motivated by adjustment crises of the developing world. We describe reallocation for the entire economy, including all firm sizes

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interpret the evidence of high JDnew as corresponding to the hostile business environment in these countries, i.e., high appropriability. Unfortunately, there is not enough data to evaluate this hypothesis. Specifically, measures of JDnew are available in only 4 countries: i.e., theirs for Russia and Ukraine in the late 1990s and ours for the Czech Republic and Estonia in the mid 1990s.

and economic activities, and not just for one sector as is typical in much of this literature.

We show that in early transition economies most reallocation occurs along a single dimension: from inherited post-soviet enterprises to small newly started private firms. (Yet, most of transition research focused on the issue of enterprise privatization as a way of creating the new economy.) The extent of reallocation is stunning as only a few years into the transition, in each of these countries small *de novo* firms were able to provide more jobs than large old firms, which existed prior to 1990. The overall degree of achieved reallocation was similar in the two economies, despite the smaller employment decline in the Czech Republic.

We also find that the two bodies of macroeconomic theory are useful in helping us understand the process and needed policies in transition economies. Although the gradualist theories of Aghion and Blanchard (1994) or Castanheira and Rolland (2000) do not provide a perfect description of the observed reallocation processes, many aspects of reallocation in both countries do fit the dynamic pattern of these models. The Aghion and Blanchard (1998) model offers an explanation for the coexistence of strong job creation and rapid job destruction in Estonia: taxes were not raised (and job creation was not curbed) because Estonia did not offer much unemployment insurance to its jobless workers. Applying the Castanheira and Rolland (2000) model to the Czech case, we suggest that efficient reallocation may be achieved even with slow scrapping of the old sector, as long as wages are kept low there, allowing the newly created firms to attract workers without unnecessary wage hikes. With respect to the Caballero and Hammour (1996) model, we draw the lesson that even in an environment with widespread contracting problems, one can achieve efficient synchronization of job destruction and creation when there is economic policy supporting job creation, as there was in the Czech Republic. On the other hand, when there is little support for job creation in an environment with contracting problems, the decoupling of job creation and job destruction can create serious problems of unemployment, as in the case of Estonia and other CIS countries.

Returning to the question in the introductory section posed by Caballero and Hammour (1996), our research would therefore suggest that gradualism combined with job

[32] See, e.g., Davis and Haltiwanger (1990, 1992) and Blanchard and Diamond (1990). For similar analysis from Germany see Boeri and Cramer (1992) and for Italy *et al.* (1996).

creation support may have redressed the transitional employment problem in the Czech Republic. However, the Czech soft-loan gradualism also apparently reduced the transparency of the economy, such that it may not be a long-run efficient policy. During the 1990s, Czech semi-state banks became increasingly inefficient in allocating external finance and the country experienced a mild recession in 1997 and 1998. Czech unemployment thus increased following 1997, even if it stayed somewhat below the Estonian level until the two countries joined the EU in 2004.[33]

The experience of transition economies can be useful for understanding the impact of the speed of job destruction in the old sector on the process of reallocation in other developing countries, where governments have the capacity to provide safety nets and/or subsidies to job creation. Similarly, the macroeconomic models we consider can also be applied to economies in the developing world, where a major economic sector is inefficient and bloated. In particular, Estonia serves as an example of a country that did not have the resources to support the ailing old sector or provide a safety net for workers. Our evidence suggests that rapid job destruction did not bring about a slow-down of job creation, perhaps thanks to very low unemployment insurance, even though job creation support and the availability of credit were not particularly high. Clearly, the holdup problem was not a key issue in Estonia, but may be an issue in Ukraine and Russia.

On the other hand, the Czech Republic serves as an example of a country where governments have the capacity to provide safety nets and/or subsidies to both slow down job destruction and support job creation. The Czech case suggests two policy instruments to achieve reallocation with low unemployment: abundant access to credit and keeping wages low in the declining sector. Most observers would imply that the early Czech reallocation was not sufficient and that the 1997 Czech recession corresponds to postponed reallocation. In contrast, our evidence suggests that early Czech transition was successful in terms of moving jobs to the new sector, at least as much as the Estonian transition did, and that the wage gain from reallocation was similar as well. We therefore find it more

[33] Unemployment in the Czech Republic rose sharply after 1996, up to almost 9 percent using the Eurostat methodology. In contrast, unemployment in Estonia after 1996 stabilized at nearly a 10-percent level until 2005. The Czech Republic also continued to enjoy somewhat higher employment rates than Estonia until the two countries joined the EU in 2004. Estonian GDP grew at a rate of 5% per annum in 1996-1999 and at about 9% per annum from 2000-2006 while the CZ stagnated with an average of 0% growth in 1996-1999 and only about 5% per annum in 2000-2006. However, this growth rate gap is to some extent related to the

likely that the Czech recession and unemployment increase of the late 1990s was caused by the implications of the form of subsidy support combined with other macroeconomic policies. The lesson for LDCs that wish to make a future massive reallocation less painful is that a successful gradual reallocation can be engineered, but that the form and political economy of subsidy provision is crucial.

