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On the Speed of Reallocation in Transition: Micro Evidence from the Czech Republic and Estonia

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October 2001

Abstract

This paper characterizes job creation and destruction during economy-wide structural reallocation. We contrast the gradualist Czech and the rapid Estonian approach to destruction of the communist economy. Our empirical work is guided by and provides evidence on the theories of reallocation with frictions (e.g., Aghion and Blanchard, 1994, Caballero and Hammour, 1996a). Gradualism appears to effectively synchronize job creation and destruction. Dramatic job destruction leads to either no or small and delayed slowdown of job creation. Small newly established firms are the under-researched fountainhead of job creation during transition.

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Acknowledgements: This work was in part supported by NCEEER grant no. 814-13g. We would like to thank John Ham for numerous helpful discussions and valuable suggestions. Further thanks go to Gerard Roland, Pavle Petrovic, Jan Svejnar, and Jan Hanousek. We benefited from comments of participants at the IZA/WDI Conference on "Labor Markets in Transition Economies", the CEPR/WDI Annual International Conference on Economics of Transition, and of seminar participants at LICOS of the Catholic University of Leuven, the University of Michigan, and CERGE-EI.

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). Among the causes of such economy-wide adjustments are brisk trade liberalizations, external shocks, e.g. oil, and recently, the collapse of totalitarian central-planning regimes.[1] What is significant about these restructuring episodes is the need to transfer massive quantities of misallocated resources from existing to new uses. The required reallocation often involves extensive labor movement (across industries as well as within), restructuring or closing of firms in low-productivity sectors, and the creation of numerous firms in high-productivity sectors.

However, reallocation frictions can thwart or even disable the transition process and the times of reallocation are often times of employment crises. Fortunately, in many situations the sectoral direction of reallocation is quite clear, opening room for simple economic policy. As it is clear which sectors need to be scrapped and which constructed, governments can take an active role in affecting the speed of both processes. There are two main classes of economic models that deal with this policy issue of (supply-side) adjustment of the productive structure.

First, a strand of models that we refer to as the Optimal Speed of Transition (OST) theory, emulates the post-soviet economies and studies the reallocation of labor (and capital) from the inefficient old state sector to the newly established private sector.[2] Note, however, that the models can be also applied to economies in the developing world, where one major sectors is inefficient and bloated.[3] The shared essence of the various OST models are macroeconomic mechanisms making the pace of job destruction in the

[1] To give examples consider (i) the abandoning of import substitution policies and trade liberalization in South Asia in the 1970s and in Latin America in the 1980s, (ii) the oil shocks to the Middle East or Latin America, and (iii) the collapse of the soviet rule in Europe and Central Asia. Note that in the post-soviet countries the period of adjustment, coined as "transition", is characterized by the simultaneous establishment of markets and democratic institutions.

[2] 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).

[3] Such as, for example, the oil-revenue-dependent public sector in the Middle East. See, e.g., Pissarides (2000).

inefficient sector affect the speed of job creation in the efficient sector. The outcome is that both too much and too little destruction slows down creation; the literature advocates gradual phasing out of the inefficient sector as optimal for maximizing the speed of job creation and minimizing the increase in unemployment created by the reallocation process.

Second, there is a large body of theoretical research, building on the notion of "creative destruction", that explains job flows in developed economies as stemming from a continuous stream of allocative shocks (e.g., Aghion and Howitt, 1992; Caballero and Hammour, 1994, 1996b). These theories focus on the adjustment process brought about by technological innovations, changing competitiveness of world markets and other idiosyncratic shocks. They also emphasize the frictions (such as search costs, moving costs, sunk investment) that impede efficient reallocation of factor inputs. Within this stream of work, Caballero and Hammour (1996a) use a two-sector model based on the embodiment of technology in capital to study the effects on reallocation of incomplete contracting in labor and capital markets. Contracting difficulties in their model account for the adjustment crises of less-developed countries—the periods of dramatic destruction of productive capacities, insufficient job creation and high unemployment. The upshot of their model is that governments should not only actively slow down the destruction process (similar to the OST prescription) but also boost job creation to attain efficient reallocation.

Unfortunately, very little empirical evidence is available on job reallocation in developing countries to support the extensive theoretical literature (see, e.g., Davis and Haltiwanger, 1998).[4] This is in stark 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 job flows in other countries undergoing economy-wide restructuring is needed to develop general theories of structural reallocation. The experience of transition economies provides an enormous opportunity for empirical research because it represents an unusually extensive experiment of restructuring. First, there are countries experiencing a very similar process under different policies. Second,

[4] The evidence from transition economies is discussed in Section 2.2.

the process of reallocation is not constrained to a particular industry, e.g. steel, or region, but is truly economy-wide, offering a striking case for evaluation of macro models of aggregate reallocation mechanisms. Third, comprehensive micro data on job and/or worker flows are available in many of these countries.

In this paper we provide consistent information on the dynamics of economy-wide job reallocation during a dramatic adjustment period in two countries operating under markedly different economic policy: Estonia and the Czech Republic. While the Czech approach to destruction of the communist economy was gradual, Estonia's early transition was characterized by extensive scrapping of old state firms. This difference occurred on a similar background of rapid price and foreign-trade liberalization.[5]

The reallocation theory cited above provides an anchor for our empirical analysis. We ask which model is a better "fit" for the observed reallocation patterns. We also ask about the optimality of the observed policy, given the validity of each model. The distinction between the two classes of models is important for evaluating *gradualism* as an effective way of avoiding high unemployment during a major change in economic environment. As Caballero and Hammour (1996a) note: "*The real test is whether gradualism can close the wedge between creation and destruction to help redress the transitional employment problem."* The use of gradualism in the transition economies was the source of great debate both among policy makers and in the theoretical literature in the early 1990s. We return to this literature and focus on the role of gradualism in affecting job reallocation. The gradualism debate is relevant for economies undergoing major structural reallocation. It is important for the transition experience of post-soviet economies as well as the adjustment crises of developing world.[6]

The plan of this article is as follows: We begin, in Section 2, by considering the link between our work and the existing theoretical and empirical literature. We discuss the essence of two sets of models of adjustment/reallocation in light of the existing evidence on job reallocation in the U.S. and the transition economies. We also offer a

[5] Studying only two countries prevents us from using a cross-country regression framework, but does allow for an informative albeit informal analysis of the reallocation process. Recently, Topel (1999) stressed that a fruitful way to learn about and to test macroeconomic theory is to conduct "detailed empirical studies of the operation of labor markets and the impact of policies and institutions within individual countries". We see our paper much in line with his suggestion.

concise description of the transition experiences of the two countries under study and lay down our research strategy. The data are described in Section 3, followed by a discussion of our estimation strategy and the complementarity of firm and worker level data in measuring job destruction and creation. In Section 4 we present the empirical findings and discuss them in view of each theory. Section 5 concludes.

2. Background and Relationship to Literature

Our paper is linked to the job reallocation literature, both theoretical and empirical. One strand of this literature developed for the U.S., another for the transition economies.

2.1 Theories of Reallocation Motivated by Job Flows in the U.S. and Europe

Our evidence on job flows during an unusually deep structural recession can be related to the abundance of microeconomic research from the U.S. (and Germany and Italy) on job creation (JC) and job destruction (JD) flows during the business cycle.[7] Three stylized facts established by this literature motivated much theoretical research. First, the U.S. job reallocation is large-scale and incessant (in the U.S. on average one job in ten is being created and destroyed every year). Second, there is a negative correlation between JC and JD over the business cycle at least in the manufacturing industry. Third, JD appears to fluctuate more than JC over the business cycle.

Mortensen and Pissarides (1994) use a search-unemployment business-cycle model to interpret the negative correlation between JD and JC as consistent with the notion of job flows being driven by aggregate as opposed to allocative shocks. Aggregate shocks (such as the oil crises) affect all sectors of the economy whereas allocative shocks are dispersed across sectors and firms.[8]

A different class of models, building on the notion of "creative destruction", explains the size of the U.S. job flows as stemming from a continuous stream of allocative idiosyncratic shocks related to technology improvements and changing

[6] Offer (1999) discusses similarities and differences between "development" and "transition".
[7] For the U.S. see, e.g., Leonard (1987), Davis and Haltiwanger (1990, 1992) and Blanchard and Diamond (1990), for Germany Boeri and Cramer (1991) and for Italy Contini and Revelli (1988).
[8] For empirical tests distinguishing between the importance of aggregate versus allocative shocks see Caballero, Engel, and Haltiwanger (1997) and Davis and Haltiwanger (1999).

competition (see, e.g., Aghion and Howitt, 1992). An important strand of this theory stresses how aggregate shocks interact with allocative shocks and reallocation frictions to influence the timing of worker and job reallocation. Specifically, Caballero and Hammour (CH) (1996b) take a creative destruction model to study the implications of contracting difficulties in the formation of production units on the cyclicality and efficiency of job flows.[9] The opportunity costs of creating unemployment are lowest during recessions; "it is therefore efficient to concentrate the unemployment needed to facilitate reallocation near the through of a recession" CH (1996b). In an efficient economy, JD sharply increases first, closely followed by a spike in JC. Contracting inefficiencies can, however, "decouple" JD and JC and result in an inefficient reallocation.

CH (1996a) study the implications of such contracting inefficiencies for adjustment periods of structural reallocation in developing and post-soviet countries. In their two-sector model efficient structural reallocation is characterized by a tightly synchronized evolution of JC and JD to avoid the waste of resources and political economy problems through excessive unemployment. Unfortunately, restructuring is thwarted by the high costs of job creation brought about by transactional difficulties. This core feature of their model leads them to reject gradualism, traditionally defined as government support for the collapsing economic sector, as an optimal policy. They argue that gradualism does not effectively synchronize creation and destruction. Instead, they advocate a policy consisting of a combination of "vigorous creation incentives" in the expanding sector and gradual phasing out of the inefficient production units.

