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DYNAMICS OF FIRM-LEVEL JOB FLOWS IN SLOVENIA, 1996–2011*

Biswajit Banerjee† and Manca Jesenko‡

ABSTRACT

In this paper, we examine several aspects of job flows dynamics in Slovenia across all sectors of the economy during 1996–2011, using firm-level data. Firm-level employment changes were associated with simultaneous high rates of gross job creation and destruction. These job flows primarily reflected persistent firm-level employment changes rather than temporary layoff and recall of workers. There was considerable variation in job flow rates across sectors. Sectors that created more jobs also destroyed more jobs. Younger firms exhibited higher job creation and job destruction rates as well as higher net employment growth rates than mature firms. Job destruction was more volatile than job creation, and relative volatility was negatively related to net employment growth. Sectoral and aggregate economy-wide shocks exerted considerable influence on variations in job creation and destruction rates. However, firm-level idiosyncratic factors were also important. Passive learning about initial conditions explained a small, but significant, fraction of firm-level heterogeneity in gross job creation and destruction.

POVZETEK

V raziskavi smo preučili nekatere vidike dinamike tokov delovnih mest v Sloveniji v vseh gospodarskih dejavnostih med letoma 1996 in 2011 z uporabo podatkov na ravni podjetij. Spremembe števila zaposlenih na ravni podjetij so bile povezane s sočasnimi visokimi stopnjami ustanavljanja in ukinjanja delovnih mest. Ti tokovi odražajo predvsem trajne, nepovratne spremembe v številu zaposlenih v posameznih podjetjih. Med dejavnostmi so obstajale precejšnje razlike v tokovih delovnih mest. V dejavnostih, kjer je bilo ustvarjenih več delovnih mest, je bilo tudi več delovnih mest ukinjenih. Mlajša podjetja so izkazovala višje stopnje ustvarjanja in ukinjanja delovnih mest, pa tudi višjo stopnjo neto rasti zaposlenosti kot zrela podjetja. Ukinjanje delovnih mest je bilo bolj volatilno kot njihovo ustvarjanje, relativna volatilnost pa je bila negativno povezana z neto rastjo zaposlenosti. Sektorski šoki in šoki, ki so vplivali na celotno gospodarstvo, so imeli precejšen vpliv na variacijo v stopnjah ustanavljanja in ukinjanja delovnih mest. Kljub temu pa so bili pomembni tudi idiosinkratični dejavniki na ravni podjetja. Pasivno učenje o začetnih pogojih je pojasnilo majhen, a pomemben delež heterogenosti v ustanavljanju in ukinjevanju delovnih mest na ravni podjetja.

EL Classification Numbers: D22, J6, L25
Keywords: Job creation, job destruction, job reallocation, firm size, firm age, Slovenia

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NETEHNIČNI POVZETEK *(NON-TECHNICAL SUMMARY IN SLOVENE)*

Eden od pomembnejših dejavnikov v raziskovanju tokov delovnih mest je poglobljeno razumevanje njihovih povezav s poslovnim ciklom, rastjo produktivnosti, strukturnimi spremembami v gospodarstvu in z dejavniki, kot so dinamika življenjskega cikla podjetij in raznolikost med podjetji. V povezavi s tem lahko ponujajo vzorci tokov delovnih mest tudi koristno informacijo pri interpretiranju gibanja brezposelnosti. Dinamiko zaposlenosti na ravni podjetja pa se pogosto uporablja tudi kot kazalnik fleksibilnosti trga dela, ki je eden ključnih pogojev za učinkovito alokacijo resursov in gospodarsko rast.

V gradivu predstavljamo rezultate analiz tokov delavcev v Sloveniji za obdobje 1996–2011. Analizirali smo obsege in časovno variiranje ustanavljanja in ukinjanja delovnih mest, trajnost ustanavljanja in ukinjanja delovnih mest, spreminjanje tokov delovnih mest po gospodarskih dejavnostih in regijah ter velikostnih in starostnih razredih podjetij. V gradivu je predstavljen tudi relativni pomen agregatnih, sektorskih in idiosinkratičnih učinkov na časovno spreminjanje ustanavljanja in ukinjanja delovnih mest ter njihove realokacije. Poleg tega smo z ovrednotenjem vloge pasivnega učenja o začetnih pogojih mladih podjetij in vloge medsektorskih sprememb v zaposlenosti proučili tudi raznolikost v dinamiki zaposlovanja na ravni podjetja.

Skupna točka literature o tokovih delovnih mest, tako v razvitih tržnih kot tudi tranzicijskih gospodarstvih, je, da tokove delovnih mest ne poganja nujno samo rast neto zaposlenosti, pač pa nenehen proces realokacije delavcev. Sočasno ustvarjanje in ukinjanje delovnih mest je v osnovi precej večje od sprememb zaposlenosti, kar velja celo za precej ozko definirane gospodarske dejavnosti.

Empirične raziskave kažejo, da je volatilnost relativnih tokov delovnih mest dokaj visoka v vseh državah, pri čemer so rezultati primerjalnih študij relativnih volatilnosti ustanavljanja in ukinjanja delovnih mest neenotni. Medtem ko za tokove delovnih mest v ZDA ugotavljajo, da je njihova realokacija proticiklična, so za Evropo značilne ugotovitve o acikličnosti ali zmerni cikličnosti realokacije tokov delovnih mest. Raziskave kažejo tudi, da so med podjetji pomembne razlike v spremembah zaposlenosti, na kar vplivajo tako vstopi in izstopi podjetij s trgov kot tudi različne stopnje rasti zaposlenosti v obstoječih podjetjih. Ugotavljajo, da večinski del realokacije delovnih mest ne izvira iz medsektorskih sprememb zaposlenosti, temveč iz sprememb zaposlenosti znotraj gospodarskih dejavnosti. To velja tudi za obdobja tranzicije v mnogih bivših centralnoplanskih gospodarstvih, na podlagi česar lahko sklepamo, da imajo v primerjavi s sektorskimi dejavniki in dejavniki na ravni celotnega gospodarstva velik vpliv na dinamiko zaposlenosti v podjetjih idiosinkratični dejavniki. Med večkrat ugotovljenimi dejstvi empiričnih raziskav je tudi vpliv majhnih in mladih podjetij na velikost realokacije in neto zaposlenosti, čeprav nedavne študije ugotavljajo, da vpliv velikosti podjetij ob kontroli njihove starosti izgine (Haltiwanger et al, 2010 and 2013; Lawless, 2012).

Rezultati analiz, predstavljenih v tem gradivu, so v večjem delu skladni s stiliziranimi dejstvi o tokovih delovnih mest, ki jih najdemo v literaturi, vendar kažejo nekateri rezultati hkrati na precejšnje razlike v odnosu do izkušenj drugih držav. Ena pomembnejših razlik se kaže v variabilnosti ustvarjanja in ukinjanja delovnih mest med poslovnim ciklom. Haltiwanger (1992) denimo ugotavlja, da je v času visoke rasti BDP-ja ustvarjanje delovnih mest večje od njihovega ukinjanja, v času recesije pa je večje ukinjanje

delovnih mest. V obeh primerih pa se realokacija delovnih mest poveča. Rezultati na primeru slovenskih podjetij so povečanje realokacije potrdili za obdobje recesije, medtem ko se realokacija delovnih mest v obdobju ekspanzije ni bistveno razlikovala od obdobja zmerne gospodarske rasti.