Using very different early-transition policies, the Czech and Estonian economies ended up with similar levels of sectoral reallocation. The Czechs "paid" for their lower unemployment with subsidies (taxpayers' costs) whereas in Estonia many jobless workers faced unemployment with little welfare support. Future research is needed to investigate whether this policy tradeoff, despite leading to the same level of reallocation, led to differences in outcomes along other dimensions. First, future studies directly measuring productivity differences can ask whether the new-sector productivity gains depend on the nature of the reallocation process and government policy. For example, they might examine the extent to which government policy can influence productivity differences and raise the technological component of the lagging sector (e.g., Sanchez-Ancochea, 2005). Second, the nature of the transition path may make it more or less difficult for the new economy to move into a steady-state creative-destruction reallocation; as Caballero and Hammour (2000) note, the nature of initial restructuring may affect steady-state reallocation levels through reallocation sclerosis or labor market segmentation.

lower initial GDP level of Estonia.

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Table 1: Macroeconomic Statistics for the Czech Republic and Estonia

	1990	1991	1992	1993	1994	1995	1996
Real GDP Growth Rate[a]							
Czech Republic	-1.2	-11.6	-0.5	0.1	2.2	5.9	4.8
Estonia	-6.5	-13.6	-14.2	-8.8	-2.0	4.6	4.0
Inflation[b]							
Czech Republic	9.7	52	11.1	20.8	10	9.1	8.8
Estonia	23.1	211.0	1076.0	89.8	47.7	29	23.1
Real Wages Index[c]							
Czech Republic	123	91	100	104	112	121	132
Estonia	227	151	100	102	113	119	122
Unemployment Rate							
Czech Republic[d]	0.7	4.1	2.6	3.5	3.2	2.9	3.5
Estonia[e]	0.5	0.9	2.1	5.8	7.6	9.7	10.0
Savings as % of GDP[f]							
Czech Republic		31.7	29.0	31.6	27.9	29.9	29.3
Estonia		36.5	32.7	22.1	16.3	18.7	16.3
Lending Rate[g]							
Czech Republic				14.1	13.1	12.8	12.5
Estonia				33.7	24.7	19.0	14.9
Private Credit as % of GDP[g]							
Czech Republic				71.9	76.6	70.8	68.9
Estonia			7.5	10.6	13.3	14.1	18.1
Tax Revenue as % of GDP[h]							
Czech Republic					42.3	41.9	40.3
Estonia					35.4	36.1	38.8
Budget Subsidies to Enterprises (% of GDP)[h]							
Czech Republic				6.4	7.1	8.3	8.0
Estonia				1.5	1.4	1.9	0.9

Sources:

(a) EBRD Transition Report Update, April 2001 p. 15.

(b) EBRD Transition Report, 2000 p. 67.

(c) Unicef, (1999) CEE/CIS/Baltics Regional Monitoring Report, 1999. Unicef, Florence. p. 141.

(d) Czech Republic: EBRD Transition Report 2000 and Business Central Europe Database.

(e) Estonian Labor Force Survey 1995 (incl. retrospective) and 1997 (Vodopivec, 2000).

(f) World Development Indicators.

(g) International Financial Statistics, IMF, Washington

(h) EBRD Transition Report, November 2001, p. 63, 136, 140.