2.2 Theory and Evidence of Job Reallocation in Transition Economies

The policy implication of CH (1996a) is in contrast to that of a strand of models on transition to a market economy, called the Optimal Speed of Transition (OST) theory, that developed in response to the collapse of the soviet rule. This literature supports the traditional notion of gradualism. It studies the intensive transitional off-steady-state

[9] Their analysis is motivated by the problem of "appropriability" arising when joint investments of employers and employees can be appropriated by one of the contracting parties or governments.

growth through more efficient use of existing resources and emulates the post-soviet economies by focusing on the reallocation of labor (and capital) from the old, less efficient state sector to the new, more efficient private sector. It goes beyond acknowledging the many reasons why an economy cannot instantly build a new productive structure (e.g., lengthy learning and technology adoption). 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. The theory takes the simple view of a two-sector economy, similar to the traditional economic development models concerned with moving from a dual sector (modern and traditional) economy to a single modern sector (e.g., Lewis, 1954), and also shared with the more recent trade liberalization literature where the dichotomy is between the import-competing and export-oriented sectors (see, e.g., Edwards and van Wijnbergen, 1989, for a review).[10]

The backbone of the OST literature is the paper by Aghion and Blanchard (1994) where, similar to the CH models, reallocation frictions occur in the labor market. While the CH model assumes transaction difficulties, Aghion and Blanchard assume an efficiency wage setting mechanism where high levels of unemployment keep wages low. In their model, increases in employment in the new private sector are decided by market forces; hence, if the cost of labor is high because of high wages and/or taxes, fewer workers are demanded. On the other hand, the downsizing of the state sector is engineered by the government 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. However, as the model suggests, an excess rate of closure tends to reduce the expansion of the tax base, out of which unemployment benefits are assumed to be financed. The

[10] In what follows we do not consider in detail the neoclassical phenomenon of trade liberalization, which has already been extensively analyzed. The models discussed here are concerned with closed economies facing internal resource constraints. We focus on sectoral reallocation that, however, could be generated by trade liberalization.

government will then have to raise taxes in order to finance unemployment (and welfare) 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 job creation in the new sector and the level of unemployment (non-employment). 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, which determines the level of wages and hence private job creation, and on the speed of labor shedding from the old sector. The economy converges to a stable level of unemployment at which the job destruction in the old sector equals the job creation in the new sector. Unemployment remains at this equilibrium level until the transition is over and the state sector disappears or is restructured.

The OST literature is extensive (see, e.g., Boeri, 2000, and Roland, 2000, for a review) and includes models that establish JD-JC links even in absence of reallocation micro frictions. To mention but one important paper, Castanheira and Roland (2000) develop a dynamic general equilibrium model of endogenous capital accumulation where again the effect of an excessive speed of closure slows down the growth of the new sector. However, their feedback mechanism works via the depression of 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). As long as wages in the old sector are kept low, old-sector firms will see their workers leaving for the new sector (quitting) even if the rate of scrapping of the old sector (layoffs) is too low.

Unlike the research process in the U.S., the OST theory was developed in the absence of well-grounded stylized facts about the reallocation of jobs. Both the empirical and theoretical work was being undertaken simultaneously. There is now a substantial literature on job and worker reallocation in transition, but most of it is descriptive and is not examined in light of the OST theory.

The empirical literature on job creation and destruction typically draws on Davis and Haltiwanger (1992) and uses firm-level data. 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 medium and large firms from only one sector of the economy. They are rarely well-defined random samples and suffer from a sample selection issue coined as "survival bias" in that they are collected in the mid 1990s and therefore miss any firms that have been completely destroyed in the first few years of transition.[11] While they offer important glimpses at job reallocation, they do not provide a time-consistent coverage of the whole economy.

The exception is a study of Estonia by Haltiwanger and Vodopivec (1999) which uses the same data we rely on in this study. 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 transition, jobs were eliminated at a very high rate, by 1994 more jobs were being created than destroyed. They offer a detailed description of job and worker flows, but do not link their findings to economic theory.

While the evidence on job reallocation in transition is limited, there is a wealth of studies on worker reallocation across industrial sectors, providing substantial evidence that in all transition economies the size of the agricultural and manufacturing sectors declined (see, e.g., Boeri and Terrell, 2001). For example, official statistics imply that in the Czech Republic and Estonia the number employed in agriculture fell dramatically in the first four to five years of transition (48% and 45%, respectively, between 1989 and 1993(4)). Similarly the number employed in manufacturing fell 20% in the Czech

[11] Survival bias may not only affect state-owned enterprises, but can come from the closure of newly established private businesses during (chaotic) early transition.

Republic and 25% in Estonia over this period. These sectors are considered to have been bloated by the communist regime. On the other hand, in both countries (and most transition economies) employment grew rapidly in sectors that had not been emphasized during communism: construction, wholesale and retail trade, hotel and restaurant services, and finance insurance and real estate services.[12] Yet, Faggio and Konings (2001) recently use another firm sample from five transition countries to suggest that most job reallocation occurs within industrial sectors and regions, rather than across. Their analysis also suggests that job creation and destruction occur simultaneously within narrowly defined firm types, much in accord with the evidence on excess job reallocation from developed economies (e.g., Davis and Haltiwanger, 1998).

Given that the transition process created double-digit unemployment rates within one or two years, in countries where there was no official unemployment for half a century, it is not surprising that the empirical literature has placed enormous emphasis on the level and determinants of unemployment. A large body of literature on flows between the labor market states of employment, unemployment and out-of-the labor force developed.[13] This literature pinpointed the extent to which unemployment was being created by large inflows vs. small outflows and given that outflows were low, led to research on the determinants of outflows.[14] However, the focus was on the impact of institutions (unemployment compensation systems) and not the relative speed of the downsizing of the old sector.

Hence, in spite of all the existing empirical work, little is known about the total extent and dynamics of job reallocation from the old state to the newly established private sector. While official statistics exist on private employment, they combine jobs in de novo firms with those in privatized companies. This is potentially problematic given that the literature on performance and restructuring of privatized firms often suggests disappointing results (e.g., Roland, 2000). Consequently, the existing direct empirical

[12] For more detail, see Sorm and Terrell (2000) for the Czech Republic, Noorkoiv et al. (1997) for Estonia and Boeri and Terrell (2001) for other countries.
[13] See for example, Bellmann, et al. (1995), Boeri (1998), Gora and Lehmann (1995), Foley (1997), Sorm and Terrell (2000) .
[14] See, e.g., Ham, Svejnar and Terrell (1998) and Micklewright and Nagy (199?).

evidence on the OST models is sketchy and does not go, for the most part, beyond discussing macroeconomic aggregates.[15]

2.3 The Transition Experiences of the Czech Republic and Estonia

Estonia and the Czech Republic are two small countries (populations of 1.5 and 10 million, respectively) that are widely recognized as being among the most market-oriented economies in their regions.[16] The path and timing of reforms of these two countries were similar in many respects, although starting in 1991 in the Czech Republic and one year later in Estonia.[17]

An important area where these countries' policies differ is with respect to the supply-side adjustment of the economy's productive structure. The Estonian privatization process proceeded much more rapidly than the Czech[18] and included the elimination of subsidies and removal of barriers to exit for state enterprises in 1993, only one year into the transition (Cornelius, 1995). This was coupled with a fast transfer of the banking sector to private hands. In contrast, bankruptcy laws were effectively not in place until 1996 in the Czech Republic (Lizal, 2001), and its banks remained under control of the government. Consequently, many of the old firms continued to receive subsidies hidden as (soft) commercial loans. A state owned bank (Consolidation Bank) set up to clear non-performing loans from the large bank portfolios in the Czech Republic was transformed from a temporary hospital for bad loans inherited from the communist era to a "state run commercial debt-alleviation agency" (Desai, 1996). The largest four banks had long-standing creditor relationships with the voucher privatized SOEs and also made equity

[15] 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.

[16] Consequently, Estonia (the only FSU economy) and the Czech Republic were selected to be among the candidates for the first wave of EU accession.

[17] Estonia gained independence from the Soviet Union in 1991 and began liberalizing prices and initiating reforms in 1992 whereas the Czech Republic became free of the soviet rule at the end of 1989 and undertook price liberalization and first reforms in 1991. See (REF) for more details.

[18] The Czechs began with small-firm privatization in 1990-91, which was followed by two waves of large-firm privatization in 1992-93 and 1994-95 (for more detail see Kotrba and Svejnar, 1994). In Estonia, small-scale privatization was completed between 1992 and 1994 and large-scale privatization was accomplished mostly in 1992 (Eamets and Philips, 1998, p. 14).

investment in these firms through their voucher investment funds. Cull, Matesova, and Shirley (2001) show that such joint stock companies exhibited worse performance and higher indebtedness than privately held limited liability firms. More generally, Lizal and Svejnar (2001) imply that large Czech firms operated under soft budget constraints.

While firms' overall financial discipline has been lax, the Czech government imposed wage growth controls in medium and large firms including the privatized companies from 1991 until 1995 (Flek, 1996). Finally, in addition to providing a softer environment for the old firms, the Czechs offered generous non-employment benefits in the first two years of their transition, possibly "pulling" the downsizing of the old sector. This is again in contrast to strict Estonian levels of unemployment and social insurance.[19]

Clearly, privatization was only one method of creating private sector jobs and output. Throughout this period new (*de novo*) private firms were being created, with varying degrees of government support. Although regulations and market institutions may have been less available (REF LACK OF REGULATION IN CZ, ANY INFO ON EST?) in the Czech Republic, it appears that credit was more available there than in Estonia. Our calculations from official statistics indicate that total credit available as a percentage of GDP was about 66-69 percent in the Czech Republic (1991-94) whereas it was only 14-17 percent in Estonia (1994-95). 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). Unfortunately, no statistics exist differentiating bank credit by ownership (or even size) of firms in neither of the countries.

