Labor reallocation and demographics: revisiting Aghion and Blanchard (1994)*

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First version: July 2014
This version: May 2015

Abstract

We analyze the role of the labor market flows and demographics in structural change of employment. We explore the evidence from all transition economies over the nearly three decades, providing insights on the mechanics between the reallocation of the labor force. We show that the flows of workers between jobs are essentially rare and occur mostly within industries rather than between them. Also, flows of jobs from public to private sector (i.e. privatizations) trump the flow of workers between the two. Finally, we demonstrate that the speed of changing the ownership structure in the economy has substantially driven exits to retirement, especially early exits.

JEL Codes: D21, D24, D92, G21
Key words: transition, job creation, job destruction, worker flows, unemployment

*Authors would like to thank Karsten Staehr, Saul Estrin, Roberta Gatti, Tomasz Mickiewicz, Jan Rutkowski for their insightful suggestions. The paper benefited greatly from the comments of the participants of IZA/World Bank (2015), EEA (2015), Scottish Economic Society (2015), EACES (2014), WIEM (2014), UoW, WSE, UCL and GRAPE seminars. The support of National Center for Science (grant UMO-2012/05/E/HS4/01506) is gratefully acknowledged. Usual disclaimer applies.

1 Introduction

Large shifts in employment structure, as those caused by technological as well as institutional changes, are frequently thought of as periods of more intense need for labor market intervention for at least two reasons. On the one hand, to the extent that economic forces alone fail to synchronize job creation and job destruction, there is room for two types of policy instruments: those that can make the two processes more positively correlated and those that mitigate the social cost of desynchronization, i.e. passive labor market policies. On the other hand, changes in the production structure often imply changes in the demand for skills, that can be addressed via active labor market policies. These policy recommendations rely on the premises that the change in employment structure is equivalent to flows of workers between the jobs – a process typically thought of as driven by complex dynamics as well as subject to many informational frictions.

In terms of labor utilization, transition countries in Europe and Central Asia underwent a significant structural change over the past three decades. This change consisted of two quite distinct economic processes. The first involved an ownership change associated with a decline in the public sector and a vivid growth in the private one. The literature in this field focuses on the optimal speed of transition (OST), see for example Konings et al. (1996); Bilsen and Konings (1998); Noorkoiv et al. (1998); Boeri and Terrell (2002); Haltiwanger and Vodopivec (2002); Faggio and Konings (2003); Jurajda and Terrell (2008). From a theoretical perspective, the process of ownership and efficiency transformation was treated in Aghion and Blanchard (1994) model (henceforth AB), with its subsequent extensions. The second process comprises a more universal economic tendency of sectoral reallocation from manufacturing to services, which has been, and is still being, observed in both transition and advanced market economies. This topic has been under scrutiny in a number of contexts ranging from Kuznets (1955) *via* Lilien (1982) to Kiyotaki and Lagos (2007), but perhaps the most influential has been the take developed by Caballero and Hammour (1996a,b, 1998, 2000), henceforth CH.

As argued by Haltiwanger and Vodopivec (2003), for the operationalization of AB and CH in empirical research, the distinction between job flows and worker flows is of crucial importance. Both, the AB and CH approaches implicitly begin with job-level adjustments and translate them mechanically to worker-level adjustments, which has important drawbacks. For example, employment in state owned enterprises can decline either through the destruction of state owned incumbents and the emergence of private firms (pure worker flows); or through privatizations, i.e. change of company ownership form without a change in company substance (pure job flows). Most of the empirical studies relied on the available net job flows ($JobCreation - JobDestruction$) or net worker flows ($Hirings - Firings$), since this type of data is more readily available. Conceptually gross job flows ($JobCreation + JobDestruction$) or gross worker flows ($Hirings + Firings$) are more appropriate. Unfortunately, actual data on job and/or worker flows is scarce among formerly centrally planned economies, whereas the changes in the aggregates such as structural employment are more frequently reported. Also, when available, labor force surveys for the early years of transition tend to be of low quality and, in general, of reduced comparability across countries. These difficulties have largely limited the selection of countries analyzed so far in the literature, with little insights on how representative these countries are.

In this paper we contribute to the literature along three margins. First, we utilize comparable worker-level data on gross flows for 27 transition countries over the entire post-1989 period. Our data comes from a new database of retrospective surveys in European and Central Asian transition economies, gathered by EBRD in the Life in Transition Survey (LiTS). This

database is particularly rich, as it contains information on the household characteristics, on the respondent's personal and familiar background as well as detailed information regarding the labor market status in every year since 1989. We can thus observe individual worker flows, which were largely missing in literature. The use of net flows is not problematic when reallocation between existing firms and within sectors is of minor importance, as seems to be the case of Slovenia (De Loecker and Konings, 2006). However, if flows within industry or between state-owned firms are of relevance, net measures are not able to tell much about the nature of the jobs and workers reallocations. Hence, our work aims to fill this space and provide new evidence on the worker flows within and between industries and their contribution to the change in structure of employment.

Second, this paper also innovates in terms of the research question. Typically, the literature in this field focuses on testing the predictions of the AB model in reference to transition economies, while the analysis of sectoral reallocation hypothesis has been usually limited to the context of industrialized countries. Given the richness of our data, we can combine the two strands of the literature in one coherent empirical framework, putting the CH and the AB into a horse race, i.e. check the explanatory power of these models for the labor reallocation in transition economies. Also, most of the tests and studies were rather indirect.[1] The advantage of working with the individual worker flow data is that we can directly identify the flows which follow the mechanics of the AB. Our results suggest that, though some of the flows indeed follow the trajectories prescribed by the literature on the optimal speed of transition, most of the adjustment occurred *via* alternative channels.

The third intended contribution of the paper consists of explicitly tackling the demographic side of the labor market reallocation. Indeed, while raised in some studies – e.g. Card and Lemieux (2001); Lemieux (2006) as well as Boudarbat et al. (2010) – demographics remain often overlooked in the literature, mostly due to the focus on net job flows. However, productivity is inherently embodied in humans, who tend to enter and exit labor market and their skills (may) become outdated. Arrival of "new" workers – i.e. the entry of new cohorts with relatively fresh education but little or no professional experience – affects both the relative bargaining position of the unemployed (important in the AB model) and the ability to "appropriate" the rent from an employment contract (important in CH models). In addition to AB and CH type of adjustments, the transition economies like all other economies experienced a fairly exogenous, demographic change with (relatively more numerous cohorts of) older workers retiring and (relatively less numerous cohorts of) young entering the labor market. These flows may indeed be crucial for explaining the speed, scale and scope of labor reallocation. Moreover, these processes can be largely influenced by policy intervention. For example, eligibility rules for the early retirement schemes may affect the rate of labor market exits, inasmuch as taxation to support such schemes could create wedge reducing job creation, in a spirit similar to the AB framework.

With these three objectives in mind we formulate the following testable hypotheses. **First**, we argue that only a minority of the flows that occurred in transition had characteristics inherent to either AB or CH models, i.e. majority of change in the employment structure had been a consequence of the demographic shift, whereas the majority of the worker flows occurred within firms of the same sector or form of ownership (H1). **Second**, we posit that the individual

[1] For example, using firm level data Brown and Earle (2004) show that after the reforms more productive firms tend to grow more than the average firm. Faggio and Konings (2003) for a panel of countries and Siebertová and Senaj (2007) for Slovakia argue that firms' size has a negative correlation with the growth in employment, which seems to suggest that smaller (i.e. private *de novo*) firms tend to hire (relatively) more. But this test is fairly weak and subject to the cut-off point in the data (the minimum size of firms included in the survey). For Ukraine, Konings et al. (2003) finds no such result in either manufacturing or services.

choices of early labor market exit were to a lesser extent driven by the rate of job destruction in the public sector and to a larger extent by the job prospects in the emerging private sector (H2).

We find that the flows consistent with AB and CH theory represent only a small fraction of all worker flows. Indeed, changes of employment within the same sector or form of ownership – whether or not mediated by an unemployment spell – proved to be much more numerous, followed closely by job flows rather than worker flows. With reference to H2, we show that flows to retirement were indeed an important driver of the net change in the structure of employment, as individuals in the public sector and in the manufacturing industries tended to exit the labor market faster. These findings suggest that in the process of massive labor market reallocation require much more intensive facilitation than has been in place in the transition economies, or else the reductions occur at a fiscal cost considerably bigger than previewed by the models in the spirit of Aghion and Blanchard (1994).

The paper is structured as follows. In the next section, we review the key assumptions and dynamics behind AB and CH models; however our focus will be set on the empirical literature. We then carefully describe LiTS data in section 3, comparing the patterns emerging from this data to other sources in order to evaluate to what extent retrospective data on fairly small samples may be trusted. We deal with the first hypothesis of our study in section 4, where we discuss the stylized facts about the gross worker flows. We decompose the flows into AB, CH and demographics, analyze the time trends and countries which stand out. Finally, in section 5 we deal with the second hypothesis of our study, analyzing the drivers of the timing of labor market exits. The concluding section discusses the policy recommendations which stem from the novel results in this study.

2 Literature review

In principle, the mechanics of the economic transition from a centrally planned to a market economy are as follows: presumably inefficient public sector firms need to dissolve and a vibrant, efficient new private sector needs to emerge. Job flows may come in two different forms: privatization, when workers stay in the firm, but the ownership structure changes to private hands; or worker flows between different jobs in different companies, possibly with a spell of unemployment between the two.

Theory posits that these simple mechanics are subject to two forces. The first of these forces comes from the fact that (possibly transitory) non-employment usually happens with state support, while at the same time the collapse of the public sector limits the options to raise the funds necessary to intensify social safety nets expenditure. This particular type of relationship was emphasized in the model by Aghion and Blanchard (1994). The state raises funds to finance safety nets by taxing labor, which pushes the (non-wage) cost of labor up. If the tax wedge becomes too high, job creation lags behind job destruction. The accumulating non-employment pushes wage claims down, but the tax wedge prevents vivid job creation, deepening the social costs of public-to-private sector reallocation. If the speed of job destruction is synchronized with the capacity of the emerging private sector to create new jobs, the non-employment pool is low, fiscal needs small, levied taxes are less distortionary, and an economy may find a fairly efficient equilibrium. Otherwise, an unstable high non-employment equilibrium emerges. Consequently, the relation between job creation and unemployment has an inverse U shape.[2] Clearly, both

[2]Garibaldi and Brixiova (1998) arrived to the same conclusion using a search and matching model, though the transmission channel was different: unemployment benefits increase the reservation wages of employees and decrease the value of a match, which discourages job creation.

the 'non-employment' and the 'taxes' should be taken figuratively, not literately. Benefits may comprise also of pre-retirement benefits made available to individuals aged between 45 and retirement age to discourage them from participating in the labor market and increase their support for the reforms, as has been frequently the policy in the transition economies, see Fox (1997).[3] Also, taxes should be viewed in a broad sense as they may encompass the opportunity costs of expanding productivity-enhancing infrastructure.