Figure 1: Stylized Job Reallocation in OST and CH Theory

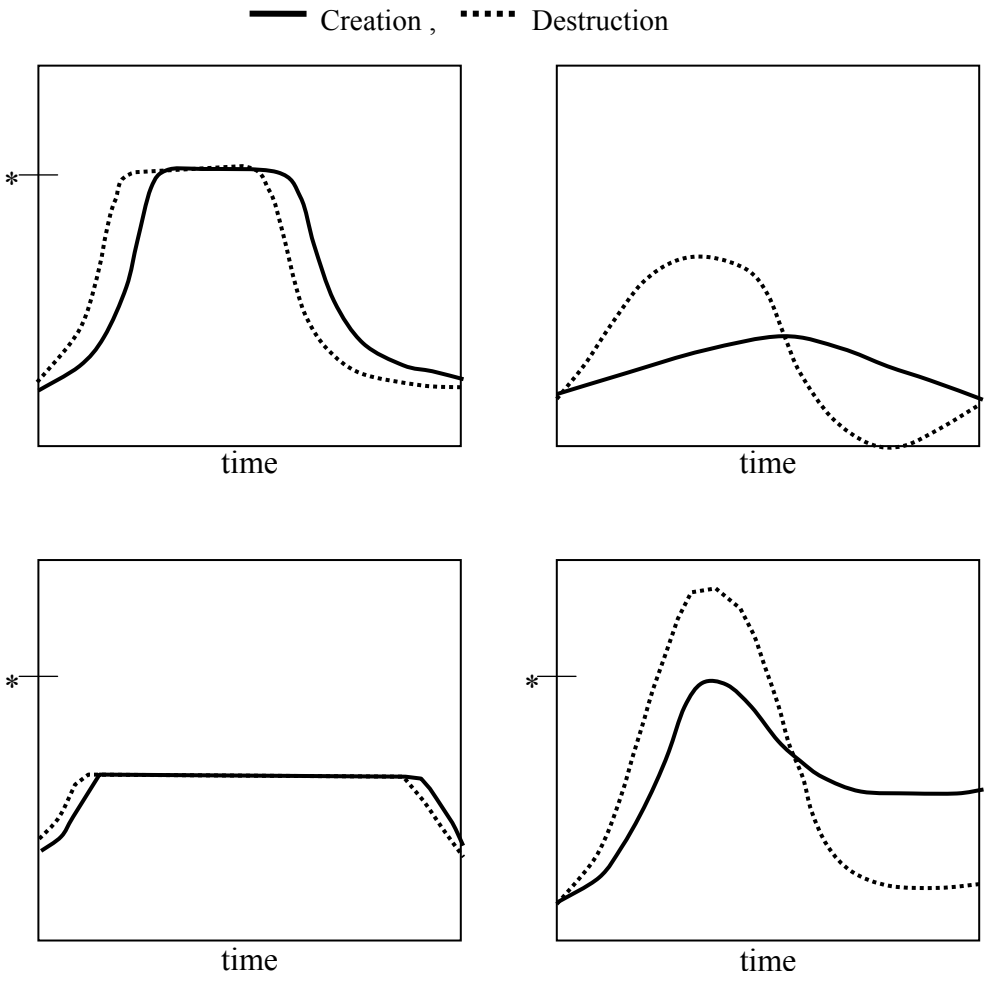


Figure 2: Unemployment and Job Reallocation in OST Theory

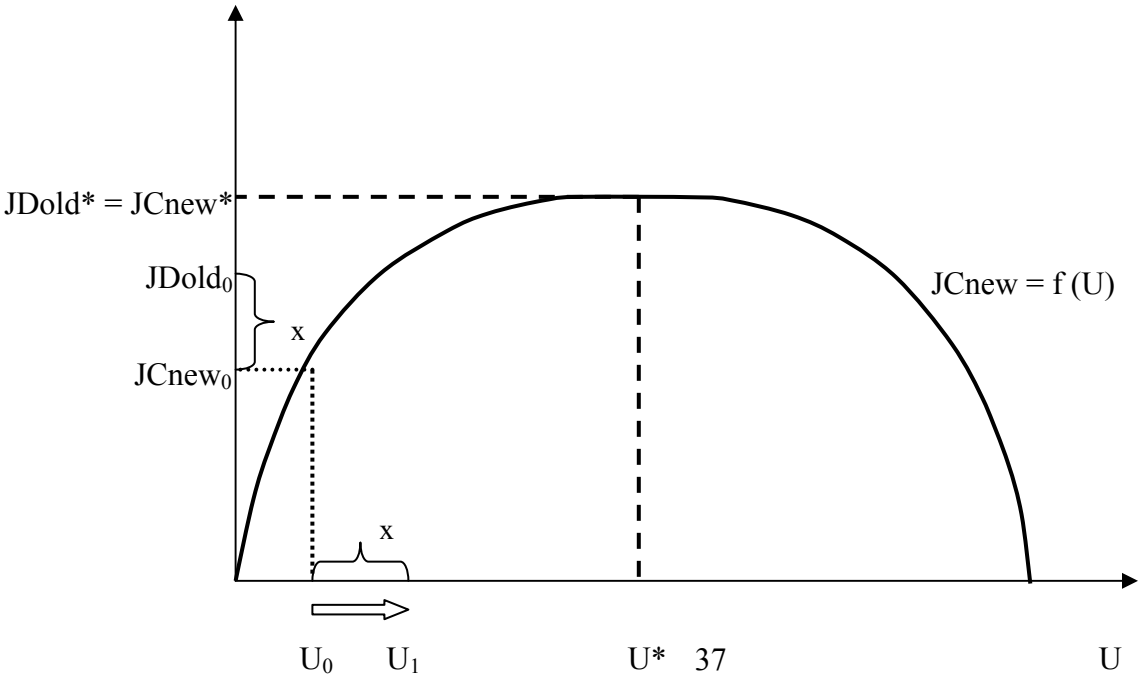