While there were obvious differences in the availability of credit, tax policies were somewhat similar??? In Estonia, the corporate income tax was lowered from a flat rate of 35% in 1992 to a flat rate of 26% in 1995, while social security contributions stood at 33% throughout transition. The Czech corporate income tax was gradually lowered from 45% in 1993 to 39% in 1996. In the Czech Republic only a part of social security is paid for by the employer, …

[19] As the transition proceeded the Czechs tightened their unemployment benefit system, reducing the replacement rate to 50-60% of the previous wage and the entitlement period to six months. Whereas the entitlement period was the same for the Estonian unemployed, the replacement rate was only 7-10%. After the entitlement for unemployment benefit ends, all poor Czech households

At the macroeconomic level, Estonia experienced a deeper and longer recession than the Czech Republic, see Table 1.[20] The Estonians also suffered far higher levels of inflation throughout the entire period, but especially in its year of price liberalization when the country suffered Ruble hyperinflation of 1,076%. Consequently, while Czech savings as share on GDP remained stable throughout transition, there was a steep decline in Estonian savings in the early years of transition. The government responded to runaway inflation by aggressively implementing tight monetary and fiscal policy and established a currency board for a newly established Estonian currency (crown) in July, 1992 (Eamets, 1999). Whereas the unemployment rate in the Czech Republic peaked at 4.1 percent during the year of price liberalization (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. According to official statistics, by 1996, the end of our period of study, employment levels in Estonia were 77 percent of their 1989 levels and Czech employment was at 93 percent its 1989 level. Finally, real wage declined more in Estonia than in the Czech Republic during the year of price liberalization and hyperinflation, but followed a very similar pattern once the new Estonian currency was introduced.

2.4 Research Strategy

Our fundamental strategy for capturing reallocation in *early* transition follows the theory as well as the knowledge about productivity differences by firm type to define reallocation as the transfer of jobs from the old state to the new private sector. The OST theory assumes higher productivity in the new sector relative to the old; the steady-state models of the cyclicality of job flows (e.g., Caballero and Hammour, 1991; Mortensen and Pissarides, 1994) assume that new entrants/jobs adopt the most advanced technology and are the most profitable in the market and offer highest wages. On the empirical front, World Bank (2000) shows that most small firms are new and finds that labor productivity

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are able to receive welfare indefinitely whereas only the Estonian families with three or more children can receive welfare assistance and only for up to three months.

[20] The comparison of Estonia and the Czech Republic is essentially comparing the FSU with the CEE in all the above respects (except for the level of the unemployment rate in the Czech Republic).

is indeed higher in small firms compared to large firms; this is true independent of the overall progress towards a market economy. New companies are more productive than inherited firms in countries as diverse as Hungary and Ukraine (World Bank, 2000, p. 47). We will therefore measure job reallocation across these two sectors and ask to what extent this classification explains the observed job flows.

The OST literature advocates gradual phasing out of the state sector as optimal. At the optimal speed of old-sector demolition, significant 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. 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.

First, we would therefore like to shed light on the Czech unemployment puzzle by analyzing the fundamentals of the Czech transition—its worker and job flows.[21] Estonia provides a natural comparison for the extent of restructuring given that its unemployment increased rapidly during early transition.

Second, we would like to interpret our basic findings in light of the two types of models of adjustment/reallocation discussed above. We begin by assessing to what extent are the main objects of the theory, namely job destruction in the old state sector and job creation in the new private sector, the driving forces of job and worker reallocation during the economic transition. Next, we compare the "fit" of the OST models to that of the "creative destruction" models of Caballero and Hammour, which, as we noted above,

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[21] The puzzle 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 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.

lead to different policy implications. We consider the dynamics of job reallocation together with the evolution of wages and the efficiency of worker flows[22] and ask whether they are broadly in accord with each theory. We also empirically estimate some of the key relationships postulated in theory using the time dimension of our data. Finally, after discussing the "fit" of each theory, we can also ask about the optimality of the actual policies *given the prior beliefs of the reader*.

The comparison of the gradualist Czech and speedy Estonian approach to the destruction of communist firms is helpful in searching for consistency of the evidence with the theory. It provides variation in the crucial object of theory.[23] In particular, assuming the OST theory holds, gradual transition should resemble an extended period of moderate, but constant reallocation, while too fast a transition should be characterized by relatively lower job creation, higher unemployment, and a slower transfer of workers from the old to the new sector. To the extent that the destruction of old firms in each country may heuristically appear too fast or too slow, we can check for the theoretical predictions.

On the other hand, in the world of creative destruction facing contracting difficulties (CH, 1996a) fast transition will be disappointing, but even gradual destruction of the old sector will result in insufficient job creation unless there are vigorous job creation incentives in place. Finally, if contracting frictions are not important, transition should result in a spike (synchronization) in destruction, creation and unemployment (CH, 1996b) and gradualism will only slow down reallocation.

Overall, we do not attempt to form a single decisive test of the theory. Rather, we marshal insightful empirical evidence related to the theories and offer conditional statements related to their validity. For instance, we are not interested in rejecting a particular model within the OST literature based on the specifics of the JD-JC feedback

[22] Efficiency is important as we would like to know the extent to which outflows from old inefficient jobs result in churning among old-sector jobs vs. moving to a new private sector job. 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.

[23] Furthermore, Estonia may provide a useful counterfactual for what would have happened in the Czech lands under rapid scrapping of old firms. This comparison can be suggestive about the total underemployment costs over the transition period under different policy to the extent that miss-allocation and reallocation frictions are the same across the two countries.

mechanism (i.e. taxes or savings). Instead, we aim to shed light on the essence of the various OST models that was expressed using various specific modeling techniques.

3. Data and Measurement Issues

At the beginning of the transition from communism to capitalism the usual mechanisms for collecting statistics began to break down such that even the level of employment became difficult to measure accurately. Under central planning, employment statistics were collected under firm censuses. In transition, however, firms no longer felt they had to report to the central statistical agencies and in the absence of effective fines, the firm census broke down as a tool for measuring total employment. 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.[24]

Unfortunately, the collection of household labor force surveys started only in the mid-1990s, leaving the first crucial years of transition uncovered.[25] Further, the existing firm-level surveys are only collected in the mid 1990s and therefore suffer from survival bias (see Section 2.2). Hence, the only way to collect representative data on the entire population of firms during the early period of transition is to collect retrospective data from households and individuals asking about employer attributes. We describe these data in Section 4.1 below. However, almost all of the studies on job creation and job destruction draw from firm level data (see Section 2). Fortunately, as we show in Section 4.2 below, one can construct measures of job creation and job destruction with retrospective individual data that are similar and complementary to those based on firm level data.

3.1 Data

[24] Even in the late 1990s, the Czech Statistical Office was unable to accurately capture the number of firms with fewer than 100 employees and their total employment (see Jurajda, 2000). Further, the ownership classification in the Czech firm census may not be fully reliable and only information on manufacturing firms has been available to researchers. In Estonia, the firm census…

[25] The Czech Labor Force Survey (LFS) starts in 1993 and provides no information on ownership or firm size. In Estonia, the first LFS was collected in ??.

Our analysis uses data from two similar retrospective surveys covering the early period of the transition. The sample design differs slightly in the two surveys. The Czech survey was administered in December 1996 to 3,157 randomly selected households throughout the Czech Republic using the sample frame of the official Labor Force Survey. Those individuals who were employed for at least two weeks during the 1991-1996 period were asked questions about their employment histories. We have usable data on 4,786 working individuals who experience 7,926 main jobs.[26] The Estonian survey was administered in the first quarter of 1995 to 12,246 individuals between the ages of 16 and 75 in 1995; this represents one percent of the population in this age group, randomly selected from the 1989 Population Census. Ultimately 9,608 (77 percent) individuals were interviewed.[27] 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 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 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, type of employment and a number of employer attributes. For those that exited their jobs, we also observe the reason for separation. 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. However, wage information from the hyperinflation years of 1990-1991 is not usable.[28]

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[26] 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. 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. Any note on non-response??

[27] Non-response was attributable to failure to locate an address for the individual (9.2 percent), emigration (7.6 percent) death (3.9 percent) and refusal to participate (1.7 percent). Much of the emigration was attributed to the return of ethnic Russians to Russia following the Estonian secession from the former Soviet Union. See ?? (19??).

[28] To form monthly labor market histories, we interpolate wages from the available information. Estonian monthly salaries are gross. Czech…

Using data that relies on recollection of labor activities up to six years before the time of the interview raises questions about "recall bias". However, research indicates that individuals recall traumatic events more readily and changes in the labor market status are likely to have been particularly memorable in an economy transiting from a system with many years of steady employment (Noorkoiv *et al*., 1997).[29]

Our fundamental strategy is to measure job reallocation from the old state to the new private sector (see Section 2.4). An important question arises regarding the classification of privatized firms. Given the evidence on the lack of restructuring of Czech privatized enterprises, one would like to pool the Czech state and privatized jobs into the old sector. An important advantage of the Czech data therefore lies in their unique ability to distinguish privatized firms from *de novo* private enterprises.[30] This allows us to easily code jobs as being in the new or old sector.

In the Estonian questionnaire firm ownership is categorized as state, cooperative/collective or private. While we do learn when privatization occurs for ongoing jobs in state firms, for jobs starting during our sample period the data do not distinguish jobs in a de novo private firm from those starting in privatized enterprises. Given that Estonian privatization was apparently more efficient in terms of restructuring, we categorize jobs starting in a private firm as new-sector jobs. However, we keep ongoing jobs in privatized firms in the old sector to highlight the role of de novo firms in reallocation. Following this strategy, the observed growth of the new sector will not be due to reclassification of ongoing jobs. Our choice maximizes comparability across the two countries given the structure of the data and the relative success of Estonian privatization in restructuring.[31]

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[29] For Estonia, Noorkoiv *et al*. (1997) compared the responses on economic activity in 1989 in the 1995 survey with the responses in the 1989 census and found that "the recall data corresponded quite well. The majority of the discrepancies are attributable to changes in labor force definitions."

[30] 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.

[31] It is not possible to gain full comparability of the new-sector definition across the Czech and Estonian data. However, we have compared the implied Estonian employment evolution to simulations based on realistic assumptions about the hiring rates of de novo and privatized firms

In the end, we therefore distinguish 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 as well as jobs of new hires into Estonian privatized firms); and the *public sector* (public administration, health and education). This is the way we characterize the heterogeneity of sectors/firms referred to by the theories. Our firm-type assumptions carefully mimic the theoretical concepts and fit the available facts from the transition economies. As will become clear soon, they also provide a very powerful way of slicing up the data.

3.2 Measurement of Job and Worker Reallocation Rates

Job reallocation is typically measured with establishment (or plant) and 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*."

Although job destruction and job creation are traditionally measured with firm data, they 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, 1999, with the Estonian data. 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.2 and A.3). We define job destruction (JD) as 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.[32] The

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and concluded that the differences at the aggregate level are minor. These results are available upon request. An alternative strategy is to also reclassify jobs in privatized firms as new. See Haltiwanger and Davis (1999) for an analysis of the Estonian data that relies on such private/state coding, which is, however, not available in the Czech data.