Spremembe zaposlenosti na ravni podjetij so bile v Sloveniji (v obdobju 1996–2011), podobno kot v drugih državah, povezane s sočasno visokimi stopnjami ustanavljanja, ukinjanja in realokacije delovnih mest, pri čemer je ukinjanje in ustanavljanje delovnih mest v podjetjih v veliki meri povezano s trajnimi spremembami zaposlenosti in ne začasnim vpoklicem in odpoklicem delavcev. Čeprav je vloga vstopov in izstopov podjetij na trg in njega v procesih ustanavljanja in ukinjanja delovnih mest pomembna, pa ugotavljamo, da večji del k ustanavljanju in ukinjanju delovnih mest prispevajo že obstoječa podjetja. Bruto tokovi delovnih mest imajo tudi pomemben vpliv na bruto tokove delavcev na trgu dela. Ocenjujemo, da je realokacija zaposlitev med podjetji v povprečju prispevala dve tretjini realokacije delavcev med različnimi delodajalci ali med nezaposlenostjo in zaposlenostjo.

Tudi med gospodarskimi dejavnostmi obstajajo precejšnje razlike v stopnjah tokov delovnih mest. Ugotavljamo, da se v gospodarskih dejavnostih, ki ustvarijo več delovnih mest, več delovnih mest tudi ukine. Ta ugotovitev podpira Haltiwangerjevo trditev (Haltiwanger et al, 2010 and 2013), da se pri proučevanju rasti neto zaposlenosti zamenjuje vpliv velikosti in starosti podjetij. Preprosta bivariatna analiza med rastjo neto zaposlenosti in velikostjo podjetja pokaže, da je neto rast zaposlenosti višja za manjša podjetja, vendar negativna povezava izgine ob kontroli starosti podjetja. V večini starostnih skupin se neto rast zaposlenosti povečuje do velikosti 24 zaposlenih, med večjimi podjetji pa je rast zaposlenosti neodvisna od njihove velikosti. V primerjavi s starejšimi podjetji je za mlajša podjetja značilna višja stopnja ustanavljanja in ukinjanja delovnih mest ter višja rast neto zaposlenosti. V opazovanem obdobju je pozitivna stopnja rasti neto zaposlenosti v povprečju značilna samo za podjetja, stara dve leti ali manj, medtem ko so starejša podjetja v povprečju delovna mesta ukinjala. To pomeni, da je pri oblikovanju politik za spodbujanje ustvarjanja delovnih mest v zasebnem sektorju treba upoštevati velikost in tudi starost podjetij. Sklepamo lahko tudi, da bi z liberalizacijo predpisov, povezanih s stroški novo nastalih podjetij, lahko pripomogli k rasti neto zaposlenosti.

Podatki kažejo na en sam šibak proticiklični odziv realokacije delovnih mest znotraj gospodarskih dejavnosti, medtem ko je ukinjanje delovnih mest v večini dejavnosti bolj volatilno kot njihovo ustvarjanje, kar se kaže v negativni povezavi razmerja standardnih odklonov ukinjanja in ustvarjanja delovnih mest z rastjo neto zaposlenosti. Čeprav je vpliv sektorskih in agregatnih učinkov na variiranje stopenj ustvarjanja in ukinjanja delovnih mest znaten, pa na njih pomembno vplivajo tudi idiosinkratični učinki. Rezultati kažejo, da na časovno variiranje realokacije delovnih mest najbolj vplivajo prav idiosinkratični učinki. Vpliv raznolikosti podjetij na tokove delavcev se odraža tudi v tem, da se le petina presežne realokacije delovnih mest zgodi med različnimi gospodarskimi dejavnostmi. Poleg tega pasivno učenje mladih podjetij o začetnih pogojih poslovanja pojasni pomemben, čeprav majhen del realokacije delovnih mest v gospodarstvu.

I. Introduction

Empirical research on job flows has grown rapidly with the increased availability of longitudinal firm-level data sets.[1] An important motivating factor has been the desire to gain deeper understanding of the connection of job flows with the business cycle, productivity growth, structural changes in an economy, and with factors such as firm lifecycle dynamics and firm heterogeneity. A related reason is that the pattern of job flows provides useful information for interpreting unemployment developments. Firm-level employment dynamics also is generally seen as an indicator of labor market flexibility, which is a crucial requirement for efficient resource allocation and output growth. As distortions in product, factor and credit markets can adversely affect the efficiency of job flows, researchers have sought to understand how job flows are affected by policies and institutions.

A common finding in the literature on job flows in both market economies and transition countries is that job flows are driven by a continuous process of labor reallocation and not necessarily by net employment growth. There is substantial and simultaneous job creation and job destruction, in excess of that needed to accommodate a given net employment change, even within narrowly defined sectors. Job flow rates exhibit considerable volatility in all countries but the cross-country evidence on relative volatility of job creation and destruction is not uniform. While movements in job reallocation in the United States are generally counter-cyclical, in European countries job reallocation tends to be a-cyclical or slightly pro-cyclical. Studies also have documented that there is considerable heterogeneity in firm-level employment changes, with many firms entering and exiting the market each year and continuing firms recording varying degrees of employment growth. Moreover, a major part of job reallocation involves employment shifts within sectors rather than between sectors, including during the early and middle stages of transition in many former centrally planned economies. This suggests that idiosyncratic factors play a large role in firm-level employment dynamics over and above any impact of sectoral disturbances or economy-wide disturbances with differential sectoral effects. Another empirical regularity is that job reallocation and net job flows are higher for small and young firms, though some recent studies have noted that the role of size weakens or vanishes once one controls for firm age (Haltiwanger et al, 2010 and 2013; Lawless, 2012). Job reallocation also tends to be greater in countries characterized by high downward wage rigidity, and in countries with relatively lax dismissal regulations and with a high share of temporary workers.

In this paper we examine several aspects of job flows dynamics in Slovenia across all sectors of the economy during the period 1996–2011, using firm-level data from the Slovenian Business Register maintained by the Agency for Public Legal Records and Related Services (AJPES). The sample period includes the middle and late-transition periods up to EU accession in May 2004 and the post-accession period covering the two-year stay in Exchange Rate Mechanism II, euro adoption in January 2007, and the subsequent fallout from the recent global financial crisis. There was considerable variation in economic activity, employment and unemployment, and notable progress in labor market reforms during the sixteen year time frame. Thus, it would be of interest to examine the dynamics of job flows underlying the developments in aggregate economic indicators and institutional changes.