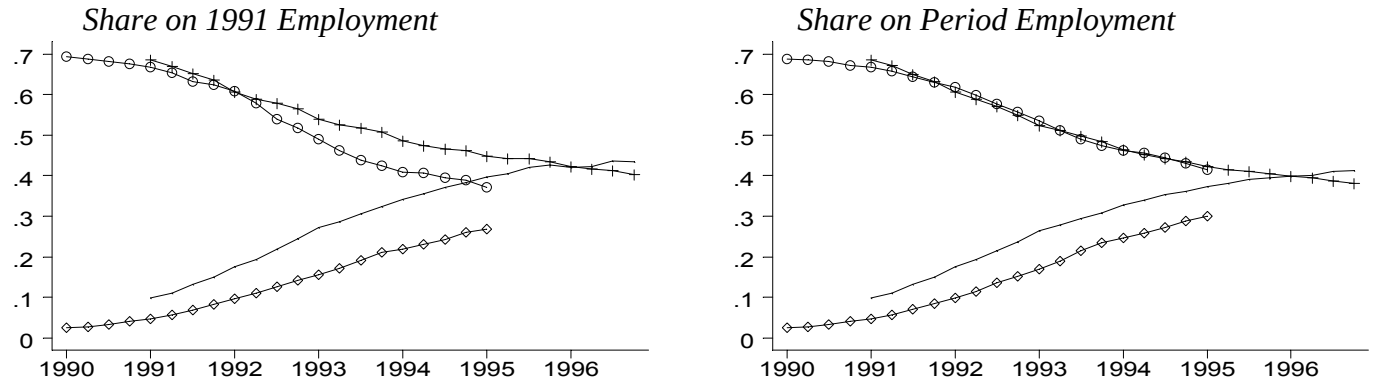


Figure 3: Employment Evolution by Old/New Sector

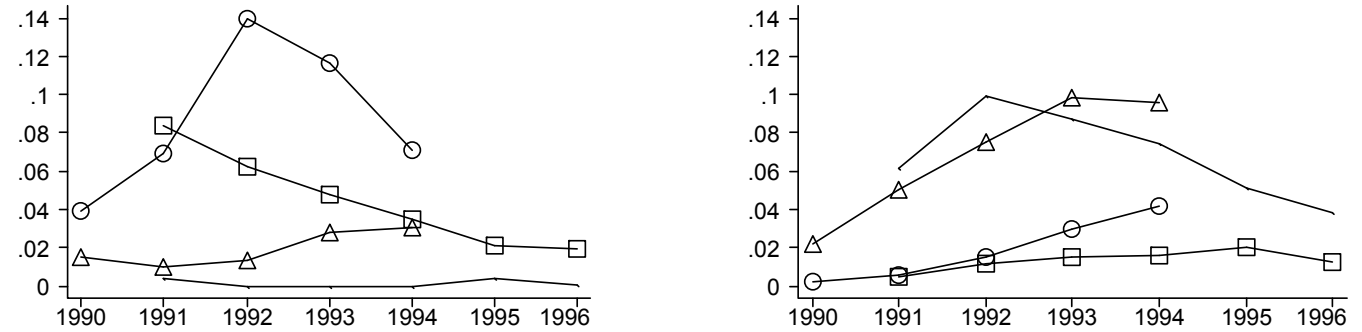


○ Estonian OLD Sector + Czech OLD Sector ◊ Estonian NEW Sector — Czech NEW Sector