The second force is associated with the extent to which labor is a specific input, as raised by Caballero and Hammour (1996a,b, 1998, 2000). Caballero and Hammour developed a family of models of structural change[4] with two particular features: capital specificity and incomplete contracts. Capital specificity leads to the generation of quasi-rents (a surplus over the value of the match) which can be partially appropriated by workers, even though they are firm specific, due to incompleteness of the employment contracts. With considerable adjustment costs, impulse to reallocate labor may yield excessive job destruction and insufficient job creation. Different characteristics and the institutional arrangements associated with an employment contract imply different scope of appropriation for the workers, which changes the bargaining balance between workers and employers. In a simple model, where all sectors have the same productivity, it produces a desynchronization of job creation and destruction, which eventually generates an inefficient equilibrium of excessive unemployment. If two sectors differ by productivity (as in AB model), appropriation leads to sudden increases in unemployment and slow job creation.[5] In the limit, employers create little or no jobs at all, despite actual demand for the final product.

Both of these forces have been put into empirical testing in abundant literature, see Table A.1 in the Appendix. The countries that were most frequently analyzed in earlier studies – Czech Republic, Estonia, Poland and Slovenia – all come from one region, while Southern Europe, most of the Baltic States as well as Central Asia were rarely subject of analyses. Also, only few of the earlier studies cover the period of early 1990s.

Three main stylized facts emerge from the empirical literature on labor reallocation during the transition. First, the patterns of job creation and job destruction changed as the transition rolled out. Haltiwanger and Vodopivec (2002) show that in Estonia initially job destruction exceeded 10% with job creation lagging, but as of 1995 they were fairly at par , making gross reallocation rates in Estonia close to those observed in the US. Gradual synchronization of job destruction and creation was also confirmed for a number of other countries by Faggio and Konings (2003) and by Jurajda and Terrell (2008), but in these studies time period covered makes it likely that cyclicality of the job flows caused this result. Second, determinants of worker flows also changed with the progress of the transition. In the first stage they were predominantly a consequence of job terminations, whereas in later stages wage differences appear to encourage worker flows (Konings et al., 1996; Bilsen and Konings, 1998).[6] Third, the literature suggests that institutional environment conducive to private property and entrepreneurship seems to

[3]Models explicitly addressing the two processes – the speed of transition and the political support – have been developed by Rodrik (1995) and Roland (2002). These models emphasize that the need to redistribute in exchange for political support is likely to affect the fiscal side of the transition and the rate of job destruction in the public sector.

[4]In a series of papers, the authors analyzed the cases of a restructuring impulse coming from cyclical factors (1991; 2005), technological innovation (1998) and intersectoral shift (1996a; 2000).

[5]A consequence of sclerosis is that if appropriation is close to complete, no transition will occur at all, even if it would be socially optimal to do so Caballero and Hammour (1996a). Unlike AB model, the reallocation is a private process, i.e. the state cannot directly decide on the flow of people to unemployment.

[6]Noorkoiv et al. (1998) analyzed the effects of flows on wages. They showed that flows were rapid whereas compensation schemes did not seem to differ for shrinking state-owned manufacturing sector from expanding private service sector.

speed up the job creation. This finding is implicit in some of the above studies, and addressed explicitly by Johnson et al. (2000) and Boeri and Terrell (2002). In principle, the net changes were initially much faster in CEECs, cfr. Boeri and Terrell (2002); Earle and Sabrianova (2002); Lehmann et al. (1999); Svejnar (2002).[7]

When it comes to testing the assumptions of the AB and CH models, the empirical evidence so far is inconclusive and country specific. De Loecker and Konings (2006) measured factor productivity in Slovenia between 1995 and 2000 and decomposed the changes into their possible causes. They showed that productivity increased more in private firms than in public firms, and that the main drivers of the increment were downsizing (job destruction) in privatized and vivid productivity growth in newly created firms. However, Orazem and Vodopivec (2009) shows that the overall productivity growth was a universal pattern, unrelated to industry or ownership. Dimova (2008) also contests the claim on transition-driven productivity with data from Bulgaria: even though jobs and workers clearly reallocated to more efficient industries, the impact of this process on factor productivity was overshadowed by industry specific changes, such as market competition and import penetration. In a series of articles Brown and Earle (2002; 2004; 2006; 2008) show that employment gradually concentrates in more efficient firms in the context of Russia and Ukraine; but workers moving within the same industry/sector from low to highly productive firms have a greater impact on overall productivity when the dispersion between firms is higher. Given how dispersed the state sector was prior to the transition – ranging from nation-wide large scale manufacturing enterprises to small, local groceries – these findings are not indicative of either AB or CH models being dominantly at work.

Both AB and CH assume that workers are in fact homogeneous. Therefore, they have the same probability of leaving the state/shrinking sector and finding a job in the emerging one. This is at odds with broader evidence provided by microlevel analysis, such as Jurajda and Terrell (2003) in the case of the Czech Republic and Estonia as well as Schaffner (2011) for Germany and Turunen (2004) for Russia: there were persistent patterns of selectivity, see also Gimpelson et al. (2010).[8]

In addition, both AB and CH models neglect four potentially important flows: movement towards permanent non-employment and movements into job-seeking from non-employment; flows out of employment from the *private/emerging* sector as well as to employment in the *public/disappearing* sector; and direct job-to-job transitions from one sector to the other.[9] The addition of these flows would be desirable if we consider, for example, the role played by early retirement schemes. Although these schemes are similar to unemployment benefits from the fiscal perspective (they are a social safety net that need to be financed *via* taxation) they are very different when it comes to labor market effects. The job-seekers with benefits are able to minimize the extent to which their household needs to reduce consumption, but they still exert pressure on wage reductions in order to re-enter employment. Individuals who leave the labor force due to early retirement schemes no longer affect wage pressure. Indeed, Boeri (1999) shows that the flows towards inactivity and between jobs were more numerous than the transitions

[7]With the exception of Czech Republic, Estonia and Slovenia, little is known about the synchronization of job destruction and job creation processes, see Sorm and Terrell (2000); Jurajda and Terrell (2003); Haltiwanger and Vodopivec (2003); Orazem et al. (2005).

[8]To address this point, Boeri (2000) as well as Balla et al. (2008) extend the original framework to comprise worker heterogeneity.

[9]An extension which comprises direct job-to-job flows has been offered by Tichit (2006), with the additional feature of job destructions occurring in the private sector. Castanheira and Roland (2000) propose that the state controls also capital flows in addition to worker flows. This is close to the idea that the state is actually in charge of the privatization process as well as actual bankruptcy (which bears some resemblance to the so-called soft budget constraint). In earlier work, Papapanagos and Sanfey (1997) extends the original AB model to include emigration flows which mitigate the unemployment and moderate wage expectations.

mediated by unemployment. Think of a following example: if 5 birth cohorts leave the labor market, e.g. the jobs in a declining sector and 5 birth cohorts enter the labor market, e.g. jobs in the growing sector, the overall change in the structure of employment will be approximately 12.5% in net terms and as much as 25% in gross terms without a single worker flow between the sectors. If roughly 10% of the active population is without a job and actively seeking one, arrival of a one new young cohort constitutes already a 25% increase in the number of job seekers, *ceteris paribus*. On the other hand, exit of an additional cohort improves the bargaining position of remaining workers, potentially reducing the size of the pool of job seekers whose skills are partially or fully outdated.[10]

In general, the narrative from transition economies suggests that job destruction occurred in the sections of the public sector that fell into bankruptcy or were privatized, mostly in the manufacturing industry; while job creation was most intense in *de novo* private firms, mostly in service sector. Previous analyses indicate also that the proportions between these processes were different across time and countries, see Boeri (2000). These general tendencies were confirmed in Baltic and Central European countries, whereas Russia, Ukraine and Southern Europe provide much weaker or sometimes even contradictory evidence, Acquisti and Lehmann (2000). On the other hand, mostly due to data shortages, not many studies were able to explicitly identify the flow of workers from "old" (state-owned, manufacturing) sector to a "new" (private, services) one. Studies show that employment grew rapidly in construction and trade while it dropped in manufacturing, but these analyses rely on the net changes in employment, rather than the gross flows suggested by both AB and CH models. In the reminder of this paper we provide evidence on the worker flows and changes in the structure of employment in transition economies.

3 Data

We employ data from the *Life in Transition Survey* (henceforth LiTS), launched by the EBRD in 2005, which overcomes many of the limitations inherent to this literature, as discussed in the previous section. The survey was conducted in 2006 and 2010 in 29 countries, including most of the European transition economies; missing only Turkmenistan from the former USSR and Kosovo. We focus on the European and Central Asian transition economies.[11] In this section, we describe the data properties and move along to some of the stylized facts emerging from this new dataset.

The LiTS database contains individual retrospective surveys on a representative sample from the population. In each country, 1000 individuals were interviewed. The sampling procedure reflects different stratification levels, including sub-national departments and cities. The questionnaire consisted of two parts. The first, answered by all members of the household, presents the general characteristics of the household. The second, individual, part corresponds to the values and attitudes, current employment and employment history, and was asked to a randomly selected individual (whoever had birthday the closest to the day of the interview and was present in the household). Only the 2006 survey provides retrospective data, and therefore is our principal source of material.

The LiTS database is extremely rich. In addition to basic socio-economic variables (age, gender, education, size of the residence) it also provides the total number of jobs held by workers in each year. This characteristic permits the direct identification of gross flows. While taking up a new job is not necessarily *job*creation (the position may be assumed after someone

[10] This issue has partially been addressed theoretically by Bruno (2006), but the empirical evidence is scarce.
[11] While Mongolia and Turkey also participated in the survey, they were excluded from our sample.

whose contract was terminated or the previous worker retired) and separation is not necessarily *job* destruction (the position may be immediately filled by someone else), *worker flows* are identified in gross terms in LiTS database, which is unique for such a long period of time and wide selection of countries. For individuals with multiple contemporaneous jobs, we identify the main occupation using the lowest ISCO code which corresponds to the highest skill level. We thus refer to separations and hirings, because identification occurs on the worker and not on a firm level.[12]

Given its retrospective nature, this database is subject to some well-known limitations. First, the interviewee might not perfectly remember all the positions held since the onset of the transition process. People might recall better the jobs they had in the recent years, which might inflate job reallocation close to 2006 (the year of the retrospective survey) relatively to the earlier ones. Second, since the sample is representative for 2006 in each country, it is likely that older workers in early transition were underrepresented for purely demographic reasons.