The paper is closely patterned after the seminal study by Davis and Haltiwanger (1992). We document the magnitudes and time variation of job creation and job destruction, the persistence rates of job creation and destruction, and the variation of job flows by sectors, regions, firm size and firm age. We measure the relative importance of aggregate, sectoral, and idiosyncratic effects for time variation in job creation, destruction, and reallocation. In addition, we shed light on heterogeneity in firm-level employment dynamics by quantifying the role of passive learning about initial conditions and the role of between-sector employment shifts.

Earlier studies on job flows in Slovenia have focused on the early and mid-transition phases during the 1990s and are limited in their sample coverage. The data set of Bojnec and Konings (1999) and Faggio and Konings (2003) contain only 97 and 511 firms, respectively, and cover the early transition period up to the mid-1990s. De Loecker and Konings (2006) restrict their analysis to manufacturing firms using a large representative data set for the period 1994–2000. Haltiwanger and Vodopivec (2003) analyze job flow dynamics of firms across all sectors of the economy using a large representative data set, but their sample period is confined to 1997–1999. Vodopivec (2004) examines labor market developments in Slovenia, including trends in job flows, during 1990-2001. In contrast to these earlier studies, the sample coverage of this paper is broader and longer and we examine more aspects of job flow dynamics.

The focus of this paper is on gross job flows (i.e., job creation and destruction by firms) as opposed to gross worker flows (i.e., hiring and separations). Job flows are closely related to worker flows, but there are differences. Job flows reflect reallocation driven by labor demand, with labor resources being channeled from old and contracting firms to new and expanding firms. In contrast, worker flows are a result of demand factors, supply factors, and worker-job matching factors. Worker flows typically exceed job flows, as workers may leave a job because the job is terminated (job destruction) or because of poor match quality or because of other factors such as retirement. The data requirement for analysis of worker flows is usually different from that for analysis of job flows. However, an attempt is made in this paper to spell out the contribution of job reallocation to worker reallocation.

The rest of the paper is organized as follows. Section II summarizes the macroeconomic and institutional background. Section III describes the data base and measurement of job flows. Section IV presents the empirical findings, and Section V concludes.

II. Macroeconomic and institutional background

Slovenia experienced robust economic growth until the onset of the global financial crisis in 2008. Real GDP growth averaged about 4 percent annually during 1996-2003 while fluctuating around a mildly declining trend. It picked up pace from 2004 and reached a peak of 7 percent in 2007. Thereafter, real GDP growth headed downward as the impact of the global financial crisis began to be felt. The impact of the crisis was particularly severe in 2009, when growth turned sharply negative, and subsequent recovery to pre-crisis rates has been elusive (Figure 1).

The swings in the growth of employment (national accounts measure)[2] were broadly similar to that of real GDP growth (Pearson correlation, ρ=0.547; marginal significance level, p=0.028), though the magnitude and variation of employment growth were smaller than those of real GDP growth. The limited data on full-time equivalent (FTE) employment reported by the Institute of Macroeconomics Analysis and Development for the years 1995 to 2001 in various issues of the *Autumn Report* show that growth of FTE employment and national account-based measure of employment were closely correlated (ρ=0.972). However, the absolute size and variation of FTE employment growth were smaller than those of the national account-based measure of employment.

The relationship between unemployment and real GDP growth was not statistically significant, for the entire sample period as well as for sub-periods. After declining in the later part of the 1990s, unemployment remained steady around 6.5 percent during 2001–2006, fell to below 5 percent during 2007–2008, and increased progressively thereafter to 8.2 percent in 2011.

Slovenia has undertaken notable reforms of the labor market since 1998 aimed at increasing its flexibility, though their impact is yet to be fully felt and many challenges remain (Koske, 2009; OECD, 2009b). Revisions to labor regulations have resulted in a significant drop in the employment protection legislation (EPL) index for both regular and temporary contracts. The overall EPL index is estimated to have declined from 4.1 in 1996 to 2.7 in 2003 and to have remained around this level thereafter (Dolenc and Vodopivec, 2007; and OECD, 2009b). However, as of 2008, employment protection in Slovenia was stricter than in other new EU member states such as Czech Republic, Hungary, Poland, and Slovakia. The liberalization of employment protection has been associated with a large increase in the share of workers with fixed term contracts, particularly among young workers. Collective bargaining was partially decentralized in 2006 and negotiations were scheduled to take place on a voluntary basis from 2010 onward. Unit labor costs were significantly reduced through a phased elimination of payroll taxes between 2006 and 2009. The minimum wage relative to the average age was on a declining trend from 2004 onward until 2010, when minimum wages were increased sharply by 23 percent. During the crisis, with an eye to limiting layoffs, the government introduced legislation to provide subsidies for shorter working hours and to reimburse wage compensation for workers on temporary lay-offs.

III. Data and measurement of job flows

The data

The analysis in this paper is based on annual firm-level data maintained by AJPES. The data base pertains to all private business entities, their subsidiaries, and other organization segments which perform profitable or non-profitable activities. Enterprises (including banks, insurance companies, investment funds and co-operatives), sole proprietors, legal entities governed by public law, and non-profit organizations have to present their annual reports to AJPES for the purpose of presenting them publicly and for tax and statistical purposes.

The AJPES data base includes information on firms' financial statements, full-time equivalent (FTE) employment, industrial affiliation, location, and incorporation year of the firm to the business register.

The analysis is confined to firms that have at least one FTE employee. The sample data set comprises between 25,000 and 37,000 annual observations on firms over the 1996 to 2011 period (see Table 1). The firms included in the sample accounted for each year, on average, about 51 percent of total domestic valued added, and their FTE employment represented about 58 percent of the total number of employees in the economy (national account measure). The gap is mainly explained by the exclusion of the government sector from the sample. An added consideration in the case of employment is that the national account measure of employees includes part-time workers. Trends in growth of FTE employment and value added for the firms in the sample were broadly similar to those for the entire economy. The simple correlation between the sample and economy-wide trends was 0.893 for employment growth and 0.969 for growth of value added. Since each firm in the data set has a unique identification code, we are able to observe entry and exit of firms within the sample period. Each year, on average, new entrants amounted to about 8.5 percent of the total number of firms while the number of exiting firms amounted to 5.8 percent of the total number of firms.[3]

Measurement of job flows

We measure gross job flows in the standard way, following Davis and Haltiwanger (1992). Gross job creation in period *t* is measured as the sum of employment gains of all firms that expand or start operations between period *t-1* and period *t.* Similarly, gross job destruction at time *t* is the sum of employment losses (in absolute terms) of all firms that contract or shut down operations between *t-1* and *t*. Gross job reallocation is defined as the sum of gross job creation and destruction, and indicates the total number of employment positions reallocated in the economy. Net employment change is the difference between gross job creation and gross job destruction. Excess job reallocation equals the difference between gross job reallocation and net employment change.