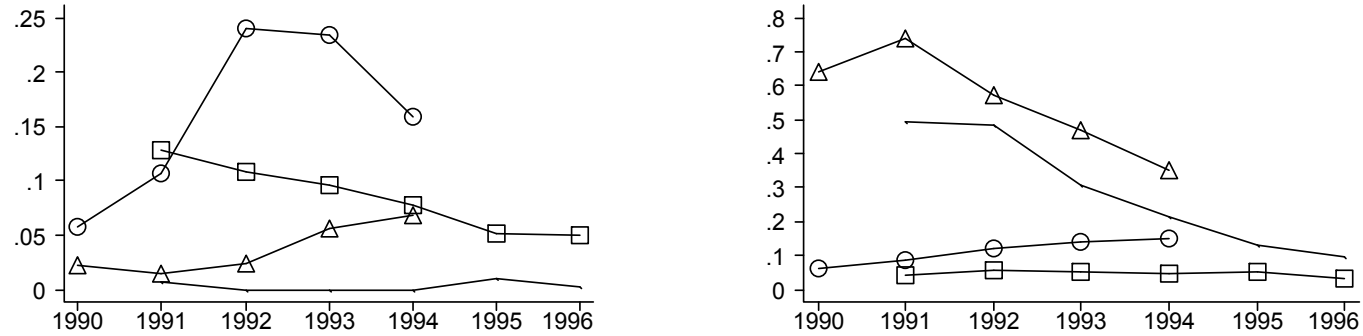
Figure 4: Job Creation and Destruction by Old/New Sector