[32] In the current version of the paper, we use the same definition for Estonia as Haltiwanger and Vodopivec (1999). In the future, we will experiment with more selective choices, i.e. including

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 likely 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.[33]

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_t denotes change in employment, 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 $JC_{tk} = \Delta E_{tk} + JD_{tk}$.[34]

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.[35]

The correction for $JC<0$ turns out to affect only JD in the old sector,[36] which comes as no surprise. Underestimation of JD is especially likely in the old firms, where

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only the following reasons for leaving employment: personnel reduction or bankruptcy or reorganization or closing of enterprise.

[33] 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. 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, see the Appendix figures A.1 and A.2.

[34] 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% (3-6.7%) of all Czech (Estonian) separations.

[35] 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.

[36] See the appendix Figures A.2 and A.3, which compare the estimated number of jobs destroyed in the old sector based on layoffs without replacement to the corresponding JD measure corrected

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.

We calculate our job flow measures taking into account all transitions that occurred within a given time interval. 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.[37] 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 (see Section 2.2), our data are based on well-defined random sampling, does not suffer from the so-called "survival bias", covers all economic activities and all firm sizes in the economy and provides a continuous coverage of the transition.[38] Our data also allow us to simultaneously consider worker and job flows. Importantly, 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

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for $JC_{tks}<0$. In both countries, the two series exhibit a similar pattern, but the corrected measure allows us to identify much more JD, sometimes close to the upper bound provided by the separation rate.

[37] Note, however, that our measure produces the same net job creation as that based on firm data.

[38] The issue of observing firms of small size turns out to be particularly important; see below.

workers (into different positions), such restructuring would be ignored in a firm-level data set, but is captured in our data. Finally, note 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 transition 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.

4. Results

4.1 Basic Findings

Employment Structure

Our first major empirical endeavor is to establish the degree of reallocation from the old to the new sector during the Czech and Estonian transitions. Figure 1 shows the number 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 1991 to 1996 for the Czech Republic and 1989 to 1995 for Estonia.[39] These are the first results available for these two countries on the evolution of the structure of jobs in the old and the new sector from the early part of the transition.

The story told by this figure is most extraordinary: within five years of the "big bang" of economic reforms in the Czech Republic and within three years for Estonia more workers were employed in the new sector than in the old in each country. This massive reallocation is not a consequence of reclassification as privatized firms remain in the old sector: within a few years newly established firms provide more jobs than the remains of the post-communist economy.[40] Moreover, in the Czech Republic, the reallocation is apparently not propped by large flows out of the workforce (and hence labors force). We note that total Czech employment is relatively steady and exhibits slow

[39] We do not present the results for the public sector since this is not highlighted in the theory. Moreover the public sector holds on to a stable workforce in both countries. For an alternative definition of employment evolution using the private/state distinction, as opposed to new/old, see the Appendix Figure A.1.

[40] With the exception of new hires into privatized Estonian firms, see Section 4.1. On the other hand, we may be underestimating the extent of restructuring in Estonia as its privatized firms are probably restructuring more relative to Czech privatization.

growth over the entire sample period. In contrast, the more rapid Estonian reallocation is characterized by a pronounced decline in total employment.[41]

What do we learn about the Czech unemployment puzzle? Was the low Czech unemployment simply a result of churning within the old sector, or did it occur on a background of vigorous restructuring? Using the new/old distinction to measure reallocation, Figure 1 suggests that the Czech transition resulted in the same degree of reallocation as the Estonian, albeit two years later, but at much lower employment costs.[42]

Reallocation by Sector

Next, it is natural to ask how job reallocation differs by sector. Is there simultaneous job creation and destruction in the declining old sector or in the growing new economy? In Figure 2 we plot over time the rates of job creation and destruction in each sector; the upper two graphs present the share of job reallocation on total economy-wide employment and the lower two graphs present the shares on employment in the relevant sector.[43] A striking result emerges. Using the new/old distinction allows us to completely separate all job creation from job destruction during early transition. Old firms are hiring

[41] To distinguish between unemployment and out-of-labor-force may be hard in early transition as the artificial notion of communist full labor-force participation fades in importance. Hence, we juxtapose sectoral reallocation with employment dynamics, rather than with unemployment. The employment growth index is corrected for population growth, which rose from 0.5% in 1991 to 3% in 1996 in the Czech Republic and was negligible in Estonia. Nevertheless, a substantial employment growth remains, which may appear suspicious given the common wisdom of large employment losses during early transition. However, as we argued earlier (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. Finally, the decline of Estonian employment in Figure 1 does not include the outflow of native Russians, mainly military personnel, during early transition (REF).

[42] 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. However, in unreported calculations using our data we find that 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.

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 (with the exception of Estonian new sector in 1994-95.[44]

Furthermore, the upper two graphs point to a remarkable similarity in job reallocation rates across our two countries at the outset of transition. In 1991, the job destruction rate in the old sector (JDold) and the job creation rate in the new sector (JCnew) were almost identical. However, the two countries then followed a different transition path. During 1992 and 1993, JDold was dramatic in Estonia where a quarter of old-firm jobs was destroyed annually. Estonian JCnew also grew rapidly and continued to rise until the end of our sampling frame. In stark contrast, we observe a gradual slowdown of both JDold and JCnew in the Czech Republic.[45]

An interesting question is to what extent were old-sector firms restructured during transition. In particular, were the new and old sectors looking alike in terms of job reallocation rates by the end of our sample when they provided an equal share of jobs in each economy? In both countries, the annual sectoral job destruction rates were indeed similar in the old and new sector; the job creation rates, however, were still much higher in the new sectors, suggesting a continuing difference in growth potential.

OLD - NEW Reallocation

The plots in Figure 2 imply that JCnew and JDold account for the employment patterns seen in Figure 1. While it is traditional to describe reallocation rates by sector, the theory focuses on cross-sectoral flows. In Figure 3, we therefore further consider the size and nature of worker flows from the old sector to the new sector.

First, to assess the magnitude and timing of the flow, the upper left graph of Figure 3A plots the number of workers moving as a proportion of total employment in our sample using the time of departure from the old sector to define the timing of the flows. In both countries, the first two years of reforms (1991-92 in the Czech Republic and 1992-93 in Estonia) record the highest old-new reallocation rate. However, this peak

[43] While the lower graphs make the reported job reallocation rates comparable to the traditional measurements, the upper graphs give a more appropriate description of the transition process.
[44] 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).

of reallocation is higher in Estonia where we see worker old-new flows in the order of about 8 percent of total employment, compared to about 6 percent in the Czech lands. These two years of high reallocation are followed by a drop to about 5 percent during the third year of reform in both countries.[46]

In Figure 2 we saw much higher JDold rate in Estonia. Does this result in a lower efficiency of old-sector outflows in terms of reaching the new sector? This suspicion is confirmed by the upper right graph of Figure 3A, which shows the fraction of old-sector separations resulting in new-sector hires within six months of the separation (the 6-month window is imposed in order to minimize the effect of right-censoring). The graph suggests that during the peak years of reallocation a much higher fraction of workers leaving the Czech old sector arrived in new-sector jobs as opposed to those separating from old Estonian firms.

The lower two graphs of Figure 3A shed light on the firm-type nature of the old-new flows. Industrial reallocation is important, but in some years almost a half of all old-new worker moves did not constitute a move across a broadly defined industry classification (15 main NACE sectors). See Faggio and Konings (2001) for comparison… Finally, the bottom right graph shows that most of employment (growth) in the new sector can be accounted for by small firms, defined here as firms with less than 100 employees. These firms, provide up to 90% of all new-sector jobs during early Czech transition, bearing the sole responsibility for Czech JCnew and, hence, Czech low unemployment. While the share of small firms on new-sector employment in Estonia is also overwhelming, at over 80%, a significant share of employment comes from firms employing over 100 workers.

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[45] These findings are in accord with the stylized facts on macroeconomic policies, e.g. the easy access to credit from Czech semi-state banks as opposed to strict Estonian policies (Section 2.3).

[46] In the Czech Republic, where are sample frame extends further into transition, we see a gradual and sustained decline in old-new worker flows. However, this is in part due to the nearing end of our sample frame (December 1996) and censoring of ongoing non-employment spells that may eventually end up with new-sector hiring. Note that in Estonia, where we only observe the first four months of 1995 we are unable to estimate the annual level of reallocation, but we count workers completing the transition to the new sector during 1995 into the 1994 reallocation measure. In other plots of Figure 3, however, we attempt to estimate the structure of Estonian 1995 reallocation based on the January-April.

In Figure 3B we further investigate the nature of the old-new flows. First, the upper left plot asks to what extent we find workers leaving the old sector voluntarily vs. being laid off. The graph indicates that in the Czech Republic, where JDold rates never reached dramatic levels, quits outweighed layoffs for all old-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-new flows.

The old-new worker moves were surprisingly fast in both countries as suggested by the upper right plot of Figure 3B which shows the fraction of sectoral old-new moves that occur with less than one month of an intervening non-employment spell. While moving from the old to the new sector was more easily realized as a quick job-to-job transitions in the Czech Republic compared to Estonia, the difference is not dramatic even during 1992-93. Transition appears efficient in that almost 80% of workers who leave the old sector and find a job in the new one makes the move within one month. (The increase towards the end of the sampling frame is a natural consequence of censoring.) The difference between the Czech and Estonian unemployment therefore likely stems from a larger share of Estonian old-sector workers never reaching the new sector as opposed to slower moves of those succeeding in finding new-sector employment. In the Czech Republic only about 20% of workers separating from the old sector report leaving the labor force and do not find a new job within our sampling frame. In Estonia…

Finally, the lower two plots of Figure 3B ask about the wage premium from working in (moving to) the new sector. The realized wage gain from the old-new move follows a very similar pattern in both economies, starting at about 40% during the first year of reforms and gradually declining afterwards. The similarity is confirmed by comparing the median wages of all workers employed in each sector.

Overall, we see that the rapid destruction of old Estonian firms in comparison to the gradualist Czech transition led to a higher share of layoffs on old-sector separations and resulted in a lower fraction of old-sector outflow reaching the new sector. While new-sector wage premia were similar, the Czech new sector relied more on small firms for its growth in comparison to the Estonian one.