The data from LiTS has some minor definitional shortcomings. First, the data does not permit a direct identification of unemployment, because individuals report the employment status, but not the labor force status. Consequently, some are not in employment because of age (e.g. schooling or retirement), others because of unemployment and yet others because of inactivity. The first group we identify based on age and previous/next status: previous pupils/students or future retirees need not be counted as unemployed in these periods. Students are included in the inactive category only before they achieved their highest degree and as long as they are under 25 years old and they have not worked in the past. Retirees are those who self-reported either to be officially retired in a given year of the sample (or any year before) or declared to move to retirement from the previous job. In a small number of cases, people kept working after being officially retired. In those cases, we consider them to be retired after they left their last job. Yet, the inactive remain indiscernible from the job seekers in the survey. To correct for this shortcoming, we constructed a definition of an inactive person to comprise individuals who do not report working in any of the years of the survey during which they were in the working age. Consequently, the unemployed are those individuals who were in the working age, who did not have a job in a given period, but did work in at least one year of the sample. Even after these refinements unemployment rates in the LiTS remained higher than the official statistics, see Figure B.1 in Appendix B.[13]

The second definitional shortcoming of the LiTS data is that there is no direct information on whether 'currently' private employer was a formerly a state-owned enterprise that got privatized or is it a *de novo* private firm. The responders are asked, though, if the particular employer existed at all prior to 1989, which we use as identification of SOE. This identification is clearly only an approximation for two reasons. First, it is likely that – especially young – responders may misidentify re-branded foreign-owned privatized firm as a one that did not exist in that country prior to 1989. Second, in some countries, such as Hungary, the private sector existed even in the centrally planned system, the limitations on size or industries granted.

Despite these shortcomings, LiTS data reflect fairly well the structural characteristics of employment. Table B.2 in the Appendix compares the results from the LiTS with the European Labor Force Survey (EU-LFS)[14] for all the countries included in both surveys and in Table B.3

[12]Unfortunately, the LiTs lacks information on wages, size of the employer and hours worked within each jobs, which limits our possibilities in the analysis.

[13]A regression of one on the other returns a coefficient of 0.601 (s.e. 0.068). Given this lack of fit we performed our analysis using both the official unemployment rate and the one derived from LiTS, with only minor differences between estimates.

[14]Given that the EU-LFS lacks information on the ownership structure of the firm, we used the Structure of Earnings Survey (SES) as of 2002. In addition, Table B.3 conveys also information on GDP *per capita* and

in Appendix B we describe age, gender and education in our sample. The minor differences stem also from differences in coverage.[15]

Using the retrospective microeconomic data, we divide the flows into seven types. First, following Aghion and Blanchard (1994) we identify a change from a public sector employment into a private sector employment, while keeping the industry constant – with or without a spell of unemployment. We call these flows AB flows. Second, in a similar spirit, we define CH to identify flows from manufacturing to services, while working in the same form of ownership sector. In addition, some flows comprise both types of changes (public manufacturing to private service) and flows within each industry/sector. We call the former ABCH and the latter SAME. Finally, one could move in directions opposite to the ones predicted by both theories – i.e. from private to public or from service to industry. If that is the case, we call these flows OPPOSITE. These five types of flows are complemented by outflows to inactivity (i.e. predominantly retirement) and entries from inactivity (i.e. predominantly youth entry). We also code the information on no changes in employment.

4 Stylized facts about worker flows in CEECs

First, we analyze the relative size of each type of flow in the 27 countries. Here, the unit of observation is a flow, which implies that one single individual could be counted many times, if within the observation window his status changed more than once. In principle, and since the sampling procedure of LiTs guarantees a similar number of observations for each country, this indicator requires no scaling. However, the employment and activity rates differ, so we present this statistic in both raw term (Figure C.2a in the Appendix) and scaled by the size of the workforce in Figure 1. These simple descriptives reveal that labor market entries and exits where by far the most numerous in all countries considered. Across all countries CH flows are of minor importance, AB flows and ABCH are relatively much larger, but still remain substantially smaller than SAME and OPPOSITE flows. Flows to retirement and from school are by far systematically the largest. Given the methodological constraints concerning the measurement of early retirement in LiTS, our estimates of this flow should be considered a lower bound.[16]

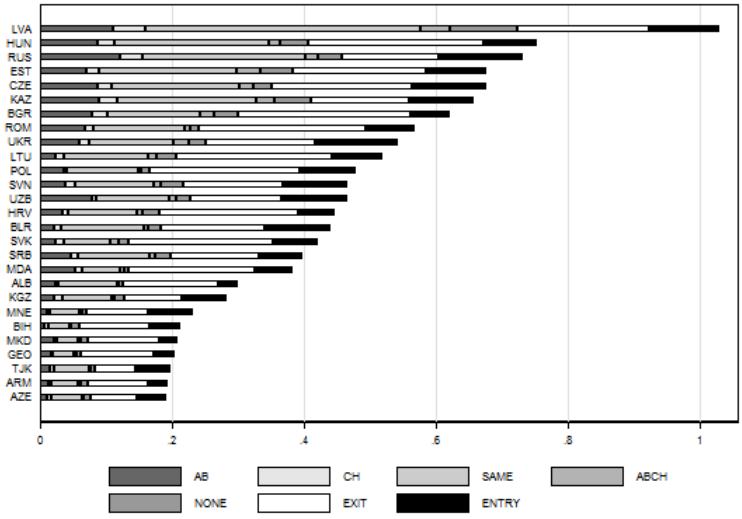
Figure 1 reveals also considerable heterogeneity across countries in the size of labor market flows. Countries with still much larger state sector – Central Asia and partly also South Eastern Europe – observed almost no AB flows, Uzbekistan and Kazakhstan clearly stand out. Also, some of the countries frequently analyzed in the literature are clear outliers. For example, Estonia and Czech Republic are generally characterized by substantially larger flows than others, which makes the comparative analysis by Jurajda and Terrell (2003) generalizable only to a certain limit. Focus on Slovenia by De Loecker and Konings (2006); Bojnec and Konings (1998)

unemployment. As expected we observe the increase in unemployment rates in all countries, with a larger variation between countries than within them, which indicates the relevance of cross country comparisons.

[15]The LiTS overestimates the importance of employment in the service sector, with a margin of difference that varies from a small 1% in Romania to almost doubling its size in the case of Lithuania. The estimations of manufacturing share in employment seem to be closer to those from the LFS, with no particular sign in the distortion. In the case of the share of the private sector in employment, we observe that the estimates from LiTS tend to be smaller, with some differences between countries.

[16]We also employ a more formal test to uncover if and to what extent AB and CH theories have explanatory power. We de-trend and remove the country specificity form the measures of labor market flows and provide statistical evidence that AB, CH and the two combined are trumped by both demographic trends and changes of jobs *within* the sector and industry. The only type of labor market flow that did not dominate AB, CH and the two combined is their complement, i.e. changes of employment which happened from services to manufacturing and from private to public sector. Results are presented in Table C.6 in the Appendix.

Figure 1: The structure of flows - total flows for a country divided by the average number of workers across time in a country (bars in the same order as labels)



was always justified by how specific this country was in its transition path, which finds little confirmation in labor market flows data. Russia on the other hand seems relatively specific and – much to a surprise – a country with massive flows, which was never confirmed in studies by Brown and Earle (2002) or Brown et al. (2006). The fact that the literature is missing on the analysis for Central Asian countries leaves reasons for little gross worker flows beyond the scope of the analysis. Finally, Latvia, a notable outlier in LiTS, has remained outside the radar of analysis. Eamets (2004) is a noteworthy exception.

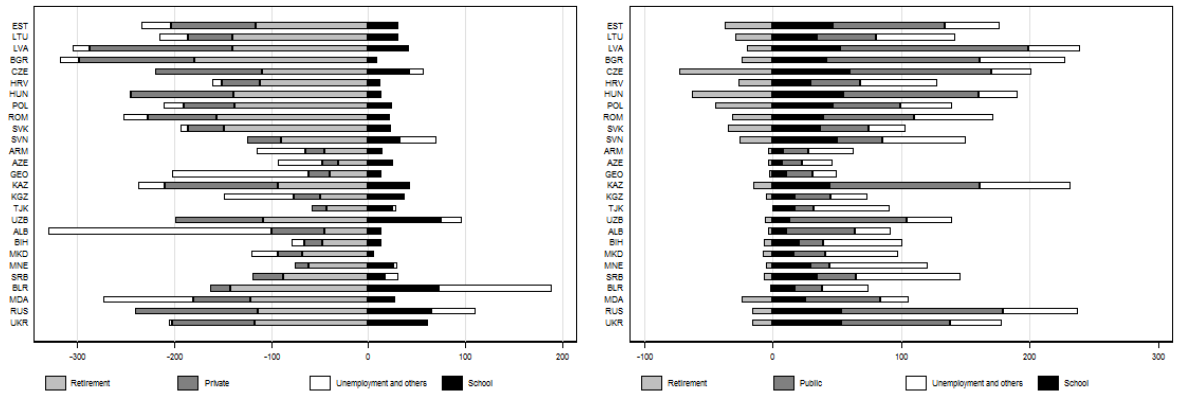
Demographics was not only universally large, but also instrumental to the reallocation between private and public sector. Figure 2 displays the relative contribution of all analyzed flows to the change in the size of the public and private sectors. While Figure 1 suggests that the flows across sectors were smaller than the flows into and out of the labor market, it remains possible that those intersectoral flows were responsible for a large part of the reallocation. This would be the case if the proportion of people exiting the labor market from private and public companies were roughly the same; or whenever students enter in equal proportions to private and public firms. To address this point, in Figure 2 we plot net of the gross flows from work in the public and private sector and other labor market status, including entries, exits, and reallocation between public and private. Bars to the left indicate that the contribution of a given type of the flow was in net terms negative. For example, in the case of unemployment and public sector, it would indicate that more people left the public sector to become unemployed than the other way around.[17]

Data indicates that setting the focus on worker flows across industries and sectors, mediated by unemployment, might have been misguided. Although in most cases we observe that the public sector did reduce its size throughout the period, it continued to attract many labor market entrants.[18] Both the private and the public sector were hiring new workers, though the

[17]The relation between public and private sectors includes those flows that were mediated by an unemployment spell as well, therefore this flows are then not counted as flows to unemployment. Neither are those flows where the worker finally finds a new employment in the same sector.

[18]Prominent examples are Belarus and Russia: in the former public sector employment grew in twelve of the sixteen years under analysis, and in the latter in eleven cases. This is consistent with the evidence presented in Boeri (2000), who indicates that Russian public sector was reduced at a much slower pace than other countries.