OLD Sector NEW Sector

Rate Relative to Total Employment



Rate Relative to Sector Employment



○ Estonian JD □ Czech JD Δ Estonian JC — Czech JC

Figure 5: Workers Moving from Old to New Sector

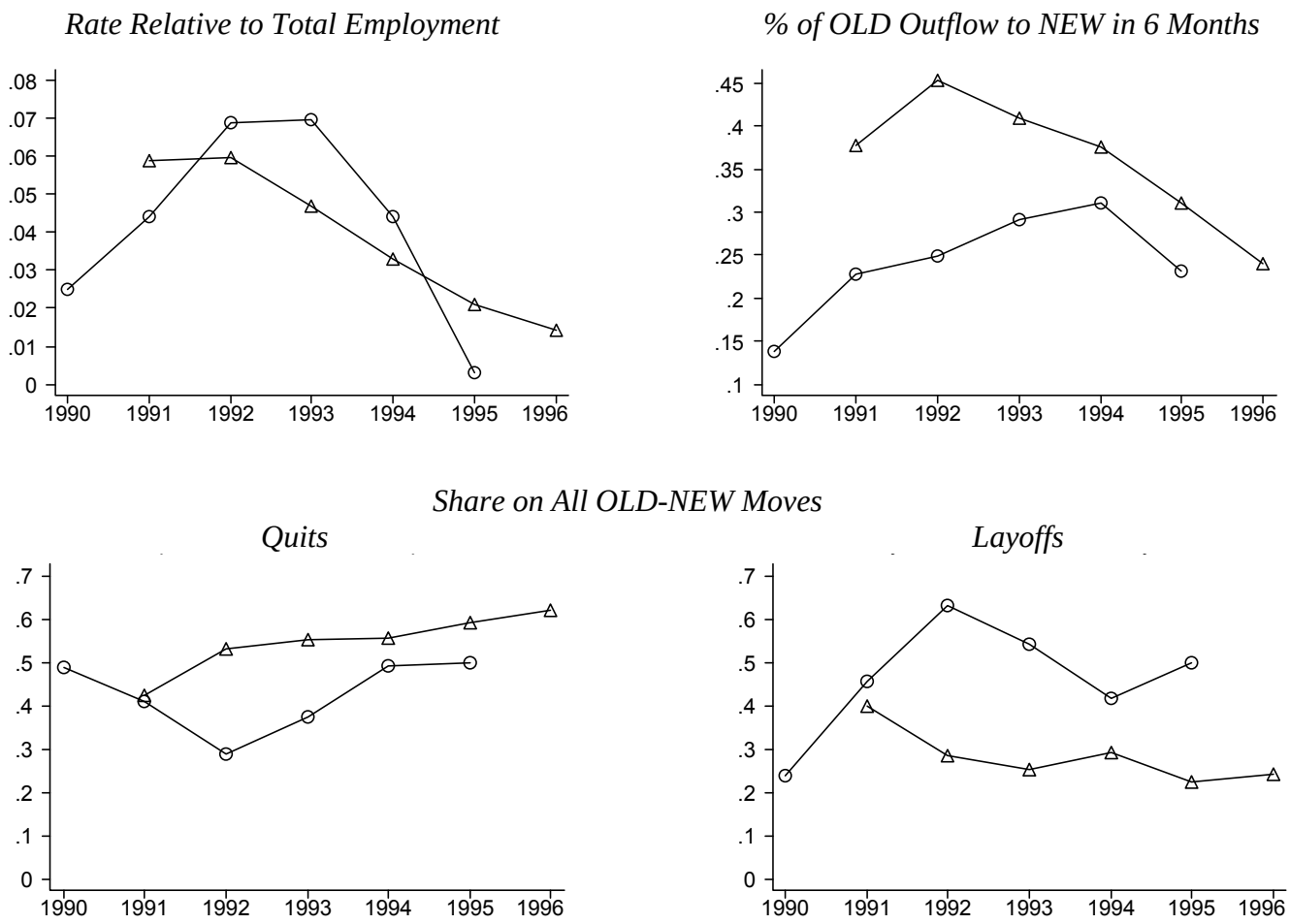


Figure 6: Wage Premium from Moving from Old to New Sector