JDold and JCnew

Next, we ask about 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.

We begin by plotting the monthly time series of JDold and JCnew counts in both samples in Figures 4A and B. While during the first year of Czech transition JDold dominates JCnew, starting early 1992 JCnew consistently exceeds destruction. In Estonia, on the other hand, JDold is the dominating force until late into transition. The surprising feature of the data is that the smooth Czech annual job reallocation measures (of Figure 2) hide a great deal of volatility at the monthly frequency, with most action occurring at the beginning of each calendar year. Yet, it would appear to the naked eye that the two series move closely together; the Czech labor market apparently clears every month, especially every January, when high number of jobs is both destroyed and created.[47]

The upper two graphs of Figure 4C plot the contemporaneous monthly values from Figures 4A and B together with fitted regression lines. The Czech labor market appears frictionless as apparently any number of jobs destroyed in the old sector is matched by an equal number of jobs created in the new sector. The R^2 of the linear regression of JCnew on JDold and a constant is 0.68 and the slope coefficient is 0.92 with a standard error of 0.07. The picture is a lot less sharp in Estonia, where a quadratic term is statistically significant in a regression of JCnew on JDold reaching an R^2 of only 0.39. Yet, at lower levels of JDold, JCnew is apparently also able to closely match the level of destruction on a monthly basis.

Given that total Czech employment remains relatively stable, it is not surprising that JDold and JCnew have a stable long-run relationship.[48] This is confirmed in the lower left graph of Figure 4C, which plots the twelve-month moving average of the monthly JCnew and JDold. The two filtered series move together for the first few months, but then JCnew reaches a higher level and both measures gradually decline in parallel. While early on, Estonian JDold and JCnew also moved closely together, when

[47] While this may be a result of recall bias, similar patterns are observed in the Labor Force Survey (details will be provided later).

[48] Indeed, they are 1-1 co-integrated in the terminology of time series analysis. Both series are non-stationary of unit root; these results are available upon request.

JDold skyrockets, JCnew appears to grow at a steady rate until it stabilizes towards the end of transition. It remains an open question whether JCnew level stabilized because job creation reached a natural level (e.g., having filled the market niche of understaffed market-oriented industries) or whether it was slowed down by the earlier spike in JDold.

4.2 Comparison to U.S. Empirical Literature

How do our results on JD/JC evolution during transition compare to the stylized empirical facts from the U.S. literature on job reallocation in recessions? In the U.S. there is a negative correlation between JC and JD over the business cycle, and JD appears to fluctuate more than JC. Over the transitional recession of the early 1990s, we see strong co-movement of JD and JC in the Czech Republic and higher rise in JD in Estonia compared to JC. Furthermore, we see strong positive correlation of JD and JC at high frequency, especially in the Czech Republic. (Correlation tables will be provided in the next version of the paper.)

How can one explain this difference? Our results are consistent with Mortensen and Pissarides (1994) and other models to the extent that the dispersion of the shock to individual firms (new versus old) is the driving force of transition, as opposed to the aggregate shock of the collapse of the communist regime.

Finally, another important difference to the U.S. findings on job reallocation is that small firms apparently create most jobs during transition. Small transition firms not only have high gross creation rate, but, unlike in the U.S., they exhibit relatively low destruction rates (see Davis, Haltiwanger and Schuh, 1996, for the relevant U.S. results).

4.3 Interpreting Results in Light of OST Theory

First, we ask whether our findings are in accord with the OST theory's perspective and focus. Indeed, the evidence in Figure 1 suggests that the OST models are correct in dividing the economy into two sectors and 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 constitute all of job reallocation. In other words, the OST literature is correct in ignoring potential job creation in the old sector and job destruction in the new firms. This success may be surprising, since our definition of the old sector included privatized

firms, which could be producing new jobs. Further, the potential for a significant level of job destruction in the new sector was perhaps a more serious challenge to OST theory since it is well know from US data that new firms are likely to fail early on (see e.g., Davis and Haltiwanger, 1999).[49] Indeed, as transition proceeds, there appears to be more churning in the new sector as separations and JD rise.

The second remarkable finding in Figure 1 in terms of the OST theory is that the transfer of jobs from the old to the new sector continued at an approximately constant pace especially in the Czech Republic, where the scrapping of the old sector was gradual. This finding is in accord with the evolutionary perspective of the OST literature.[50] Our micro evidence supports the "organic" view of new-sector growth and old-sector scrapping.[51]

The number of workers in our data moving from old sector to new sector jobs jumped to high levels during the first two years of reforms in both countries and then declined. The OST models would have this number constant over time, as long as there is need for reallocation (transition). Hence, our 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 transition slowed down after the first few years. 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 (SBC) in the Czech Republic, where evidence of SBC exists (e.g.,

[49] High uncertainty characterizes initial phases of transition, implying that new-firm deaths and JD could be high 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 explored this issue by estimating layoff hazard functions with micro data. In our preliminary estimation using the Czech data, we find no significant differences between the layoff hazard in new and old firms, even after conditioning on productivity-related characteristics of the worker and industry classification of the firm.

[50] Moreover, the curvature of the trajectory describing the increasing size of the new sector in Figure 1 follows the prediction of the Castanheira and Roland (2000) model: slightly convex first and turning concave later on.

[51] Furthermore, in the Czech Republic, the economy quickly converged to a stable level of unemployment at which the JDold equaled JCnew as prescribed by OST.

Lizal and Svejnar, 2001). 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.

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 as the main force of labor reallocation during transition. In the Czech Republic, quits were the dominant way of transfer from the old to the new sector. However, this is in accord with the Castanheira and Rolland (2000) OST model, where even if old firms are not forced to layoff massively due to SBC, as long as their wages are kept low, close to the actual productivity level, these firms will see their workers leaving for the new sector. In this respect, it is important to stress that most medium and large Czech firms were affected by wage controls during 1991-1995 (see Flek, 1996). This policy may have made pulling labor from old to new sector easier, saving the transition in terms of the Castanheira and Roland (2000) model.

If we observed a very high new-sector wage premium in the Czech Republic, where there were relatively few layoffs from the old sector, but a low premium in Estonia, one might be tempted to interpret the wage premium as a pull factor necessary to lure workers out of their old jobs, signaling that low JDold is a bottleneck on reallocation. However, given the similarity of wage patterns in both countries, the premium is more likely a result of a selection on benefits from moving, where the old-sector workers with the highest potential profits and earnings in the new sector move first.[52]

Finally, the thrust of the OST theories is the inverted u relationship between the speed of job creation in the new sector and the level of non-employment (see, for example, Figure 5.2 in Roland, 2000). Hence, we estimate this relationship using the time dimension of our data. We regress 24 quarterly observations of JCnew in each country on the corresponding employment level, its square, and a constant. These regressions are presented in Figure 5. In both countries, both coefficients of the quadratic function were individually statistically significant at the 5% level, with correct signs in terms of the theory; further, attempts to estimate a higher-order polynomial failed. The behavior of

[52] Recall that our definition of the new sector contains self-employed and small firms where the profit sharing is likely to be high.

JCnew and employment over time track the theoretical relationship postulated by OST. The data provide a much better fit to the theory in Estonia where the OST curve reaches R^2 of 0.88 compared to a much poorer fit of the Czech regression with R^2 of 0.25.

Assuming that the theory holds, one can use the estimated patterns to assess the optimality of the actual macroeconomic policies. In this regard, Estonia exhibits a striking resemblance to an optimal transition. JCnew rises as employment decreases (non-employment rises) and most of the reallocation (job creation) occurs at the optimum level of non-employment. The Czech Republic does not conform to the OST prediction in that employment actually rises. Nevertheless, there appears to be a level of employment maximizing the rate of job creation. Yet, Czech employment passes through this point and most of transition occurs at suboptimal job creation rates.

Overall, the above discussion appears to support the usefulness and validity of the OST models.[53] Yet, heart of the theory is feedback from too high JDold to JCnew. Those readers who heuristically consider the Estonian JDold too high, and at 25% sectoral annual destruction rate in 1992 and 1993 many readers may, would expect high JDold to negatively affect JCnew. Yet, figure 4C shows that JCnew continued to grow at a steady rate while JDold peaked in Estonia.[54] Moreover, double JDold in Estonia compared to the Czech low (gradualist) JDold apparently coexist with similar levels of JCnew. In order for these findings not lead to a rejection of OST theory, the high Estonian JDold must not be too high compared to the optimum Estonian rate and the Czech JCnew must be lower than the attainable maximum. This seems to be confirmed by the estimated OST curves

[53] We are not interested in narrow rejections of the theory, i.e. based on the specifics of the JD-JC feedback mechanism. Instead, we focus on the essence of the various OST models. One could reject the Aghion and Blanchard (1994) model by pointing out that taxes were not raised during transition in either of our two countries in spite of growing unemployment. Further, at least in the Czech Republic, most of reallocation occurred as job-to-job flows so that unemployment did not play a role in keeping wages down. On the other hand savings did remain stable in the gradualist Czech economy and did decrease during the faster Estonian transition as required in the Castanheira and Rolland (2000) model. However, savings may have decreased as a result of hyperinflation and micro evidence from the Czech republic suggests that retained profits, not savings, were the driving force of capital accumulation in transition (Lizal and Svejnar, 2000).

[54] One possible explanation within the OST theory for why JCnew grows in Estonia when JDold shoots up is if the government is rapidly downsizing the old sector to speed up transition by raising unemployment and lowering wages. However, both the Czech and Estonian old sector enjoyed comparable rates of wage growth, making this explanation unlikely.

in Figure 5.[55] However, for some the ultimate lesson may be that Czech JCnew was just as high as the Estonian JCnew without the cost of mass layoffs and rising non-employment.

4.4 Interpreting Results in Light of Creative Destruction with Frictions

[VERY ROUGH FIRST DRAFT] How do the transition experiences of Estonia and the Czech republic compare to the assumptions and workings of the CH models discussed in Section 2.1? CH 96a,b motivate their models using contracting difficulties in the formation of production units. Czech transition is famous for its weak legal setup (for example, consider the case of TV Nova being taken from Ronald Lauder), asset stripping, weak collateral rules,[56] financial markets that lack transparency and investor protection, etc.[57] So it would appear that at least in the Czech Republic, appropriability frictions are important.