To express the job flow measures as rates, we need to divide by sector size. Firm size at time *t* is calculated as the average employment between period *t* and *t-1*, i.e. $x_{ft} = 0.5*(n_{ft} + n_{ft-1})$. Accordingly, the sector size is defined as $X_{st} = \sum_{f \in S} x_{ft}$, where *S* is the set of firms in sector *s*. The job creation rate (*POS*) and job destruction rate (*NEG*) can be expressed as the size-weighted average over firms' growth rates as follows:

$$POS_{st} = \sum_{g_{fst}>0, f \in S} \left(\frac{x_{fst}}{X_{st}}\right) g_{fst} \qquad (1)$$

$$NEG_{st} = \sum_{g_{fst}<0, f \in S} \left(\frac{x_{fst}}{X_{st}}\right) |g_{fst}| \qquad (2)$$

where $g_{fst} = (\Delta n_{fst}/x_{fst})$ is the growth rate of employment in firm *f* in sector *s* in period *t*. This measure of g_{fst} allows for entry and exit, is symmetric for employment losses and gains, and lies within a closed interval [–2, 2]. The job reallocation rate (*SUM*) is equivalent to the size-weighted mean of absolute growth rates among firms and is given by

$$r_{st} = SUM = POS_{st} + NEG_{st} = \sum_{f \in S} \left(\frac{x_{fst}}{X_{st}}\right) \left|g_{fst}\right|. \qquad (3)$$

As Hijzen et al. (2010) note, gross job reallocation can be thought of as the "maximum" number of worker movements needed to adjust to changes in employment opportunities across enterprises. It is the maximum in the sense that it counts workers both when they lose their jobs as a result of job destruction and also when they move to a job that is created.

Net employment growth rate, or the net reallocation rate, (NET_{st}) is equal to $POS_{st} - NEG_{st}$. The rate of excess reallocation is the difference between the gross and net rates of job reallocation, $EXCESS_{st} = SUM_{st} - NET_{st}$. $EXCESS_{st}$ is therefore a measure of the number of job changes in excess of those required to accommodate employment growth.

IV. Empirical results

A. Job flows at the aggregate level

Magnitude and time variation of job flows

The sample period can be divided into three broad phases: 1996–2003, 2004–2008, and 2009–2011 (Figure 2). Net employment growth rate (NET) in the first phase fluctuated narrowly around a horizontal trend of zero growth. A mild expansionary phase began with EU entry in 2004 and net employment growth peaked with euro adoption in 2007. With the onset of the financial crisis in Q4, 2008 net employment growth slowed in 2008 and turned sharply negative in 2009 and continued to remain negative in the subsequent years. As shown in table 1, the cumulative decline in employment during 2009–11 exceeded the total employment gains accumulated in the earlier periods.

The magnitude of annual net employment growth masks substantial and simultaneous job creation and job destruction. When employment virtually stagnated during 1996–2003, on average 8 percent new jobs were created each year (POS) and an equal percentage of existing jobs were destroyed (NEG).[4] This implies that on average one in every six jobs was either created or destroyed each year in the economy during this period. During the expansionary phase, the job creation rate peaked at 10 percent in 2007 while the job destruction rate slowed down to 6 percent. Following the onset of the financial crisis the job creation rate slowed to a low of around 6.5 percent in 2009 while the job destruction rate increased sharply to a high of 12.5 percent.

The job reallocation rate (SUM) during the expansionary phase (2004–2008) did not differ much from that during the earlier phase of employment stagnation, as the magnitudes of the increase in job creation rate and the fall in job destruction rate during the expansionary phase were broadly similar. This is contrary to the pattern found by Davis and Haltiwanger (1992) in the United States that during upswings the increase in gross job creation is greater than the decrease in gross job destruction. However, in line with the pattern in the United States, job reallocation rose sharply during the recession phase (2009–2011) as job destruction varied more than job creation. Thus, in the stagnation and expansionary phases covering the period 1996–2008, there was no significant correlation between the pace of job reallocation and net employment growth (ρ=-0.120; p=0.696). However, in the period confined to the 2004–2011 business cycle, the job reallocation rate exhibited significant counter-cyclic

time variation: the correlation between job reallocation and net employment growth was negative and statistically significant (ρ=-0.811; p=0.015).[5]

Concentration and persistence

Entry and exit of firms played an important role in the job creation and destruction process. On average, entry accounted for 27 percent of job creation and exit accounted for 33 percent of job destruction during the entire sample period. The pattern is consistent with the findings in other countries. The fraction of job creation accounted for entry of new firms was 30 percent in the United Kingdom during 1997–2008 (Hijzen et al., 2010) and 20 percent in the United States during 1972–1986 (Davis and Haltiwanger, 1992). The contribution of firm exits to job destruction was 45 percent in the United Kingdom study and 25 percent in the United States study. Davis and Haltiwanger (1999) points out pitfalls in directly comparing the prominence of firm entry and firm exits across countries and studies because of differences in sample design, the sampling interval, and the unit of observation (firm or establishment).

There were notable differences between continuing firms and new entrants in the temporal pattern of job creation rate (Figure 3). The job creation rate of new entrants (POS_{entry}) displayed little variation during the sample period: in particular, there was no significant increase during the expansionary phase or slow down during the recession period. In contrast, job creation rate of continuing firms (POS_{exist}) displayed clear cyclical variation, with the rate rising during the expansionary phase and slowing down during the recession period. There were differences also in the temporal patterns of job destruction of continuing firms and exiting firms. During much of the employment stagnation phase (1996–2003), job destruction rate of exiting firms (NEG_{deaths}) fluctuated greatly and moved in an opposite direction to the job destruction rate of continuing firms (NEG_{exist}). Also, during the recession period, the job destruction through firm exit continued to rise even when employment contraction in continuing firms slowed down after an initial spike.

Continuing firms experienced a range of expansion and contraction rates. Figure 4 displays the distributions of job creation and destruction over various growth rate intervals, with the extreme end-points showing the fraction of job creation and destruction accounted for by entry and exit, respectively. The figure shows that the incidence of large changes was relatively small. Whereas firms experiencing employment change within ±20 percent (i.e., $|g|<0.20$) accounted for 24 percent of job creation and 28.5 percent of job destruction, firms experiencing growth rates above 100 percent in absolute terms ($|g|> 1.0$) accounted for only 10–11 percent of both job creation and job destruction. There was a mild asymmetry between the distributions of job creation and destruction by firm-level growth rate. Relative to job creation, job destruction displayed a slightly greater concentration of establishments with moderate growth rates ($|g|<0.10$). The concentration of job flows points to a major role for fixed costs in the adjustment of labor, and suggests that there is greater lumpiness in employment contraction than employment expansion. High concentration of job creation and destruction also may accentuate effects on local economies.

Annual job creation and destruction primarily reflected persistent firm-level employment changes rather than temporary layoff and recall of workers. The persistence rates of newly created and newly destroyed jobs over different time horizons were high and exhibited cyclical movements. During the employment stagnation phase (1996–2003), the average one-year, two-year and three-year persistence rates were broadly similar for job creation and job destruction.[6] As table 2 shows, of the newly created (destroyed) jobs in any given year during the stagnation phase, on average 82 percent continued to be present (lost) the following year, 76 percent continued to be present (lost) two years later, and 73 percent were still present (lost) three years later. During the expansionary phase (2004–2008), the one-year persistence rate for job creation remained broadly unchanged from the stagnation phase, but the two-year and three-year persistence rates went up slightly, while the persistence rates for job destruction over all time horizons fell. During the recession period (2009–2011), the persistence rates for job creation fell sharply by 10–14 percentage points, and those for job destruction increased but by a smaller margin.