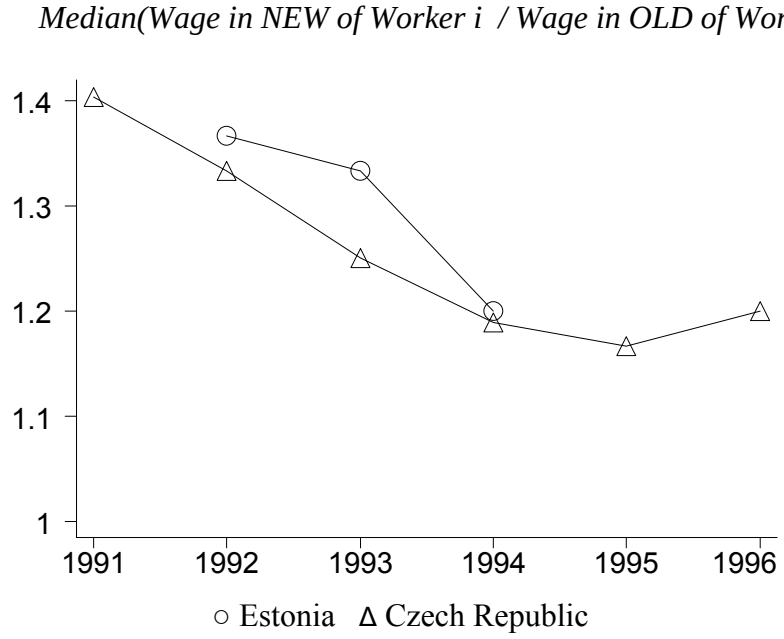


Figure 7: Relationship between Contemporaneous Values of JCnew and JDold

JC and JD Expressed as Shares on 1991 Employment

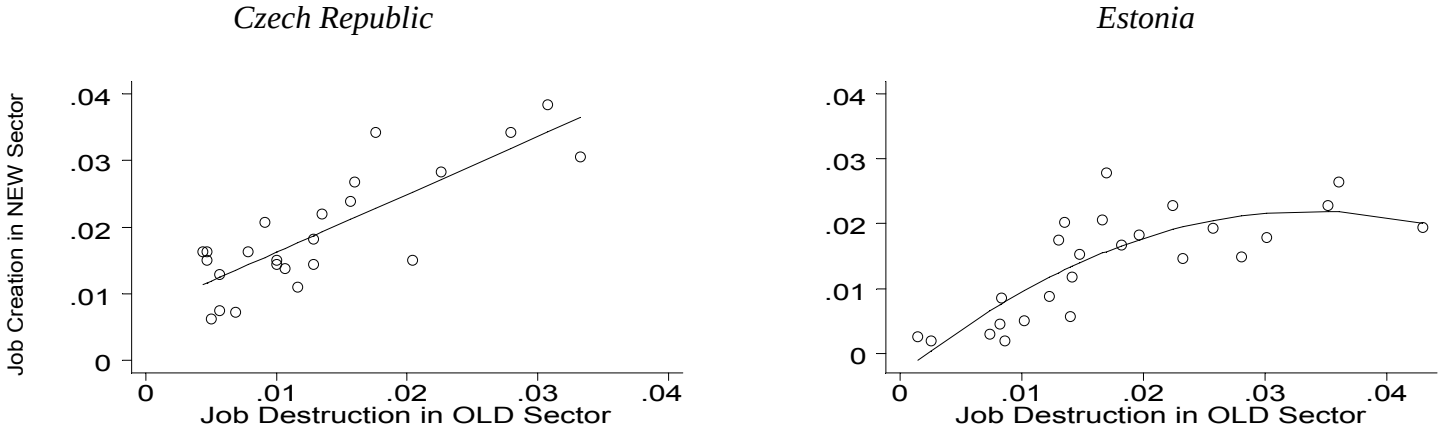
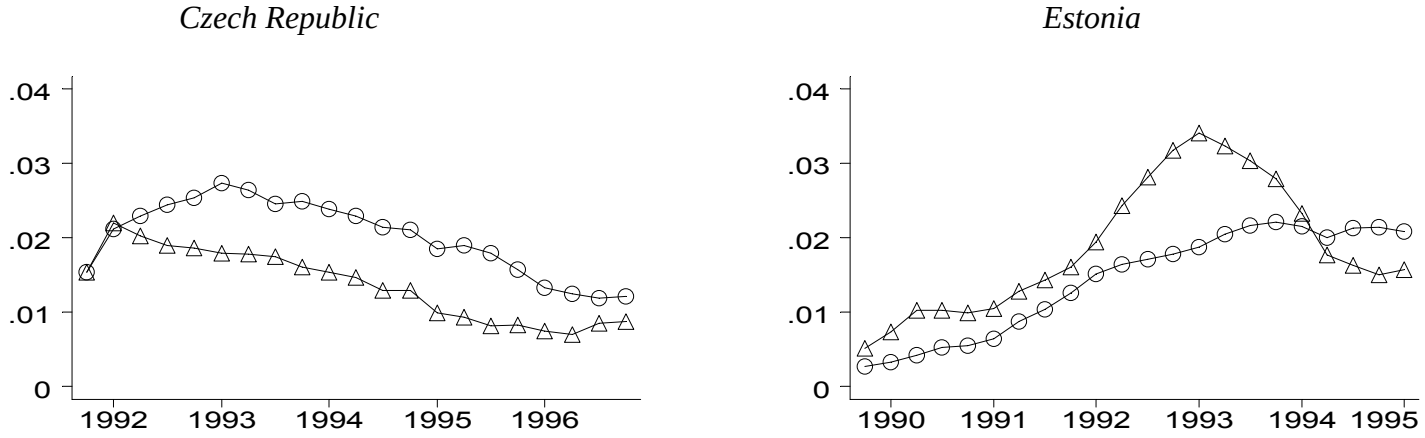


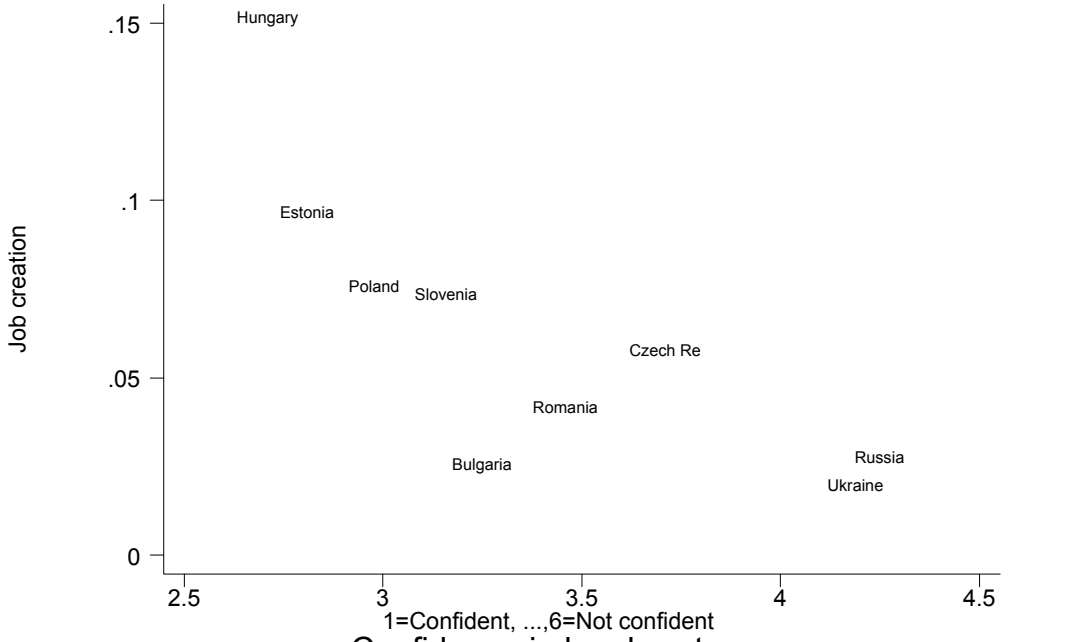
Figure 8: Time Series of JCnew and JDold