The theory predicts that in the absence of optimal CH policies, such frictions should result in decoupling of JDold and JCnew. If frictions are less prevalent in Estonia, its JDold and JCnew should be better synchronized. At the extreme, if contracting frictions are not important, transition should result in a spike (synchronization) in destruction, creation and unemployment (CH, 1996b).

We find that in Estonia, there is a large spike in JDold that corresponds to an increase in unemployment and JCnew. In accord with the theory, there are no large coinciding spikes in both JD and JC in the Czech Republic, which followed gradualist

[55] Admittedly, this support for the OST theory is based on two data points (country experience), but we find the inability of our detailed micro data to refute the OST theory an important signal about its validity. Yet, a truly convincing test of the OST models would use data from many countries differing in their speed of job destruction of the old sector and other of the OST parameters. It would consider the resulting (different) dynamics of unemployment and job creation across these countries. Unfortunately, detailed micro-level data providing consistent and accurate coverage of the relevant indicators over the course of transition for a number of transition countries is not available.

[56] At least 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.

[57] Further, a study by Riboud, Silva-Jaregui (2001) calculates differences in the institutional rigidities in the labor market in FSU and CEE countries to compare them to EU countries – sclerosis. They find that Estonia is rated ____ and Czech Republic is _____ while _____. We are currently collecting evidence on potential differences in bargaining position of insiders

policies in an environment full of frictions. However, we find powerful synchronization of Czech JD and JC, albeit of a different form. Czech gradualism results in a high-frequency synchronization, which makes the market appear frictionless and eventually leads to an extent of sectoral reallocation comparable to that of the fast-acting Estonia.

One explanation for the seemingly well synchronized Czech transition is if the optimal policies in terms of the CH models were put in place. Unfortunately, there is no evidence on the share of the generous Czech bank credit going to small new firms. If it were substantial, one could interpret the early Czech success as being due to the combination of creation incentives and gradualist destruction of the old sector.

5. Conclusion

[INCOMPLETE, TO BE PROVIDED]

Only few years into transition, small de novo firms provide more jobs than large old firms.[58] Yet, most of transition research focuses on the issue of enterprise privatization.

Does gradualism "redress the transitional employment problem"? It may. Czech gradualist transition eventually leads to a similar extent of reallocation compared to the rapid Estonian approach to the destruction of the post-communist firms. However, the Czech (Bulgarian, Romanian) soft-loan gradualism leads to corruption and reduces the transparency of economy.

Future research is needed to shed light on the new/old difference in productivity as a true measure of restructuring. Further, it may be interesting to ask about the institutional determinants of JC and JD such as SME start-up procedures, unemployment insurance and welfare.

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and the structure of creation costs from the EBRD-World Bank Business Environment and Enterprise Performance Survey.

[58] World Bank (2000) indicates the importance of distinguishing between the entire private sector and its *de novo* components by showing that the strength of the association between cumulative GDP and the share of small (new) firms is somewhat greater than that between the share of the private sector and cumulative GDP.

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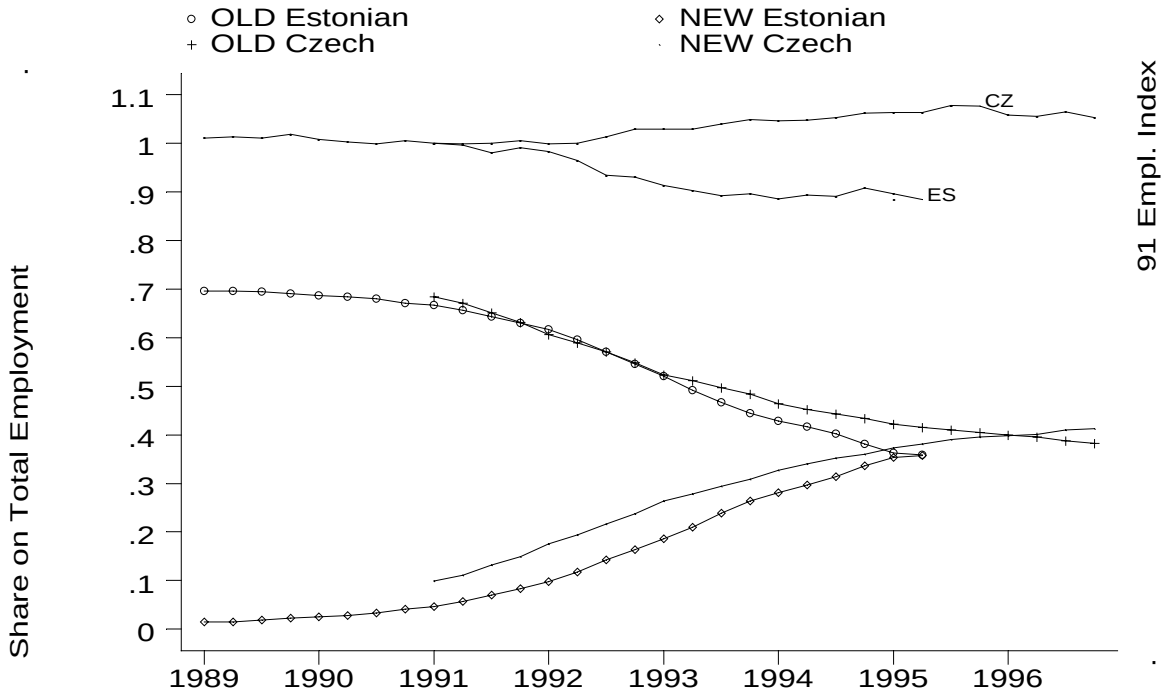