Figure 2: Net contributions of gross worker flows to the changes in between public and private sectors employment (total for 1989-2006)



(a) Public sector by the type of flow

(b) Private sector by the type of flow

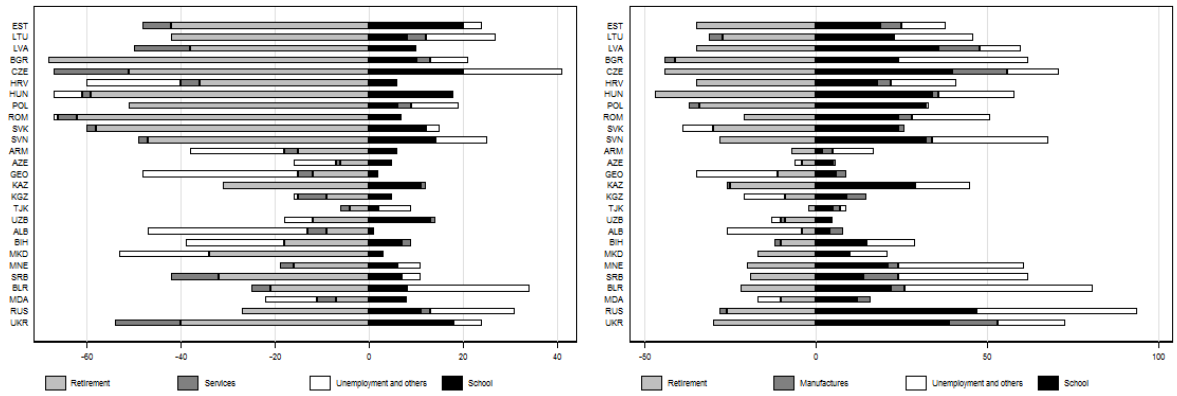
proportion of workers going to each sector varied greatly across countries. Differences are more pronounced when we focus on exits from the labor market. Flows to retirement from the public sector were on average twice the size of flows to the private sector. On the other side, flows to retirement from the private sector were negligible. These figures suggest that an important part of the adjustment in the public sector corresponded to flows towards retirement. These flows seem particularly relevant from the perspective of the private sector; however, we should be careful when interpreting this numbers, as they represent aggregates over almost twenty years.

A similar analysis across industries reveals the paramount role of the retirement flows and youth labor market entry. In Figure 3 we demonstrate the contributions of the respective type of gross worker flows to the net change in employment for the manufacturing and services. While the scale of adjustments in net terms is substantially smaller than in Figure 2, the majority of overall decline in manufacturing comes from exits to retirement. Only in few selected countries did the outflows to the unemployment matter quantitatively, whereas in many countries the manufacturing actually employed more unemployed individuals than it sent to unemployment. The outflows to the service not only were negligible, as portrayed in Figure 1, but also played a negligible role in overall structural adjustment in both manufacturing and service sector. The increase in the service sector came mostly from the youth labor market entry and partially also from employment.

Indeed, the timing of the transition does play an important role. In Table 1, we report the time effects from a set of regressions where total flows of each type are correlated with time and country dummies. The years of the flows correspond to the year at the end of the period, i.e. flows in 1990 correspond to the differences between 1990 and 1989.[19] The gradual aging of the post-war baby boom should be reflected in gradually intensifying labor market exits to retirement. Yet, we observe the opposite: EXIT flow has the largest intensity in early transition years and a gradually decreasing pace since late 1990s, peaking around mid 2000s. This suggests that the flows driven by labor market and institutional features – e.g. early retirement schemes, which were quite popular in these countries, see Fox (1997) – quantitatively dominated purely demographic trends. The entries to the labor market were not in general significantly different across years.

[19]We also report country effects in Figure C.3.

Figure 3: Net contribution of the gross worker flows to the changes in manufacturing and services employment (total for 1989-2006)



(a) Manufacturing by the type of flow

(b) Services by the type of flow

As to the worker flows between the jobs, AB flows were relatively more important in early years of transition, whereas the CH flows gradually gain momentum towards the end of the analyzed period. There is also a non-linear pattern spiking in mid 1990s for ABCH flows (individuals changing both industry and sector). These time patterns would be consistent with AB driving most of the reallocations related to transition and CH driving most of the reallocations related to plugging into the global value chains as of late 1990s. However, the steepest time trend is observable for the SAME flows (i.e. individuals changing a job within a sector and industry). In fact, these flows were on average six times larger in mid 2000s than they were in early 1990s.[20]

Summarizing the analysis of these stylized facts, we find compelling evidence that AB and CH theory are not sufficient to explain the change in the structure of employment in the transition economies, which was our first hypothesis in this study. The majority of the gross worker flows occurred within industry and sector, whereas the majority of the net reallocation appears to be due to the entry of youth and exit of retirees. During the entire period, we also observe that there was some job creation in the public sector (partially reflected in the SAME flow) and also job destruction in the private sector. Large flows to retirement are to some extent analogues to the flows to-benefits as proposed by AB model, with the distinction that they were one-way (did not return to employment) and were more costly in terms of public finances. If they are excessive and desynchronized, the costs of supporting the retirees can hinder job creation, following the mechanics suggested by the AB model. The retirees, however, are unlikely, to have the power to mitigate the wage pressure from the workers as have the unemployed in the AB model.

5 Results

In this section, we provide empirical evidence in favor of the second hypothesis formulated in our study. The descriptive analysis suggests the paramount importance of demographic

[20] As a robustness check other variables were added, such as unemployment rate, GDP per capita, and lagged values of the dependent variables. The results were consistent, with only slight changes in the adjusted R^2. The results are displayed in Table C.4. An additional advantage of Table 1 is that it allows to reconcile some of the discrepancies between the earlier studies.

Table 1: Time patterns of the gross worker flows

Flow/year	AB	CH	ABCH	SAME	OPPOSITE	To U	ENTRY	EXIT
1990				base level				
1991	1.000*	0.111	0.148	0.667	0.481	-0.815	0.556	1.296
1992	1.593***	0.333	0.667***	2.037***	0.667**	0.481	0.370	0.111
1993	1.926***	0.407*	0.815***	2.074***	0.481	-3.556*	-0.074	-0.148
1994	1.556**	0.185	0.519**	2.148***	0.481	-5.333**	-0.000	-1.630*
1995	1.444**	0.296	0.222	3.148***	0.741**	-6.037***	0.148	-1.148
1996	1.778***	0.778***	0.778***	3.852***	1.000***	-2.333	0.444	-1.259
1997	1.074*	0.185	0.556**	3.074***	0.778***	-5.185**	-0.037	-2.407**
1998	1.778***	0.333	0.407*	2.667***	1.000***	-7.333***	0.037	-2.111**
1999	0.593	0.407*	0.333	3.148***	0.593**	-6.704***	-0.481	-2.111**
2000	1.222**	0.407*	0.519**	4.370***	1.667***	-6.556***	0.185	-1.519
2001	1.630***	0.741***	0.481**	4.333***	1.111***	-4.778**	0.185	-2.296**
2002	0.593	0.481**	0.333	2.889***	1.074***	-6.481***	0.556	-2.963***
2003	0.148	0.667***	0.333	4.333***	1.222***	-7.185***	0.667	-2.519***
2004	0.889	0.889***	0.259	5.296***	1.111***	-5.037**	1.000*	-1.889*
2005	0.852	1.000***	0.185	4.630***	1.778***	-1.593	2.185***	-2.000**
2006	0.741	1.296***	0.259	6.148***	1.667***	-1.074	-0.370	-4.370***
# of obs.	459	459	459	459	459	459	459	459
R^2	0.640	0.538	0.494	0.887	0.700	0.790	0.774	0.827

Notes: The table shows the effects of time on consecutive variables in a fixed effects estimator. ***, ** and * denote the 1%, 5% and 10% significance levels respectively. Dependent variables represent specific flows of workers (total in country, year): ownership change, from public to private (AB); an industry change from manufacture and agriculture to services (CH); from public industry to private services (ABCH); within the same sector and industry (SAME) and in the opposite directions (OPPOSITE). All these flows comprise cases mediated by unemployment within the observational window. The models did not include a constant, but a full set of dummy variables for the different countries. The table also presents year effects on labor market entries (ENTRY), retirement (EXIT) and movements to unemployment (To U).

flows in explaining the structural change in employment in the transition economies. Yet, the remaining question to be asked concerns the extent to which the decision to retire – especially to retire early – was driven by the general tendencies of sectoral reallocation and the extent to which it was affected by the individual labor market prospects. Clearly, with shrinking manufacturing as well as public sector, individually perceived hazard of becoming redundant should be higher for workers with such contracts. The real question is however to what extent the decisions were driven by individual characteristics of the employer and to what extent by general tendencies. We thus operationalize H2 as a model of decision to retire conditioned by individual characteristics and the labor market conditions at the moment of exit, controlling for country specificity.

We estimated a series of survival models, where we define a movement to retirement as a failure. In our main specification, individuals become at risk when they become 45 years old.[21] Our main dependent variable is the time elapsed between the year in which their 45th birthday and retirement. We record the sector and ownership of employment at the moment of retiring and keep the individual characteristics such as gender, education or place of residence. We complement this setup with indicators of employment structure at the moment of retirement with a following premise: labor markets with faster creation of the private sector and the service sector should create more employment opportunities, thus reducing the incentives to retire early. To account for the country specificity, we have two specifications: with country fixed effects and with the private and service sector employment shares in 1989. Since the early labor market exits due to transition were not likely to occur *before* it, we we reestimate our specification for the sub-sample of workers that were younger than 45 in 1989, that is the individuals that become at risk during transition. Table C.7 in the Appendix displays the descriptive statistics for the sample used in these analyses.

[21] While this cezure is discretionary, we provide also a check of how sensitive are the results to this cezure, see Table C.8 in the Appendix.

We estimated the models with three sets of controls. First, we always include characteristics of the individual and his/her last workplace. In addition, we always control for the shares of private and service industries at the timing of retirement. Second, we add country fixed effects to the model, to test the robustness of the results to the specificity of regions and countries. In a third approach, to explicitly include the country characteristics that could drive this specificity, we use 1989 shares in employment of the service and private sectors. The marginal effects from all these six specifications are reported in Table 2.