4-Quarter Moving Average of JD and JC Expressed as Shares on 1991 Employment



○ JC in NEW Sector Δ JD in OLD Sector

Figure 9: Aggregate Job Creation and Appropriability



Appendix

(3 tables)

Table A.1: Czech Retrospective Data

Sample counts	
Number of workers	4786
Number of spells (jobs)	7924
Number of spells that ended within sampling frame	4010
Reported distribution of exits (initial JD estimate bolded)	
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%

Table A.2: Estonian Retrospective Data

Sample counts	
Number of workers	7928
Number of spells (jobs)	14465
Number of spells that ended within sampling frame	8821
*Reported distribution of exits (initial JD estimate bolded)**	
a. Closing of the enterprise/organization	**7.4%**
b. Reorganization of the enterprise/organization	**8.4%**
c. Bankruptcy of the enterprise/organization	**2.3%**
d. Privatization of the enterprise/organization	**0.8%**
e. Dissmissal initiated by employer	2.9%
f. Personnel Reduction	**12.4%**
g. Expiration of employment contract	4.9%
h. Expiration of the trail time	0.3%
i. Army service	1.3%
j. Imprisonment	0.2%
k. Illnes/injury	4.4%
l. Studies	1.9%
m. Retirement	9.8%
n. Marriage/child birth	6.8%
o. Change of residence	2.5%
p. Wanted/was proposed higher salary	13.6%
q. Wanted/was proposed better working conditions	9.2%
r. Wanted/was proposed more interesting work	5.8%
s. Wanted to start own business	2.6%
t. Main job become second job	0.5%
Total	98.0%

* Note: After correction for JC<0 (Section 5.2), the results are not sensitive to alternatively choosing first 7 answers as corresponding to JD.

Table A.3: Data on Job Creation and "Appropriability"

Country	JC	Confidence in legal system (1=Confident...6=Not confident)	Share of firms that pay for protection	Percentage of sales paid for protection	Appropriability
	(1)	(2)	(3)	(4)	(3)x(4)
Bulgaria	0.024	3.25	0.790	1.64	1.30
Czech Rep.	0.056	3.71	0.112	2.10	0.24
Estonia	0.095	2.81	0.000	0.00	0.00
Hungary	0.150	2.71	0.033	0.75	0.02
Poland	0.074	2.98	0.445	1.05	0.47
Romania	0.040	3.46	0.031	2.57	0.08
Russia	0.026	4.25	0.202	1.88	0.38
Slovenia	0.072	3.16	0.021	2.33	0.05
Ukraine	0.018	4.19	0.063	3.65	0.23

Notes:

The JC measure corresponds to the average of available measures from the following studies:

Country	*Years*	*Sectors*	*Data on*	*Sources*
Bulgaria	1994-1997	All Sectors	Firms	Faggio and Konings (2003)
Czech Republic	1991-1996	All Sectors	Jobs	Author's own calculations
Estonia	1994-1997	All Sectors	Firms	Faggio and Konings (2003)
Estonia	1991-1994	All employees	Firms	Haltiwanger and Vodopivec (2002)
Hungary	1993-2000	All Sectors	Firms	Korosi (2003)
Poland	1994-1997	All Sectors	Firms	Faggio and Konings (2003)
Poland	1991	Manufacturing	Firms	Konings, Lehmann and Schaffer (1996)
Poland	1993-1995	All Sectors	Firms	Rutkowski (2002)
Romania	1995-1997	All Sectors	Firms	Faggio and Konings (2003)
Russia	1990-1999	All Sectors	firms	Brown and Earle (2002)
Russia	1997	Manufacturing	Firms	Acquisti and Lehman (1999)
Slovenia	1994-1997	All Sectors	Firms	Faggio and Konings (2003)
Slovenia	1997-1999	All Sectors	Employer-Employee	Haltiwanger and Vodopivec (2003)
Ukraine	1991-1996	All Sectors	Firms	Konings and Walsh (1999)
Ukraine	1999	All Sectors	Firms	Konings, Kupets and Lehmann (2003)

Confidence in legal system is based on Q23 in the 1999 BEEPS firm survey:
Q23: "To what degree are you confident that the legal system will uphold your contract and property rights in business disputes?"
Answers: 1=Fully agree, Agree in most cases, Tend to agree, Tend to disagree, Disagree in most cases, 6 = Strongly Disagree

The share of firms that pay for protection and the % of sales paid for protection are based on Q44 in the 2002 BEEPS firm survey:
Q44: What percent of its sales would a firm like yours pay for protection?