Figure 1: Employment Evolution by Sector

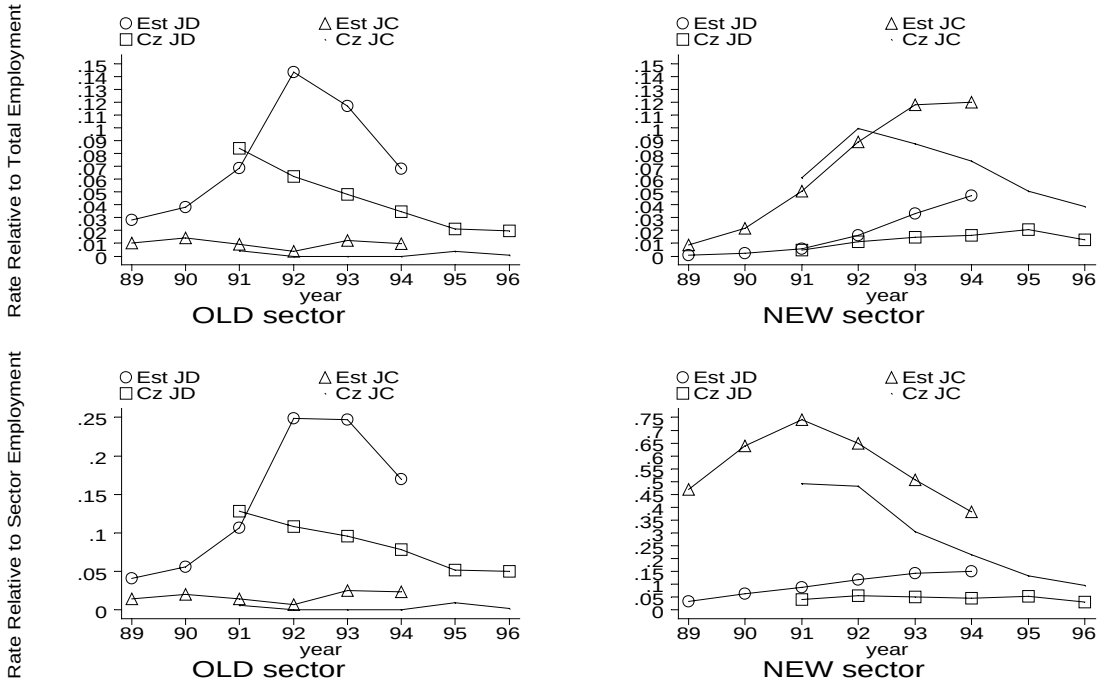


Figure 2: Job Reallocation by Sector

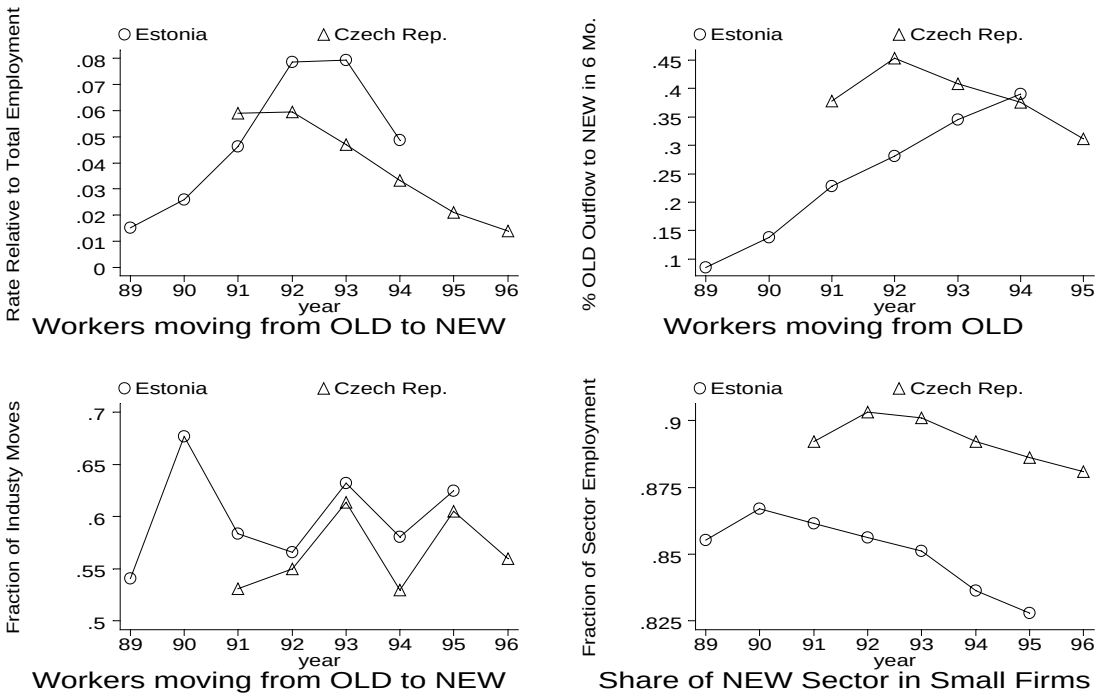


Figure 3A: Reallocation from OLD to NEW

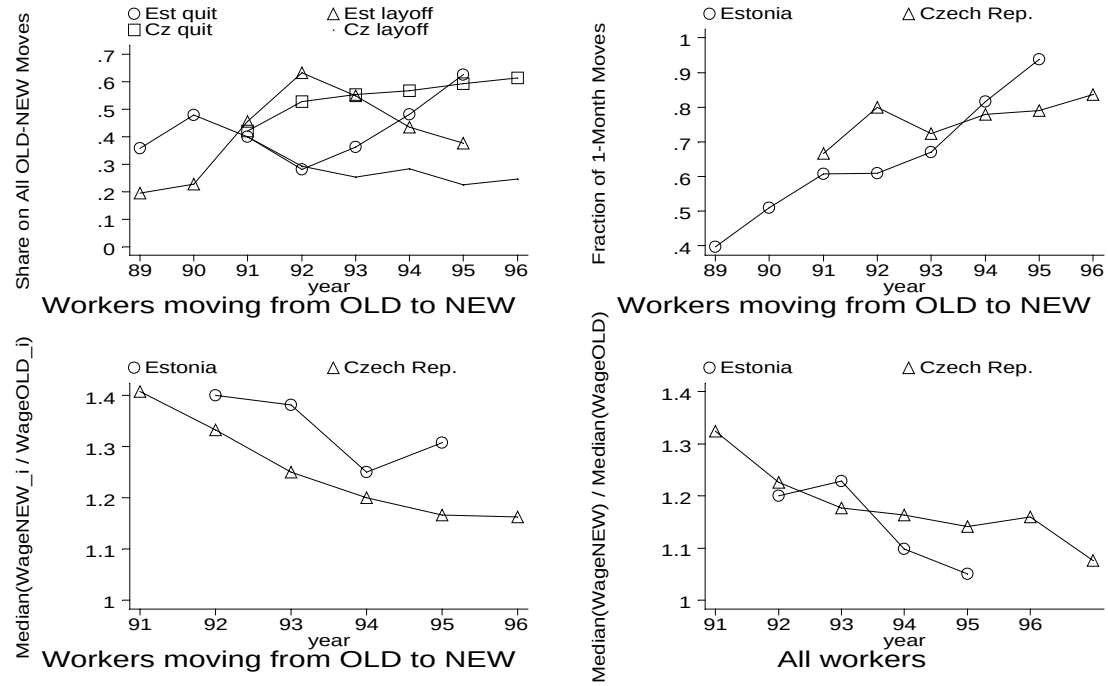


Figure 3B: Reallocation from OLD to NEW

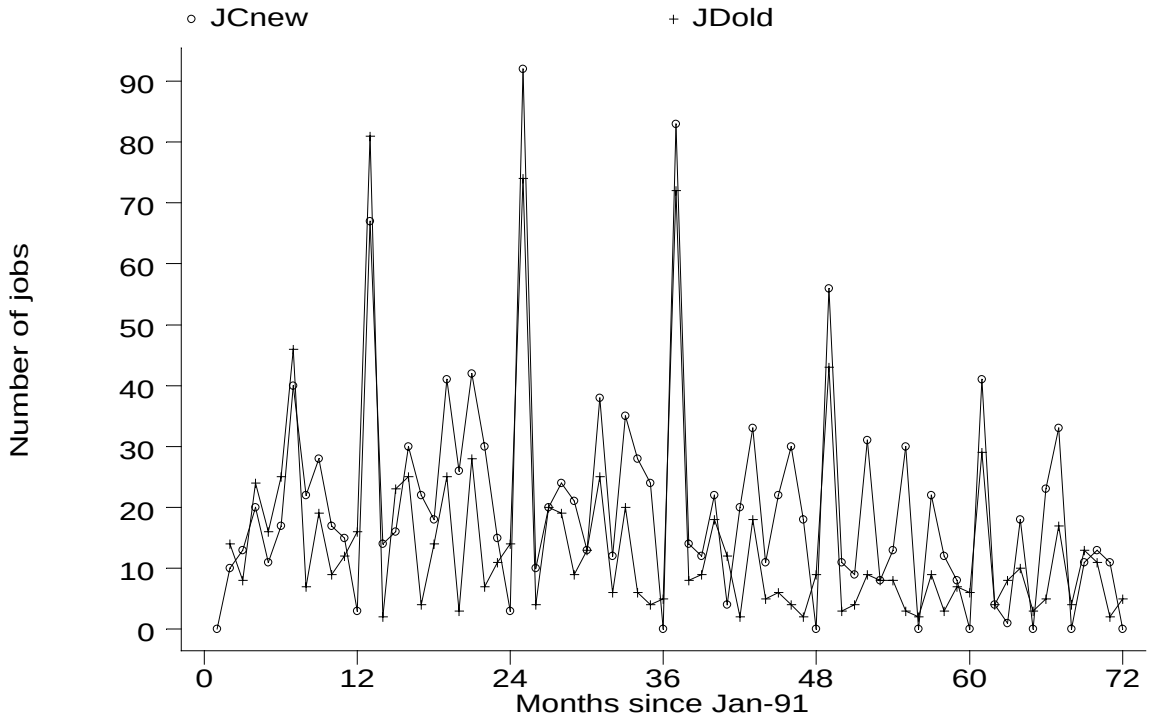


Figure 4A: Czech Monthly JDold and JCnew

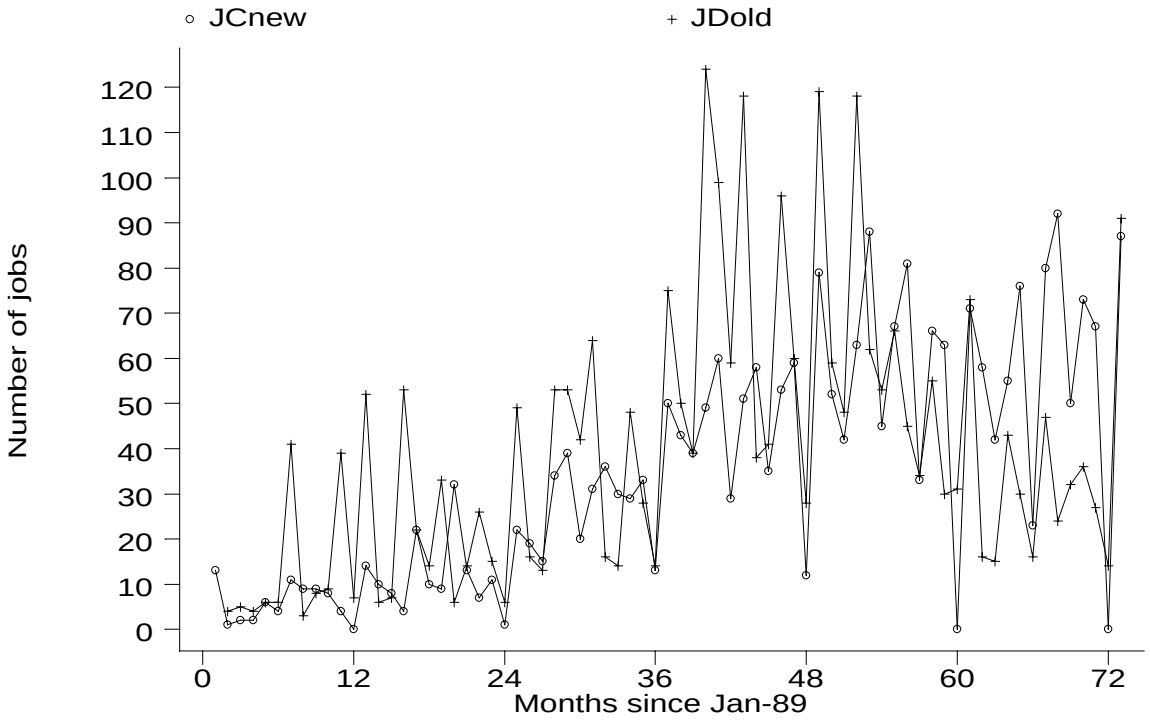


Figure 4B: Estonian Monthly JDold and JCnew