Table 2: Marginal effects on the survival models of permanently leaving the labor market

	All			Under 45 in 1989			Over 45 in 1989		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Individual characteristics									
Female	-0.219***	-0.230***	-0.212***	-0.153***	-0.073***	-0.121***	-0.172***	-0.152***	-0.160***
	(0.015)	(0.015)	(0.015)	(0.028)	(0.021)	(0.028)	(0.015)	(0.015)	(0.015)
Secondary Education	-0.065***	-0.094***	-0.072***	0.048	-0.003	0.045	-0.029*	-0.057***	-0.037**
	(0.017)	(0.017)	(0.017)	(0.033)	(0.023)	(0.033)	(0.017)	(0.016)	(0.017)
Tertiary education	0.070***	0.000	0.053**	0.185***	0.034	0.161***	0.071***	-0.001	0.049**
	(0.023)	(0.022)	(0.023)	(0.043)	(0.031)	(0.044)	(0.022)	(0.020)	(0.021)
Married	-0.139***	-0.132***	-0.138***	0.030	0.007	0.029	-0.117***	-0.100***	-0.113***
	(0.015)	(0.015)	(0.015)	(0.027)	(0.020)	(0.027)	(0.015)	(0.014)	(0.015)
Urban	0.017	0.046***	0.027*	-0.002	0.006	0.006	-0.009	0.026*	0.004
	(0.016)	(0.015)	(0.016)	(0.026)	(0.019)	(0.027)	(0.016)	(0.015)	(0.016)
Employment structure at retirement									
Share of privatized firms	-0.639***	-2.597***	-1.259***	-0.390**	-0.557	-0.052	-0.340***	-1.150***	-0.325
	(0.102)	(0.295)	(0.205)	(0.173)	(0.575)	(0.306)	(0.106)	(0.288)	(0.216)
Share of *de novo* private firms	3.249***	4.113***	3.131***	5.118***	7.541***	4.684***	3.072***	3.657***	2.768***
	(0.092)	(0.146)	(0.101)	(0.225)	(0.298)	(0.217)	(0.090)	(0.132)	(0.095)
Share manufacturing	-0.934***	-0.918**	-2.551***	-3.059***	-1.145*	-6.444***	-1.093***	-1.622***	-3.061***
	(0.110)	(0.359)	(0.245)	(0.257)	(0.674)	(0.460)	(0.114)	(0.359)	(0.267)
Employment at retirement									
Manufacturing	-0.067***	-0.067***	-0.069***	-0.057**	-0.020	-0.060**	-0.040**	-0.039***	-0.041***
	(0.015)	(0.015)	(0.015)	(0.027)	(0.020)	(0.027)	(0.016)	(0.014)	(0.015)
Public	-0.050**	-0.029	-0.039*	-0.059*	-0.033	-0.059*	-0.036*	-0.018	-0.030
	(0.021)	(0.020)	(0.021)	(0.034)	(0.024)	(0.034)	(0.021)	(0.020)	(0.021)
Employment structure (1989)									
Share private sector			0.558***			-0.935***			-0.239
			(0.216)			(0.342)			(0.225)
Share manufacturing			1.673***			3.199***			2.226***
			(0.225)			(0.337)			(0.251)
Observations	7,536	7,536	7,536	4,972	4,972	4,972	2,564	2,564	2,564
# of failures	2810	2810	2810	853	853	853	1957	1957	1957

Notes:Time to retirement is the dependent variable in all specifications. Standard errors reported in parentheses. *, **, *** denote significance at the 10%, 5% and 1% levels. Results from columns (1) to (3) were obtained from the entire sample. Results in (4) to (6) were obtained only for the subsample that turned 45 after 1989. Finally, the results in (7) to (9) were obtained from the subsample of individuals that were older than 45 in 1989.

The main findings of the model are consistent across specifications. First, there seem to be some country specificity, because including the fixed effects leads to changes in the coefficients, particularly large in the case of the shares of employment at the time of retirement. These differences might be related to the initial shares of employment as they were significant in most of the specifications. Second, individuals employed in the public sector are more likely to retire *earlier*. Third, more vivid job creation by the private sector delays retirement, whereas the restructuring induced by privatization has the opposite but also substantially smaller effect, when we account for country specificity. The large positive effect of the *de novo* firms is high and robust, whereas the coefficient for the privatized firms appears less robust to the inclusion of controls for the initial structure of the economy or country fixed effects. Fourth, faster decline in the manufacturing sector seems to be associated with somewhat earlier exits to the retirement. The last two points provide some confirmation to the intuition suggested by Fox (1997): privatized firms were often incentivized to co-fund early retirement schemes as a form of redundancies programs. New firms, lacking this incentives, might be more likely to reduce their staff by firing individuals.

Our findings reveal also an interesting pattern concerning the link between the skills and the decision to retire. As expected, workers with a tertiary degree tend to retire later than individuals with primary education only. However, surprisingly those with a secondary school diploma tend to retire earlier. It suggests that these were medium-level jobs that born a large part of the adjustments – either due to the overmanning in such positions in centrally planned economies or because the kind of skills that are required at these positions in the market economy are substantially different. Relatively speaking, this finding undermines the intuition that majority of job reductions concerned manual, low-skill jobs – that were also more often subjected to early retirement schemes, see Fox (1997). While they could have been more overstaffed and more prone to automation, apparently the competitive gain from increasing the capital intensity with the economic transition helped to preserve these jobs. Once we restrict our sample to individuals that became at risk after the collapse of the centrally planned system in Europe and Central Asia, the effect of secondary education disappears while tertiary education is somehow reduced.

Overall, the speed of restructuring by the state and the mode of restructuring were driving the retirement decisions. This is in line with the earlier findings: demographics are relevant for explaining the adjustment patterns during the transition, while the AB and CH models with subsequent extensions focus on the adjustment *via* the worker flows between the sectors (including the unemployment mediated flows). The ownership structure of the economy seems to be also more relevant for the retirement decisions than the industrial composition. Indeed, while employment in manufacturing shortens the time before retirement; the hypothesis that changes in the industrial composition of the transition economies affect retirement decisions receives a much weaker confirmation.

6 Conclusions

In the analysis of labor reallocation it is customary to emphasize the role of the inter-sectoral flows as well as potential effects for and of the unemployment. Both Aghion and Blanchard (1994) and Cabaillero and Hammour models offer appealing predictions concerning the optimal speed of reallocation – be it due to economic transition (AB) or institutional causes (CH). AB emphasizes synchronization of the state-driven job destruction to the capacity of the private sector to create new jobs. CH models indicate that slowing down the restructuring forces leads

only to a reduction in the job creation rate without any benefits on the side of job destruction. This reasoning relies on the premises that the flows into and out of the unemployment are quantitatively important when analyzing the structural change in employment: workers are projected to flow from declining sector to an emerging one. In the expectation of frictions in this process, economic policy should weigh the benefits of *laissez-faire* against the negative consequences of excessively high unemployment and / or excessively long unemployment spells. The evidence presented in this paper argues against such approach. Namely, we show that worker flows are fairly rare and – if occur at all – concentrate within the same segment of the economy, be it industry or form of ownership. The actual change in the employment structure in the transition economies stems from the demographic factors: exits of the elderly workers and entry of the youth. This generational exchange has fostered reallocation from public to private and from manufacturing to services more effectively than worker flows, even those mediated by the unemployment. Also, the decision to retire early was to a larger extent driven by the speed of reallocation than by individual labor market status.

Two important policy implications emerge from our findings. The first one concerns the area of intervention at the times of a structural change. Evidence from transition economies seems to suggest that the policies cushioning unemployment targeted the quantitatively less important channel. In fact, they implicitly posit the existence of processes that in reality occur seldom or not at all. With universally rare flows between manufacturing and services, the apparent need to re-skill workers stemmed from standard labor market mismatches within industry – and not from the restructuring of the economy. Similarly, since the flows from the public to the private sector – even mediated by the unemployment – were actually much less numerous than labor market entries of the youth, the skill mismatch could have been an outcome of the educational system inefficiency, but not a consequence of the excessively fast decline in the state owned sector. Indeed, instruments encouraging early retirement – quite popular in those countries – coupled with the educational boom among the youth effectively did "all the work", as opposed to both passive and active labor market policies, which apparently dealt mostly with the flows within the same industry and/or form of ownership.

Second, such patterns of labor reallocation come at the expense of permanent rather than transitory fiscal burdens and a substantial reduction in labor supply. Exits to retirement are rarely reversible, which implies that the costs of early exit accrue over time. In addition, the mechanics of the pressure to keep down the wage claims – as suggested by both AB and CH models – will not be at play, because the retirees are not job seekers. Thus, the wage pressure is likely to be asymmetric (higher in faster growing sectors) and substantially more detrimental to the job creation. We find no evidence that the key demographic flows are somehow related to the unemployment, but the negative consequences of policies encouraging early retirement for the employment rates are self explanatory.

Like many other works in the field, our research suffers from some limitations related to data availability. Even though the LiTS proves to be a unique source of information on workers flows, it lacks information on wages, which prevents us from actually analyzing the wage pressure channel. Thus we cannot test explicitly if the movements to early retirement reduce the wage pressure nor that they increase the non-labor costs of hiring new employees (the tax-wedge channel), thus hindering further the job growth of new firms, *ceteris paribus*. Notwithstanding, we have demonstrated that there is virtually no effect of demographics on the unemployment variation within and across countries.

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A The coverage of countries and years available in the literature

Table A.1: Coverage of countries and periods in the previous literature

Paper	Country	Period studied
Rutkowski (2003c)	Bulgaria	2000
Rutkowski (2003a)	Croatia	2001
Brown and Earle (2006)	Ukraine	1992-2000
Christev et al. (2008)	Ukraine	1993-1999
Konings et al. (2003)	Ukraine	1996-2000
De Loecker and Konings (2006)	Slovenia	1994-2000
Bojnec and Konings (1998)	Slovenia	1991-1996
Dong and Xu (2009)	China	1988-2002
Earle (1997)	Romania	1994-1995
Faggio and Konings (2003)	Romania	1995-1997
Flek (1999)	Czech Republic	1993-1996
Gottvald (2001)	Czech Republic	1993-2001
Sorm and Terrell (2000)	Czech Republic	1994-1998
Turunen (2004)	Russia	1992-1996
Brown and Earle (2002)	Russia	1997-1999
Gimpelson et al. (2010)	Russia	2004
Masso and Heshmati (2004)	Estonia	1992-2001
Vodopivec (2002)	Estonia	1994
Rutkowski (2003b)	Lithuania	1998-1999
Siebertová and Senaj (2007)	Slovakia	2000-2004
Schaffner (2011)	East Germany	1992-2001
Dries and Swinnen (2002)	Poland	1990-1997
Walsh (2003)	Poland	1994-1996
Warzynski (2003)	Poland	1996-1999
Burke and Walsh (2012)	Poland	1994-1997
Jurajda and Terrell (2003)	Czech Republic, Estonia	1989-1995
Faggio and Konings (2003)	Bulgaria, Estonia, Slovenia, Poland	1994-1997
Brown et al. (2006)	Hungary, Romania, Russia, Ukraine	1992-2002