Cross-country evidence also shows a high persistence of job creation and destruction over one-year and two-year time horizons. For a sample of thirteen European OECD member countries, Gomez-Salvador et al. (2004) report that in the 1990s between 81 percent and 92 percent of newly created jobs and between 64 percent and 86 percent of newly destroyed jobs persisted of at least one year. After two years, the persistence rates in job creation fell to a range of 71–86 percent while persistence in the job destruction rate varied between 52 percent and 79 percent. In the United States, Davis and Haltiwanger (1992) found the average one-year persistence rates for newly created and newly destroyed jobs to be 68 percent and 81 percent, respectively.

The connection of job reallocation to total worker reallocation

Job flows are closely related to worker flows. The creation and destruction of jobs require workers to switch employers or change employment status between employment and non-employment. However, turnover of workers is usually greater than that of jobs as worker reallocation also reflects a number of considerations such as retirement of older workers, entry of young persons in the work force, and job changes motivated by better career prospects, dissatisfaction with present job, and worker-job mismatch. Thus, it is of interest to determine the extent to which firm-level job reallocation contributed to total worker reallocation.

Since we do not have matched employer-employee data set we cannot measure worker flows and job flows in an integrated manner like Haltiwanger and Vodopivec (2003) and Vodopivec (2004). Instead, we derive worker flows indirectly from employment and job tenure figures obtained from the various rounds of labor force surveys. However, a comparison of job flows with worker flows estimated from labor force surveys has shortcomings because of measurement issues. Whereas firm-level job reallocation in our sample is measured on the basis of full-time equivalent employees, the labor force surveys include full-time employees, part-time employees, own-account workers and unpaid family workers among the employed. To partly mitigate the problem, we exclude own-account workers and unpaid family workers from the worker flow calculations. Still, bias remains since we cannot determine the full-time equivalent employment for part-time employees.

Following Davis and Haltiwanger (1992), we calculate total worker reallocation in any year as the sum of the number of persons who had a different job or different employment status than they had 12 months earlier (i.e., job-to-job transition, joblessness-to-job transition, and job-to-joblessness transition) and express this as percent of total employment. On this basis, total worker reallocation rate in any year ranged between 21.7 percent and 25.9 percent over the period 2002–2011 (see column 4, Table 3). It is notable that the worker reallocation rate was on a rising trend except during 2008–2009. The fall back in worker reallocation during the crisis period was the outcome of two factors: first, the efforts of the Slovene government to induce firms to keep workers on their payroll through subsidies for shorter-hour work schedule and for giving workers paid leave for a temporary period; and second, a slowdown in the switch in employment status from non-employment to employment.

Table 3 shows that job reallocation accounted for a large proportion of worker reallocation in Slovenia during the sample period. In relating job reallocation to worker reallocation, it has to be recognized that job reallocation (SUM_{st}) represents an upper bound on switches in employers or employment status in response to firm-level employment changes, as some job losers may move from shrinking to expanding firms in the same sector within the observation period. A lower bound on worker reallocation associated with job reallocation is given by $MAX_{st} = max\{POS_{st,}\ NEG_{st}\}$. Taking the ratio of SUM_{st} to the total worker reallocation figures, we find that the upper bound contribution of job reallocation to worker relocation ranged between 63.4 percent and 80.5 percent (column 7). These figures are broadly in line with the estimate of two thirds obtained by Haltiwanger and Vodopivec (2003) for Slovenia for the period 1997–1999. The lower bound contribution of job reallocation to worker reallocation in our sample ranged between 33.8 percent and 51.7 percent (column 8), which is close to the estimate of 35 percent obtained by Davis and Haltiwanger (1992) for the United States. As may be expected, the fraction of worker reallocation explained by job reallocation jumped sharply during the recession that followed the onset of the financial crisis.

B. Variation in job flows by sector, location and firm characteristics.

Cross-sectoral variation

There was considerable variation in net job flow across sectors. Employment in financial and insurance activities and in manufacturing had been contracting on account of structural changes even before the onset of the financial crisis. These two sectors also were among the most severely impacted by the financial crisis, and experienced further cumulative employment loss of 15–20 percent during 2009–2011 (Table 4). Within manufacturing, employment loss during the recession period ranged from a low of about 2 percent in the leather industry to a high of around 40 percent in the manufacture of textiles, wearing apparel, furniture, and other transport equipment. The impact of the crisis was also particularly severe on the construction sector: employment in this sector fell by nearly one third during 2009–2011 after substantial gains in the earlier periods. In contrast, services were a major source of employment growth during 1996–2008 and experienced only small losses in employment during the recession period.

As table 5 shows, there were also enormous differences in gross job creation and destruction rates across sectors. The mean gross job creation rate (POS) over the sample period ranged from 1.6 percent in the electricity and other energy sector to 13.7 percent in health and social work activities, while the mean gross job destruction rate (NEG) varied from 2.6 percent in water supply and other utilities to 13.3 percent inreal estate activities. These sectoral differences reflect, inter alia, fluctuations in demand, stabilitity of market share, firm size and firm age structure in the sector, and other idiosyncratic factors (Bassanini, 2010).

In the sector grouping by NACE Sections shown in table 5 as well as in the more disaggregated sector grouping by NACE Divisions (not shown), there was a positive and statistically significant correlation between mean job creation and destruction rates: sectors that created more jobs also destroyed more jobs. Thus, this pattern existed for the subsectors within manufacturing and within services. A positive correlation between job creation and job destruction rates has also been observed in other studies (e.g., Davis et al., 1996; Hijzen et al. 2010; OECD, 2009a) and is consistent with a variety of theoretical explanations. According to Mortensen and Pissarides (1994), enterprises have diverse experiences because of persistent idiosyncratic shocks and an increase in the variance of the idiosyncratic shock faced by enterprises can result in an increase in both job creation and destruction in a sector. Klepper (1996) explain job creation and job destruction patterns in terms of differences in the product life cycle of sectors. Entry is generally large in new technologically progressive industries, where the process of innovation and competition also generate large exit and shakeout.

Job flows by region

Eight out of the 12 regions experienced net job loss over the sample period (Table 6). The four regional employment growth poles were geographically spread out across the country: Obalno-Kraška in the south west, Osrednjeslovenska in the center, Jugovzhodna Slovenija in the south east, and Podravska in the north east. In contrast, the regions with the highest job reallocation rates were located in the two extreme ends of the country— Obalno-Kraška in the south west, and Koroška, Podravska, and Pomurska in the north east. Similar to the cross-sectoral pattern, there was a strong positive association between gross job creation and destruction. Regions with higher gross job creation rates also had higher job destruction rates.