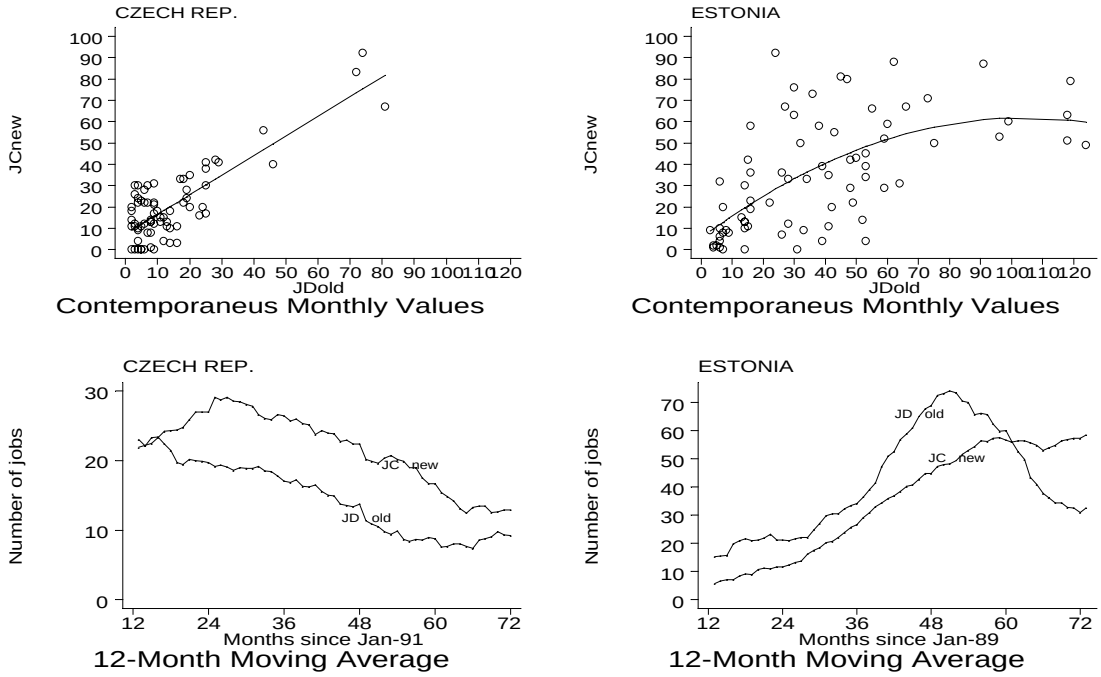


Figure 4C: JDold and JCnew Time Series

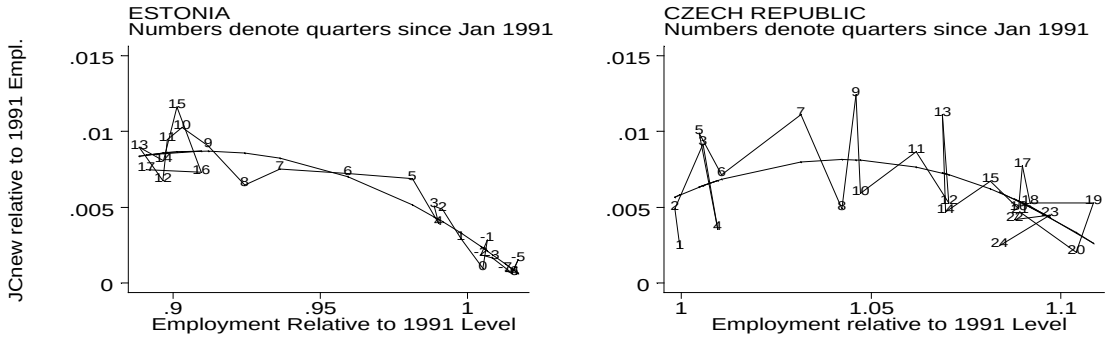


Figure 5: OST Curve

Appendix

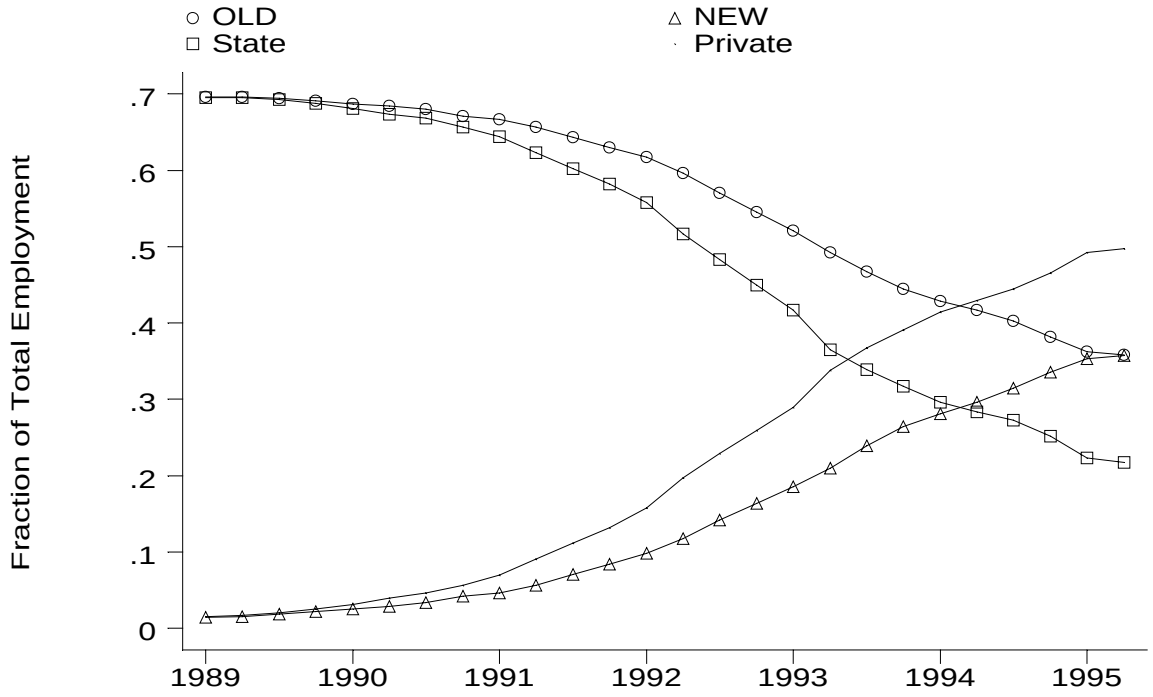


Figure A.1: Estonian Employment by Sector

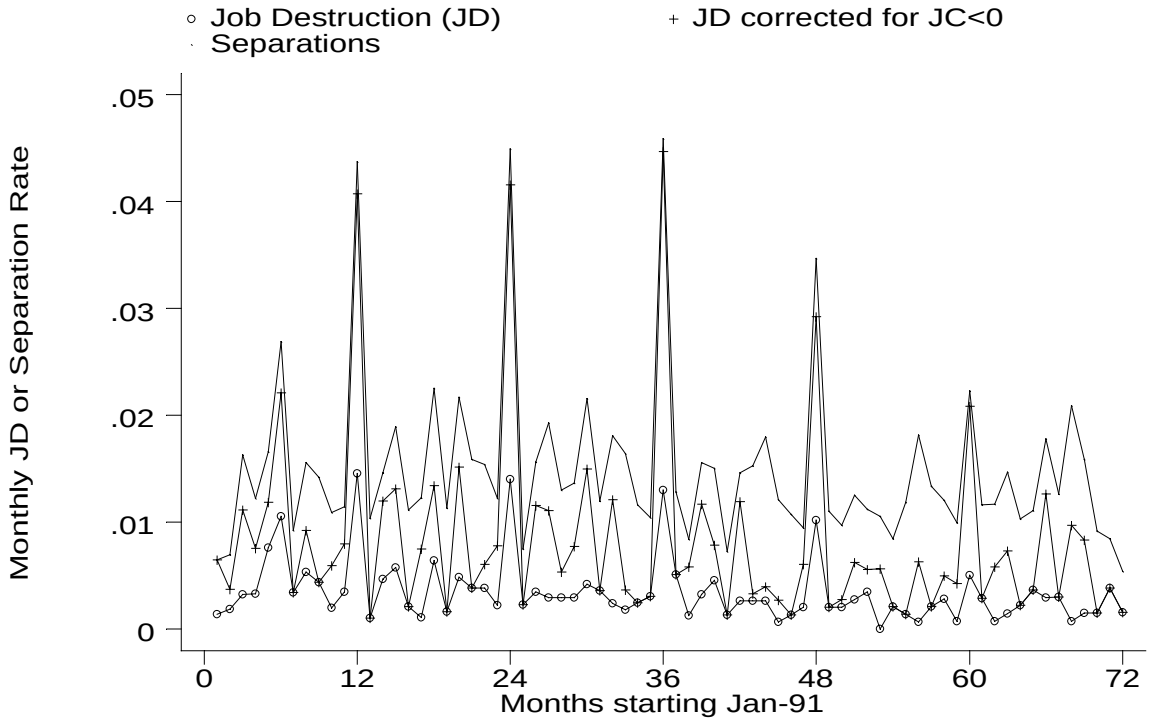
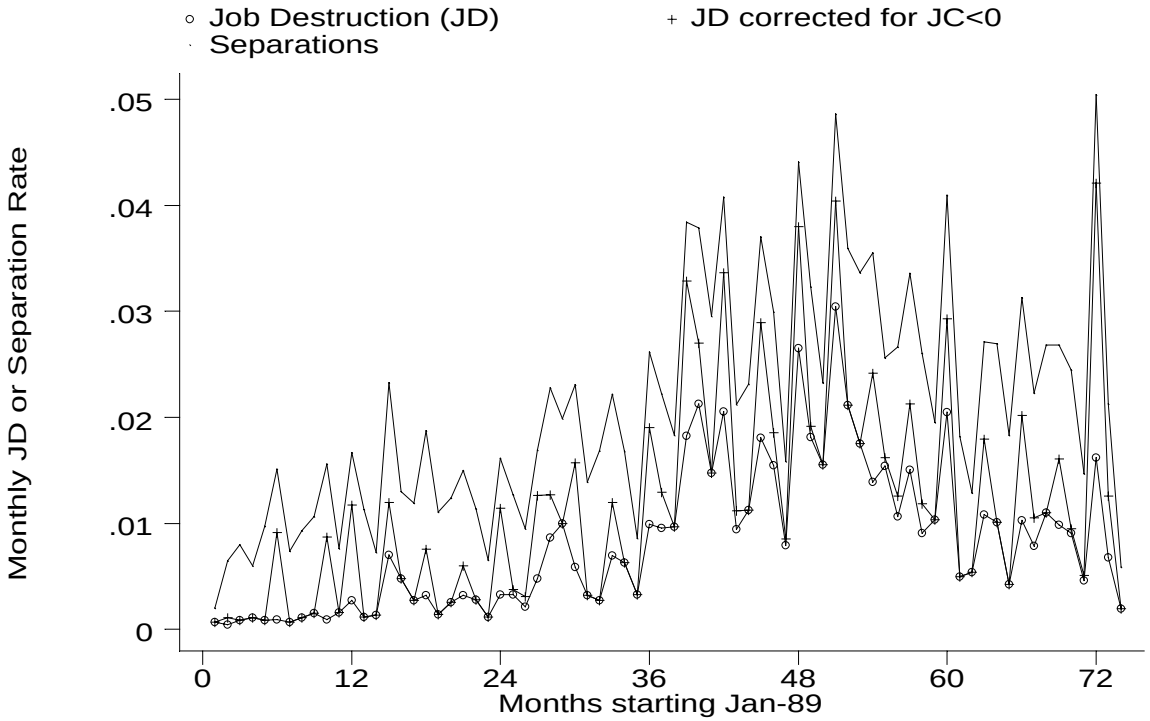


Fig. A.2: Correcting the JD Measure in Czech OLD Sector



ig. A.3: Correcting the JD Measure in Estonian OLD Sector