B Data characteristics

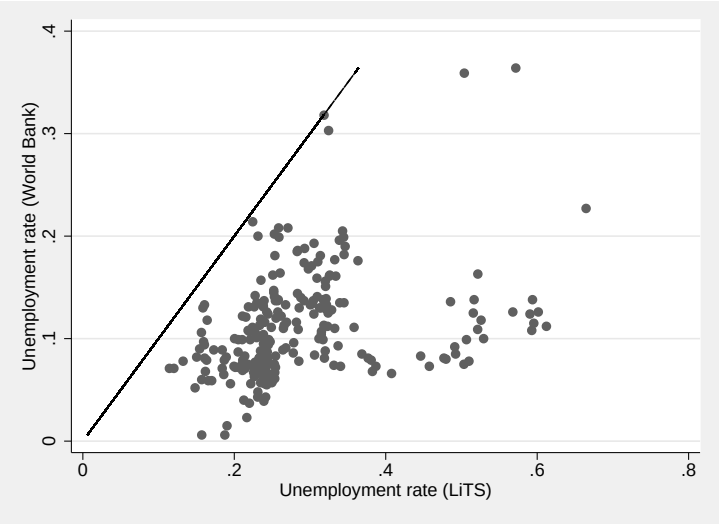


Figure B.1: Unemployment rate comparison

Table B.2: The match between LiTS data and other sources

Country	Year	Services (LFS)	Industry (LFS)	Private (SES)	Services (LiTS)	Industry (LiTS)	Private (LiTS)
Bulgaria	2000	51.8	39.6		57.2	36.0	48.7
	2002	54.9	38.3	55.9	60.0	34.4	53.5
Czech Republic	1997	56.1	33.3		60.8	33.5	59.5
	2002	58.0	32.1	59.8	65.5	30.4	63.3
Estonia	1997	53.1	33.1		58.4	30.6	52.7
	2002	56.0	32.9	91.8	59.8	30.9	62.2
Hungary	1997	55.6	34.7		65.4	27.2	52.6
	2002	56.1	36.3	22.9	68.7	26.8	61.9
Latvia	1998	47.4	30.1		67.1	23.6	51.2
	2002	49.0	27.7	88.0	67.1	24.4	59.7
Lithuania	1998	27.0	28.3		61.5	29.5	36.5
	2002	29.0	26.3	51.3	63.4	29.1	44.2
Poland	2000	46.1	40.1		59.6	34.6	50.0
	2002	51.5	37.8	47.1	59.0	34.3	53.4
Romania	1997	48.4	22.8		54.1	39.7	44.2
	2002	58.0	24.7	65.3	58.8	36.1	54.8
Slovakia	1998	50.2	29.2		62.6	30.1	39.7
	2002	52.7	27.7	63.0	65.6	28.6	45.9
Slovenia	1997	51.8	41.8		62.3	34.7	43.9
	2002	53.2	41.3		64.3	33.3	52.4

Notes: Data on services and industry was taken from the EU LFS. In all cases, we display the earliest available year and 2002. Data on the ownership of the companies was taken from the SES 2002. Firms are considered private if private individuals own at least 50% of the company's shares. In the LiTS, respondents indicated the ownership of the firm.

Table B.3: Sample characteristics

Country	Age			Female			Basic education			Higher education			GDP per capita			Unemployment		
	1989	1995	2005	1989	1995	2005	1989	1995	2005	1989	1995	2005	1991	1994	2005	1991	1996	2005
Estonia	40,4	43,4	46,2	64,5	63,2	60,4	17,1	16,5	12,8	20,7	21,5	26,2			208,5	14	23,5	23,4
Latvia	38,3	41,0	43,4	60,3	59,2	55,8	18,9	18,4	14,7	16,0	16,7	22,1	143,6	99,5	210,9	24,4	25,6	24,5
Lithuania	39,5	42,3	44,4	65,7	64,0	62,0	23,5	21,6	13,3	17,3	17,2	23,0	159,4	96,1	192,2	26,4	27,9	24,1
Czech Republic	36,7	39,1	42,7	56,5	56,1	57,2	11,5	10,2	7,9	11,7	11,8	16,8	92,1	94,1	135	16,9	18,4	22,4
Hungary	36,6	37,0	41,0	58,5	57,2	58,5	29,4	24,1	19,2	11,7	13,5	16,8	98,9	98,4	145,2	25,3	25	24
Poland	36,0	39,3	42,8	63,1	63,4	62,9	24,6	22,2	16,6	11,0	13,5	17,4	84,3	93,6	153,2	20,3	22,9	29,5
Slovakia	36,8	38,4	41,6	59,0	59,0	60,6	14,8	12,7	8,4	12,1	13,1	18,0	100,1	94,8	149,5	23	23,6	27,6
Albania	34,1	38,7	44,2	51,7	51,4	51,8	48,3	47,3	43,6	9,8	11,0	13,3	77,8	87,6	178,2	18,8	24,7	21,1
Bulgaria	38,7	40,8	43,6	57,7	55,7	54,6	27,6	24,8	20,6	21,7	23,9	26,4	101,8	96,8	143,5	31,5	29	27,4
Moldova	36,8	40,4	45,4	54,2	53,6	53,2	36,4	34,0	27,7	24,9	25,9	32,2	207,8	100,9	127,8	17,3	16	16,3
Romania	36,3	37,1	39,7	48,2	48,5	48,5	28,2	20,2	13,4	13,2	15,5	22,2	95,7	93,1	129,8	19,2	15,4	18,1
Bosnia and Herc.	34,3	35,8	37,6	48,4	52,2	52,0	21,6	16,8	11,0	12,8	13,1	16,7		79,7	392,3	28,3	32,8	36,6
Croatia	37,9	39,6	41,7	48,9	51,2	50,8	21,8	17,6	14,3	20,2	21,1	23,3			154,5	22,3	23,4	28,5
Macedonia	34,5	37,0	42,1	40,1	38,8	38,2	15,5	14,4	12,7	18,8	19,4	22,2	116,8	101	117,8	37,2	41,1	45,4
Serbia	34,6	36,6	39,8	53,3	53,8	51,8	21,1	17,4	12,8	14,9	15,7	18,5	185,1	94,3	150,8			
Slovenia	34,6	36,6	38,7	55,7	55,4	53,2	23,3	18,4	11,0	18,0	20,8	26,2	93,8	96,5	146,9	17,2	19,9	21,6
Armenia	35,7	39,4	42,6	59,2	58,7	57,7	6,5	6,0	3,3	30,4	31,4	35,2	153,5	91,6	244,2	25,1	28	34,9
Azerbaijan	31,9	35,5	40,9	62,2	61,4	60,5	10,8	10,5	6,0	31,5	34,4	39,7	250,7	114,7	242,5	11,1	11,1	13,2
Georgia	37,9	41,1	44,4	58,2	57,7	59,1	4,9	4,7	1,8	33,1	35,4	42,2	273,4	94,9	205,2	17,2	15,9	18,5
Kazakhstan	34,5	35,7	39,6	58,2	54,8	52,7	12,5	9,3	4,9	19,9	20,8	24,0	139,4	107	193,3	16,6	20,8	16,2
Kyrgyzstan	32,6	35,5	41,0	57,5	57,6	57,5	10,6	8,1	5,2	18,8	22,2	29,3	185,7	106,8	139,7	15,2	15,2	14,3
Tajikistan	30,4	34,1	38,3	53,8	53,7	54,5	20,8	18,5	14,6	12,8	13,1	14,8	260,9	115,8	135,8	16,3	16,1	16
Uzbekistan	31,0	33,1	37,8	58,4	58,1	60,0	7,9	5,4	3,7	12,0	13,8	13,9	133,4	102,7	136,9	16,1	16,3	16,4
Belarus	35,1	36,8	39,0	55,3	55,0	53,9	10,9	9,2	4,7	24,1	25,9	35,5	151,3	111,2	205,8	21,8	23,8	25,2
Ukraine	36,1	38,5	40,3	60,8	59,3	58,4	10,2	8,4	2,6	18,9	21,7	30,4	189	113	143,2	20	21	19,4
Russia	35,0	37,2	39,7	67,1	65,6	65,2	10,5	7,1	3,7	23,1	25,6	30,5	152,4	104,2	151	23	22,7	19,7

Notes: Age, female and the education variables are expressed with respect to active population. Age corresponds to the average age, while female and education level is expressed as a percentage of active population. GDP and GDP per capita were taken from the WDI database. In both cases 1995=100. Unemployment rate was built on data from the WDI (employment to population ratio, labor force to population).