The role of firm size and age

A well-known hypothesis on firm growth, Gibrat's law, is that growth rates of firms are independent of their size (see Sutton, 1997). However, findings of a large number of studies have led to the conventional wisdom that net employment growth is negatively related to firm size. Several authors have noted pitfalls in relating firm-size and job flow rates. Haltiwanger et al. (2010, 2013) have argued that researchers may be confusing firm size effects with the effects of firm age: new firms are an important source of net job growth and are typically small when they start operations. Thus, the relationship between firm size and growth should be examined after controlling for firm age. Earlier, Davis et al. (1996) noted that the relationship is prone to bias because of regression-to-the mean effects. Transitory shocks to employment or random measurement errors could result in firms being

categorized smaller or larger than their "typical" size. If these transitory shocks or random measurement errors were not highly serially correlated, this would lead to upward bias in the estimated growth rate of small firms and downward bias in the estimated growth rate of large firms. To mitigate the effects of regression to the mean, Davis et al. proposed using a classification based on the current average size, measured as the simple average of firm size in base year *t-1* and current year *t*. The average size class methodology has now become standard in the literature, but researchers typically also report results using base-year size classification to highlight the sensitivity of the results to regression-to-the mean effects (e.g., Haltiwanger et al., 2010 and 2013; Hijzen et al., 2010; Neumark et al., 2011).

Table 7 indicates that the regression fallacy applied mainly to the smallest firms in our data set. The net job creation rate at firms with one full-time equivalent employee was substantially lower under the average-firm size classification compared with the base-year size definition. In every other size group, the mean net job creation rate was higher for the average-size classification than for the base-year classification, and the gap between them was in the range of only 1.5–3.5 percentage points. In the discussion that follows, we focus on the results based on the average-size classification.

Consistent with most studies, there was an inverse univariate relationship between firm size and net employment growth. Net employment growth fell steadily as firm size increased, but turned around slightly for the largest firms with 250 or more employees. Firms with up to 49 workers experienced positive average net job growth during the sample period, while firms above this size experienced net job loss.

The relationship between gross job creation rate (POS) and firm size is monotonic, with smaller firms having higher gross job creation rates and accounting for a disproportionate share of gross job creation relative to their share in total employment. Firms with up to nine workers accounted for about 51 percent of total gross job creation but for only about 14 percent of total employment. Firms in the size groups covering >9 to 99 workers had job creation share close to their employment share, while firms in higher size categories had job creation share much smaller than their employment share.

In contrast to the pattern for job creation, the relationship between job destruction (NEG) and firm size is not monotonic. The job destruction rate dropped sharply from firms with one-FTE workers to the next size group of >1 to 9 workers, remained broadly steady for firm sizes up to 99 workers, and fell thereafter in the higher size categories. Although the two smallest size groups accounted for a higher share of job destruction than their employment share and the two largest size groups accounted for disproportionately less, the gap between the two shares was narrower than in the case of gross job creation.

Controlling for firm age reveals a markedly different pattern from that observed in the univariate relationship between firm size and net employment growth. In particular, firm size continues to have an influence but there is no evidence of smaller firms systematically having higher net employment growth rates than larger firms once we control for firm age. Among one-year old firms, the relationship between firm size and net employment growth is inverted U-shaped, while among firms that have been in existence for 15 years or more the relationship between net growth and firm size is positive

throughout. This reasons for this pattern are not easily explaind. Among firms in the intervening age groups, net employment growth rises with firm size up to 24 workers and flattens out for the size groups beyond this (upper panel of Figure 5). Thus, consistent with Gibrat's law, firm growth is independent of size among firms with more than 24 workers in the age groups between 2 and 14 years. Dixon and Rollin (2012) for Canada and Haltiwanger et al. (2010 and 2013) for the United States also found evidence in support of Gibrat's law among medium-sized and large firms.

The univariate relationship between net employment growth and age is L-shaped: net growth fell up to the age of five and flattened out in the subsequent age groups. Only firms up to two years of age experienced net employment growth over the sample period, and all firms older than this suffered net job loss (Table 8). Controlling for firm size, we find a weak relationship between net growth and age for firms in the largest size group with more than 249 workers. The relationship was negative for all other size groups, with younger firms exhibiting higher net growth or smaller net job loss than more mature firms (lower panel of Figure 5).

In general, younger firms had both higher gross job creation and destruction rates than mature firms, but there were differences in the pattern. The gross job creation rate fell progressively as firms become older. In contrast, the job destruction rate rose as firms attain two years of age and remained broadly flat until five years of age, and fell gradually thereafter for the higher age categories. Young firms had higher rates of job losses from firm exit than more mature firms. Job destruction rates through contraction of continuing firms and through firm exit were almost evenly balanced for firms up to the age of five. However, for higher age categories the job destruction rate through firm exit was much smaller than that on account of contraction of continuing firms.

C. Cyclical dynamics of job flows and accounting for time variation in job reallocation

Cyclical dynamics

There was only weak evidence of countercyclical behavior of job reallocation within individual sector groups. As can be seen in Table 5, during 1996–2008, a negative significant correlation between job reallocation rate and net employment growth was observed only in information and communication, financial and insurance activities, and education. In addition, in the 2004–2011 business cycle period, only 7 out of the 19 NACE Section groups exhibited significant countercyclical variation in job reallocation. This may be because the cycle in the other sectors was not particularly sharp. Table 9 sheds further light on cyclical behavior of sectoral job allocation rates for the sample period as a whole. Size weighted correlations were calculated between adjusted sectoral job reallocation rates and net employment growth, using alternative sectoral classification schemes where NACE industry grouping is interacted with region, size, and age. The calculations in the upper panel of the table show that about one-half of the sector groups exhibited countercyclical movements in job reallocation rates. For most of the classification schemes, the absolute size of the average correlation for negative correlations was broadly similar to the size of the average correlation for positive correlations. The lower panel of the table indicates that countercyclical movements in job reallocation rates were strongest in the case of

older firms. In contrast, for small and younger firms and for firms in the services sector, the average correlation between net sectoral job growth and adjusted job reallocation was positive.

Job destruction was more volatile than job creation in most sectors of the economy. The exceptions were mining, water supply and other utilities, wholesale and retail trade, and transportation and storage—job creation was more volatile than job destruction in these sectors. Davis and Haltiwanger (1999, p. 2735) also found job destruction to be more volatile than job creation in the manufacturing sector of six out of the eight countries that they reviewed.