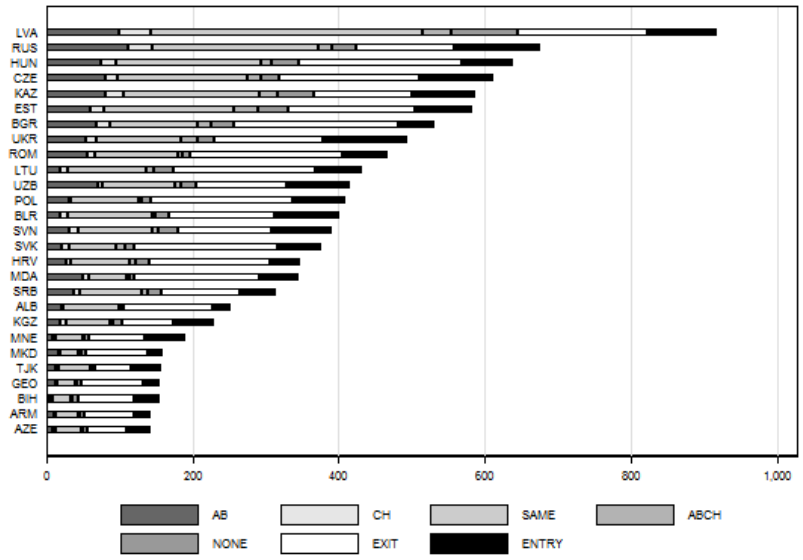
C Stylized facts and regressions

Table C.4: Time effects: additional controls

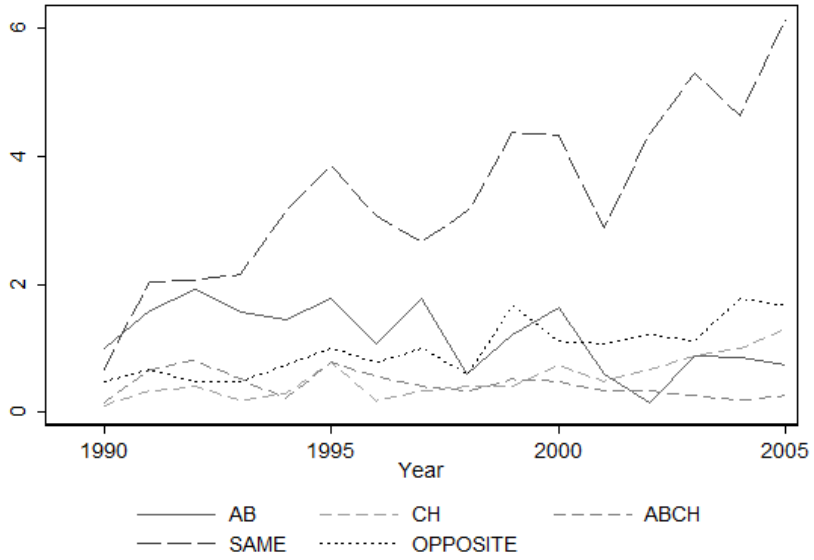
Flow/year	AB	CH	ABCH	SAME	OPPOSITE	To U	ENTRY	EXIT
1990				base level				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1991	1.752	0.925**	-0.439	6.294***	0.892	-15.175***	6.429***	4.910***
	(1.162)	(0.466)	(0.439)	(1.540)	(0.577)	(2.482)	(1.197)	(1.720)
1992	2.394**	1.094**	0.024	8.028***	1.390**	-15.429***	6.209***	2.744
	(1.144)	(0.459)	(0.431)	(1.517)	(0.567)	(2.468)	(1.185)	(1.699)
1993	2.843**	1.158**	0.562	7.919***	0.901	-17.139***	6.121***	4.469***
	(1.165)	(0.466)	(0.439)	(1.554)	(0.577)	(2.406)	(1.196)	(1.715)
1994	2.409**	0.986**	0.149	8.290***	0.949	-17.057***	5.952***	2.868*
	(1.176)	(0.470)	(0.445)	(1.562)	(0.580)	(2.370)	(1.200)	(1.734)
1995	2.687**	1.038**	-0.036	9.403***	1.110*	-16.377***	6.351***	4.553***
	(1.168)	(0.466)	(0.440)	(1.559)	(0.578)	(2.349)	(1.190)	(1.719)
1996	3.209***	1.697***	0.653	10.081***	1.207**	-12.677***	6.481***	3.991**
	(1.132)	(0.452)	(0.425)	(1.522)	(0.559)	(2.329)	(1.157)	(1.670)
1997	2.400**	1.057**	0.411	9.170***	1.040*	-17.364***	5.875***	2.794*
	(1.147)	(0.463)	(0.434)	(1.551)	(0.566)	(2.373)	(1.176)	(1.686)
1998	3.308***	1.233***	0.047	8.654***	1.224**	-18.058***	6.154***	3.486**
	(1.157)	(0.463)	(0.437)	(1.556)	(0.573)	(2.315)	(1.180)	(1.703)
1999	1.648	1.305***	-0.000	9.176***	0.829	-16.267***	5.383***	3.117*
	(1.182)	(0.473)	(0.444)	(1.578)	(0.584)	(2.277)	(1.205)	(1.735)
2000	2.779**	1.313***	0.355	10.360***	1.903***	-16.518***	6.363***	3.940**
	(1.182)	(0.475)	(0.446)	(1.591)	(0.586)	(2.318)	(1.198)	(1.746)
2001	2.932**	1.750***	0.162	10.782***	1.395**	-15.145***	6.185***	2.680
	(1.231)	(0.495)	(0.466)	(1.667)	(0.615)	(2.315)	(1.258)	(1.816)
2002	1.959	1.454***	0.109	9.122***	1.264**	-17.435***	6.455***	2.336
	(1.194)	(0.482)	(0.450)	(1.618)	(0.592)	(2.335)	(1.216)	(1.756)
2003	1.779	1.563***	0.183	10.395***	1.406**	-16.943***	6.783***	2.886*
	(1.182)	(0.476)	(0.447)	(1.588)	(0.587)	(2.331)	(1.213)	(1.743)
2004	2.411**	1.826***	0.119	11.580***	1.301**	-14.635***	7.143***	4.060**
	(1.191)	(0.481)	(0.451)	(1.620)	(0.593)	(2.343)	(1.228)	(1.758)
2005	2.301**	1.875***	0.070	10.577***	1.948***	-12.515***	7.928***	3.954**
	(1.165)	(0.473)	(0.440)	(1.601)	(0.579)	(2.373)	(1.207)	(1.724)
2006	2.793**	2.137***	0.181	12.235***	1.801***	-13.227***	5.491***	1.677
	(1.149)	(0.467)	(0.434)	(1.563)	(0.574)	(2.451)	(1.206)	(1.700)
				Additional controls				
Lagged dependent	0.243***	-0.016	-0.028	-0.085	0.017	0.551***	0.014	0.124**
	(0.055)	(0.059)	(0.055)	(0.058)	(0.056)	(0.045)	(0.054)	(0.053)
GDP pc growth	-0.002***	0.000	-0.001***	0.001	0.001*	-0.002	-0.000	-0.003***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)
Unemployment rate	5.813	-5.906***	2.956	-18.759**	-0.720		-8.304	17.164**
	(5.648)	(2.264)	(2.126)	(7.414)	(2.797)		(5.533)	(8.403)
Observations	370	370	370	370	370	408	370	370
R-squared	0.717	0.609	0.581	0.904	0.769	0.870	0.812	0.869

Notes: Table serves as a robustness check to Table 1 in the main text. *,**,*** indicate significance at the 10%, 5% and 1% level respectively. All estimations include country fixed effects.

Figure C.2: Country and time heterogeneity in gross worker flows

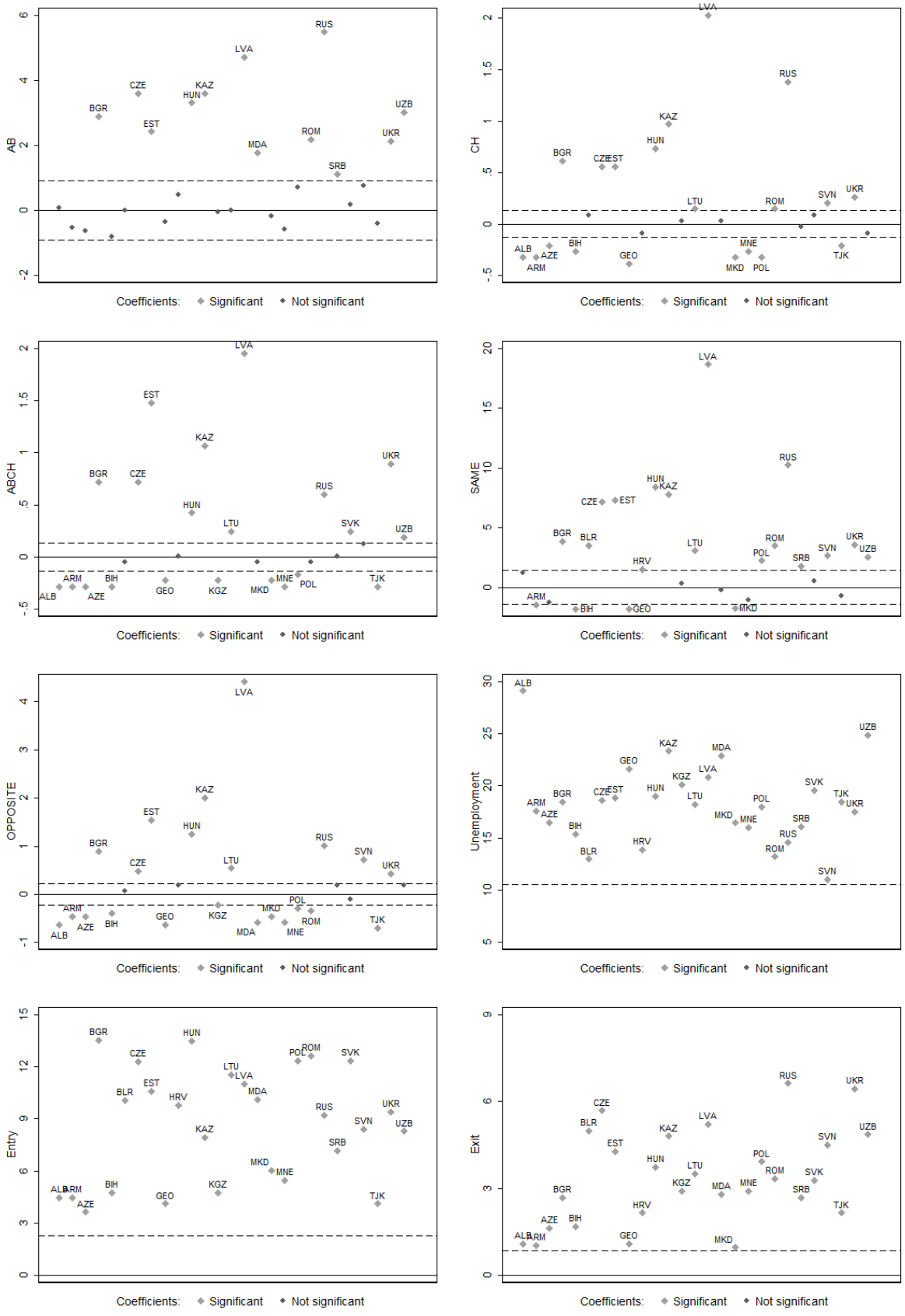


(a) The composition of labor market flows, total sum of flows for a country



(b) Time fixed effects - labor market flows, as in Table 1.

Figure C.3: Country fixed effects – labor market flows, analogous to Table 1



Note: country effects from a regression of flows against time, as in the case of Table 1. The dashed lines show the 5% significance level threshold. Data come from 2006 wave of LiTS.

C.1 Correlations between worker flows and unemployment

If AB and CH theories had explanatory power for the variation in unemployment, it should be positively linked to these flows. Table C.5 reports the estimates of correlations between the flows and the unemployment rate (with fixed effects for country and period). Following both AB and CH theories we include the non-linearities. As a robustness check, we use the unemployment rate provided by The World Bank. Since these data do not cover early transition years and some countries, we also show a specification with the same countries and years as The World Bank data, but using LiTS as a source. Regardless of the unemployment rate definition, data do lend support to the AB model – higher labor market flows of the AB type are associated with higher unemployment rates. Models were also consistent in finding insignificant values for the coefficient on CH flows. The significance of ABCH flows is thus inherited from the cross-sectional and time variation in AB rather than CH flows. Indeed, the CH flows have the same signs as the AB flows but are estimated with much less precision. ENTRY and EXIT flows have generally no explanatory power for the variation in the unemployment rates.