Foote (1998) found that in manufacturing industries in the United States during 1972–1988, the relative variance of job destruction declined sharply with an industry's trend employment growth rate. He explains the negative relationship as follows: the existence of adjustment costs separates job creation and destruction margins in enterprises in a way that job destruction is the more important margin for accommodating aggregate shocks in declining sectors, while the opposite holds for growing sectors. Looking at a disaggregated grouping by NACE Divisions, Figure 6 shows that for the Slovene economy as a whole, the standard deviation of job destruction relative to the standard deviation of job creation was lower in sectors with higher net employment growth. Regression analysis in Table 10 confirms a statistically significant negative relationship and indicates that about 44 percent of the variation in the standard deviation ratios of job destruction and job creation is explained by employment growth differences. However, the pattern within the manufacturing sector was different from that in non-manufacturing. The lower panel of Figure 6 suggests a weak relationship between relative volatility and employment growth in manufacturing, and this is confirmed by the regression analysis. When a regression equation for the entire sample is estimated with the addition of an intercept dummy and slope interaction term representing sub-sectors in manufacturing, the coefficient on the slope interaction term is positive and statistically significant, indicating that the relationship between standard deviation ratios and net employment growth in manufacturing is less negative than in non-manufacturing. A separate regression equation for manufacturing only further shows that there is no statistically significant relationship in this sector between the standard deviation ratios and net employment growth. In contrast, in the separate equation for the services sector, the coefficient on net employment growth is close to -1 and statistically significant. Besides being unable to explain the relative variation of job destruction in the manufacturing sector in Slovenia, Foote's model also does not fully explain the pattern in the non-manufacturing or services sectors. In the regression equations for the non-manufacturing and services sectors, the coefficient on the constant term is positive and statistically significant, indicating that even non-growing subsectors display a higher standard deviation of destruction than that of creation.

Accounting for time variation in job creation, destruction, and reallocation

Aggregate labor market fluctuations can be the combined outcome of aggregate (economy-wide) disturbances, sector-specific shocks and differential sectoral responses to aggregate disturbances, and idiosyncratic firm-level changes. We follow the decomposition method used by Davis and Haltiwanger (1990 and 1992) to measure the relative importance of aggregate, sectoral, and idiosyncratic effects for

time variation in job creation, destruction, and reallocation and to determine the nature of the covariation between these three effects.

A linear model for firm-level employment growth rate, g_{ft} , can be expressed as:

$$g_{ft} = g_t + g_{st} + \tilde{g}_{ft}^{ST} \qquad (4)$$

where g_t is the aggregate growth rate of the economy, g_{st} is the sector growth rate deviated about g_t, and $\tilde{g}_{ft}^{ST}$ is the residual idiosyncratic component of the firm growth rate. From the distribution over the $\tilde{g}_{ft}^{ST}$, we can compute gross job creation, destruction rates, and allocation rates adjusted for aggregate-time and sector-time effects as follows:

$$\widetilde{POS}_t^{ST} = \sum_{f,\tilde{g}_{ft}>0} \frac{x_{ft}}{X_t} \left(\tilde{g}_{ft}^{ST}\right), \qquad (5)$$

$$\widetilde{NEG}_t^{ST} = \sum_{f,\tilde{g}_{ft}<0} \frac{x_{ft}}{X_t} \left(|\tilde{g}_{ft}^{ST}|\right), \qquad (6)$$

and

$$\widetilde{SUM}_t^{ST} = \sum_{f} \frac{x_{ft}}{X_t} \left|\tilde{g}_{ft}^{ST}\right|. \qquad (7)$$

Temporal movements in these adjusted measures reflect only the contributions of the idiosyncratic effects. Thus, $\widetilde{SUM}_t^{ST}$ measures the gross rate of change in firm-level employment positions due to idiosyncratic firm-level employment behavior.[7]

Taking the identity,

$$SUM_t = \widetilde{SUM}_t^{ST} + (SUM_t - \widetilde{SUM}_t^{ST}) , \qquad (8)$$

we can decompose the variance for gross job reallocation as:

$$\mathrm{var}(SUM_t) = \mathrm{var}\left(\widetilde{SUM}_t^{ST}\right) + \mathrm{var}\left(SUM_t - \widetilde{SUM}_t^{ST}\right) + 2\mathrm{cov}(\widetilde{SUM}_t^{ST}, SUM_t - \widetilde{SUM}_t^{ST}). \quad (9)$$

If the ratio $\frac{\mathrm{var}\left(\widetilde{SUM}_t^{ST}\right)}{\mathrm{var}(SUM_t)}$ is equal to zero, it implies that the distribution over the idiosyncratic component, $\tilde{g}_{ft}^{ST}$, is time invariant. On the other hand, a large value for this ratio indicates that the temporal variation in the cross-sectional variance (and higher moments) of $\tilde{g}_{ft}^{ST}$ accounts for much of the temporal variation in gross job reallocation. The covariance term cannot be unambiguously assigned to

either the aggregate and sectoral effects or to the idiosyncratic effects. The variance of job creation and destruction can also be decomposed along similar lines as equations (8) and (9) and variance ratios calculated to obtain information on the contribution of idiosyncratic effects relative to those of aggregate and sectoral effects.

The top panel (A) of Table 11 shows that idiosyncratic effects played a dominant role in accounting for the annual variability of gross job reallocation. Aggregate economy-wide effects and sectoral effects unambiguously accounted for only between 7 percent and 15 percent of the time variation in job reallocation, depending on the sectoral classification scheme. The variance of the idiosyncratic component was very large. However, the negative and sizeable covariance term suggests that idiosyncratic effects strongly worked against the aggregate and sector effects.

The second panel (B) of Table 11 indicates that aggregate and sector effects as well as idiosyncratic effects exerted considerable influence on job creation, but that they also had a very forceful counteracting tendency. The third panel (C) of the table shows that aggregate and sector effects played a greater role than idiosyncratic effects in accounting for fluctuations in job destruction rates, except in the sectoral classification by age. Idiosyncratic effects explained 18–23 percent of the overall variance of job destruction compared with 43–65 percent accounted for by aggregate and sectoral effects. The sign of the covariance term is positive, indicating that idiosyncratic effects reinforced the fluctuations in job destruction associated with aggregate and sectoral effects.

Thus, the covariance terms from the POS and NEG decompositions together explain the dominant role of the idiosyncratic component in job reallocation fluctuations. When POS falls and NEG rises during economic contractions, idiosyncratic effects work against the fall in gross job creation while reinforcing the rise in gross job destruction.[8]

D. Explaining simultaneous job creation and destruction

Quantifying the role of passive learning about initial conditions

There are many sources of firm-level heterogeneity that lead to simultaneous large job creation and destruction rates within narrowly defined sectors of the economy. One theory stresses selection effects associated with passive learning about initial conditions. According to this theory, firms face ex ante uncertainty about their cost parameters or efficiency level, but accumulate relevant information over time through the process of production on the basis of which they decide whether to exit or to remain (Jovanovic, 1982). The contribution of learning about initial conditions to job flows typically diminishes as the length of tenure of the firm increases. A negative relationship between firm age and gross job flows is consistent with this theory. However, one shortcoming of this theory is that it cannot explain large gross flows among mature firms.

Co-existence of job creation and detruction can also arise from capital vintage effects, differences in factor intensities and production techniques, differences in entrepreneurial and managerial ability, and differences in local conditions. A firm's investment in new and technologically superior capital equipment may enhance its productivity and improve its position relative to competitors, thus leading

to expansion. Firms with different factor intensities and production techniques are likely to respond differently to common cost shocks (e.g., changes in energy prices and wages) and demand shocks. Entrepreneurial and managerial ability plays a key role in business performance, including job and productivity growth outcomes.