Table C.5: The link between the unemployment rates and flows

	AB	CH	SAME	ABCH	OPPOSITE	EXIT	ENTRY
	Unemployment definition from LiTS						
$flow^2$	0.057***	0.089	0.009	0.220*	0.026	0.006	0.037*
	(0.017)	(0.090)	(0.006)	(0.118)	(0.055)	(0.007)	(0.022)
$flow$	-0.789***	-0.688	-0.533***	-1.067**	-0.595*	-0.060	-0.762***
	(0.221)	(0.436)	(0.154)	(0.486)	(0.349)	(0.162)	(0.247)
N	486	486	486	486	486	486	486
R^2	0.888	0.885	0.890	0.886	0.886	0.885	0.889
$\bar{flow} * \hat{\beta}$	-1.51		-3.13	-0.56	-0.70		-2.23
	Unemployment definition from The World Bank						
$flow^2$	0.040**	0.011	-0.001	-0.063	-0.015	0.003	-0.014
	(0.019)	(0.055)	(0.005)	(0.104)	(0.038)	(0.007)	(0.016)
$flow$	-0.269	-0.411	-0.130	0.188	0.184	0.014	0.124
	(0.205)	(0.303)	(0.131)	(0.396)	(0.262)	(0.159)	(0.206)
N	236	236	236	236	236	236	236
R^2	0.816	0.814	0.817	0.810	0.810	0.813	0.810
$\bar{flow} * \hat{\beta}$	-.447						
	Unemployment definition from LiTS restricted The World Bank availability						
$flow^2$	0.038**	-0.016	-0.006	0.099	-0.013	0.001	0.002
	(0.016)	(0.048)	(0.004)	(0.088)	(0.032)	(0.006)	(0.014)
$flow$	-0.350**	0.190	0.066	-0.356	0.044	0.053	-0.118
	(0.174)	(0.260)	(0.112)	(0.336)	(0.223)	(0.135)	(0.174)
N	236	236	236	236	236	236	236
R^2	0.967	0.966	0.967	0.966	0.966	0.967	0.967
$\bar{flow} * \hat{\beta}$	-.708						

Notes: Standard errors reported in parentheses, ***, ** and * denote significance at 1%, 5% and 10% significance levels. Each column presents the results of the regression of detrended unemployment rates on the size of the flows and its square. Flow definitions are the same as in the case of Table 1. All regressions include period and country fixed effects. For the computation in $\bar{flow} * \hat{\beta}$ we extract the country and period fixed effects, i.e. a coefficient on a squared applied to a square of means as reported in Table C.6 plus the coefficient on the linear term times the same mean value, insignificant coefficients treated as zeros.

C.2 The relative size of flows

To formally test in a robust way that AB and CH flows were smaller than the others, we pursue a three-step procedure. First, we obtain a sum of each type of flow for each country in each year (i.e. reduce individual data to country-year data point for each type of flow). Second, we clear these values from the year and country specificity, by running a regression

$$\forall \textbf{ flow type}: \; flow_{j,t} = \alpha \cdot constant_j + \beta \cdot constant_t + \epsilon_{j,t}, \tag{1}$$

where j denotes country, t denotes time period. From this regression we obtain estimates of $\hat{\epsilon_{j,t}}$ (a regression without a constant). This allows removing any specific variation, extracting the overall trends. Finally, in the third step, we run a series of pairwise tests for the equality of means between $\hat{\epsilon_{j,t}}$ obtained for each of the flow types. We report these tests in Table C.6. The top row and the most left column report the mean values of $\hat{\alpha} constant_j + \hat{\beta} constant_t + \hat{\epsilon_{j,t}}$. Thus, the numbers reported as means describe an average number of flows of each type in each country and each period. For example, net of period and country effects, about 7.7 workers leave to retirement per year, which should be related to approximately 500 workers, yielding app. 1.5% of the labor force *per annum*. The remaining cells show the t-statistic of pairwise comparison tests of mean equality in each tested pair of the flow types.

Table C.6: The adjusted size of each type of flows

		OPPOSITE	EXIT	ENTRY	SAME
	Means	1.18	7.69	3.53	5.88
AB	2.30	-17.76***	40.16***	18.89***	22.67***
CH	0.66	17.97***	45.61***	44.62***	27.84***
ABCH	0.60	16.88***	46.80***	43.94***	27.33***

Notes: $t-$*statistics* reported, ***, ** and * denote significance at 1%, 5% and 10% significance levels.

C.3 Survival models

Table C.7: Sample characteristics for the survival models

	All		Under 45		Over 45	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Time to event	10.698	6.759	7.639	4.417	16.632	6.565
Individual characteristics						
Female	0.563	0.496	0.572	0.495	0.546	0.498
Secondary education	0.577	0.494	0.615	0.487	0.505	0.5
Tertiary education	0.251	0.434	0.269	0.444	0.216	0.412
Married	0.63	0.483	0.68	0.467	0.532	0.499
Urban	0.676	0.468	0.662	0.473	0.704	0.457
Last employment						
Manufacturing	0.283	0.451	0.271	0.444	0.307	0.461
Public	0.749	0.434	0.698	0.459	0.848	0.359
Employment structure (at retirement)						
Share private firms	0.233	0.081	0.243	0.078	0.212	0.082
Share new private firms	0.239	0.109	0.275	0.085	0.169	0.117
Share manufacturing	0.207	0.062	0.195	0.055	0.229	0.07
Employment structure (1989)						
Share private (1989)	0.15	0.075	0.148	0.075	0.155	0.074
Share manufacturing (1989)	0.264	0.076	0.263	0.079	0.265	0.07

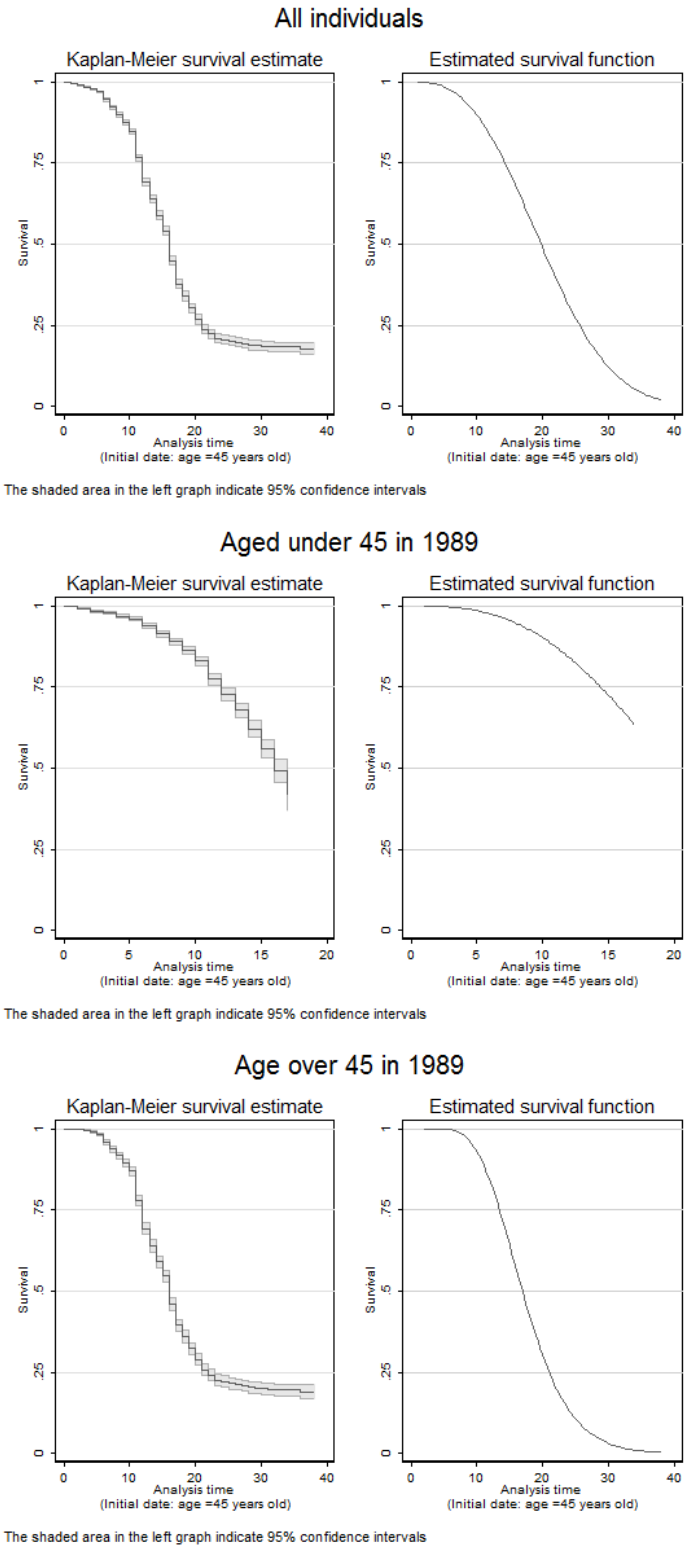
Notes: Table C.7 presents summary statistics of the observations used in Table 2. Dependent variables are years after 45 and before retirement in specification (1); the same measure applied only to individuals that were aged between 28 and 45 in 1989 (2); and years after 55 and before retirement, for those individuals that did not retire earlier. Differences in shares between specifications result from these minor changes in sample composition.

Table C.8: Sensitivity analysis - specification as Table 2 with 55 years as threshold

	Survival models		
	(1)	(2)	(3)
Personal characteristics			
Female	-0.552***	-0.552***	-0.535***
	(0.038)	(0.037)	(0.038)
Secondary Education	-0.112***	-0.170***	-0.130***
	(0.043)	(0.042)	(0.043)
Tertiary Education	0.168***	-0.008	0.128**
	(0.053)	(0.051)	(0.053)
Married	-0.257***	-0.241***	-0.257***
	(0.037)	(0.036)	(0.037)
Urban	-0.007	0.057	0.019
	(0.039)	(0.038)	(0.039)
Last employment			
Manufacturing	-0.105***	-0.104***	-0.109***
	(0.039)	(0.037)	(0.038)
Public	-0.119**	-0.081*	-0.103**
	(0.049)	(0.047)	(0.049)
Employment structure at retirement			
Share privatized	-0.362	-4.110***	-1.464***
	(0.259)	(0.694)	(0.449)
Share new firms	5.907***	8.263***	5.641***
	(0.205)	(0.319)	(0.214)
Share manufacturing	-2.442***	-0.919	-6.041***
	(0.291)	(0.871)	(0.579)
Employment structure in 1989			
Share private			0.860*
			(0.467)
Share manufacturing			3.820***
			(0.521)
Observations	3,701	3,701	3,701

Notes: Time to retirement is the dependent variable in all specifications. Standard errors reported in parentheses. *, **, *** denote significance at the 10%, 5% and 1% levels. Analogous to Table 2, age at which individuals become at risk set to 55 years.

Figure C.4: Parametric and non-parametric survival curves



Note: Survival curves estimated using the Kaplan-Meier and the fitted values from the third column of each specification in Table 2.