Following Davis and Haltiwanger (1992), we quantify the contribution of passive learning about initial conditions to job flows. Davis and Haltiwanger make some simple identifying assumptions to estimate the fraction of job reallocation that can be attributed to passive learning and selection. First, it is assumed that the learning process is largely completed within *n* years of birth. This implies that job reallocation among mature firms (age ≥ *n*) is associated with other factors such as those noted in the previous paragraph. Second, it is assumed that these other factors have age-neutral effects on job reallocation rates. Thus, these other factors generate the same "base" job reallocation rate for younger and older firms. Third, it is assumed that long-run net growth generates age-nonneutral effects on job reallocation rates. Accordingly, all job reallocation in excess of the "base" amount and the amount required to accommodate net expansion can be attributed to passive learning about initial conditions.

Davis and Haltiwanger (1992) make a further adjustment to take into account that in a contracting sector the contraction is likely to occur through shrinkage and death among plants of various ages. They assume that (i) net contraction has age-neutral effects on the reallocation rates, and that (ii) net expansion has age-nonneutral effects. On this basis, the fraction of job reallocation due to passive learning and selection can be estimated as

$$P = \left[\sum_{a<n} \frac{x(a)}{X} \left[r(a) - r(age \geq n) \right] - \max\{g, 0\} \right] / r \qquad (10)$$

where *x(a)/X* is the *a*th age group's share in sectoral employment, *r(a)* is the job reallocation rate of age group *a*, *r(age ≥ n)* is the measured job reallocation rate among mature plants, *g* denotes the net sectoral employment growth rate, and *r* denotes the sectoral job reallocation rate.

Estimating equation (10) using the pooled sample data, we find that learning about initial conditions explains a small fraction of the *levels* of job reallocation. As Table 12 shows, selection effects associated with learning about initial conditions accounted for 21 to 25.6 percent of job reallocation in the economy, assuming that firms completely learnt their underlying efficiency level by age four to six. The role of learning in job reallocation in Slovenia was higher than that observed by Davis and Haltiwanger (1992) in the United States. They found that learning about initial conditions accounted for only 11–15 percent of job reallocation in the U.S. manufacturing sector. Separate estimations of equation (4) for each NACE Sections show that there were cross –sectoral differences in the importance of learning about initial conditions, but that learning never explained more than 30 percent of the observed level of sectoral job reallocation.

Following Davis and Haltiwanger (1992), we quantify the ability of passive learning story to explain cross-sectoral *differences* in job reallocation rates. The results indicate that the passive learning story provides a limited explanation of the inter-sectoral differences in job reallocation rates. As Table 12

shows, learning about initial conditions explained only 21.7 to 25.9 percent of the variation in job reallocation rates among NACE Sections.

Excess job reallocation and its decomposition: quantifying the role of between-sector employment shifts

Total job reallocation in the various sectors was in excess of the minimum required to accommodate net employment changes. As shown earlier in Table 5, in the sectoral grouping by NACE Sections, the average excess job allocation rate was as high as 20.5 percent in real estate activities and as low as 2.9 percent in electricity and other energy supplies. Construction and service sectors (except for financial and insurance activities, arts and recreation, and public administration) had above-average excess job reallocation. Within manufacturing, excess job reallocation was very low in petroleum products and pharmaceuticals. For the economy as a whole and for the manufacturing sector, the average excess job reallocation rate fluctuated over time and there was no significant correlation with net employment growth. Bassanini (2010) explains low excess job allocation in an industry in terms of the presence of large and stable market share of big firms, and high excess job allocation in terms of fluctuation in demand and presence of small firms.

We follow the decomposition method used by Davis and Haltiwanger (1992 and 1999) to determine the extent to which this excess job reallocation process reflected between-sector employment shifts and job reallocations within the sector. Aggregate excess reallocation of jobs satisfies the decomposition

$$EXCESS_t = SUM_t - |NET_t| = (\sum_s |NET_{st}| - |NET_t|) + \sum_s (SUM_{st} - |NET_{st}|), \quad (11)$$

where the first term on the right-hand side captures between-sector employment shifts, and the second summation captures excess job reallocation within sectors. If all sectors change in the same direction, the first term will be equal to zero.

Using lower-case letters for rates, the decomposition for the excess job reallocation rate can be written as

$$excess_t = r_t - |g_t| = \left[\sum_s \left(\frac{X_{st}}{X_t}\right) |g_{st}| - |g_t|\right] + \left[\sum_s \left(\frac{X_{st}}{X_t}\right) (r_{st} - |g_{st}|)\right]. \quad (12)$$

The decomposition results reported in Table 13 show that between-sector shifts accounted for only a small proportion of excess job reallocation, implying that job flows were largely driven by firm-level heterogeneity in labor demand changes rather than by sectoral disturbances or economy-wide disturbances with differential sector effects. Aggregate and sectoral effects were more important in the manufacturing sector than in the services sector. Measured at the NACE Division grouping, between-sector shifts accounted for on average 17.6 percent of excess job reallocation annually in the economy as a whole, 20.4 percent in the manufacturing sector, and 10.2 percent in the services sector. Over the sample period, the contribution of between-sector shifts ranged between 5.9 percent and 29.4 percent in the economy as a whole, between 0 percent and 34 percent in the manufacturing sector, and between 0 percent and 24 percent in the services sector. There was no significant relationship between the contribution of between-sector shifts and the business cycle.[9] The average contribution of between-

sector shifts to excess job reallocation in Slovenia was similar to that obtained for Estonia by Masso et al. (2005).

V. Conclusions

The findings of this paper are consistent with a number of stylized facts concerning job flows that have been well documented in the literature, but there are some notable differences with the experiences of other countries.

Firm-level employment changes in Slovenia during 1996–2011 were associated with simultaneous high rates of gross job creation, destruction, and reallocation. Annual job creation and destruction primarily reflected persistent firm-level employment changes rather than temporary layoff and recall of workers. Entry and exit of firms played an important role in the job creation and destruction process, but a major proportion of job creation and destruction occurred at continuing firms. Gross job flows had a strong impact on gross worker flows in the labor market. On average, reallocation of employment opportunities across firms accounted for two thirds of worker reallocation between employers or between employment and joblessness.

There was considerable variation in job flow rates across sectors. Sectors that created more jobs also destroyed more jobs. The findings support the contention of Haltiwanger et al. (2010 and 2013) that researchers may be confusing firm size effects on net employment growth with the effects of firm age. The simple relationship between firm size and net employment growth indicated that net growth rates were higher for smaller firms. However, this negative relationship disappeared after controlling for firm age. For most age groups, net employment growth rose with firm size up to 24 workers and was independent of firm size among larger firms. Younger firms exhibited higher job creation and destruction rates as well as higher net employment growth rates than mature firms. Only firms up to two years of age exhibited net employment growth over the sample period, and older firms suffered net job loss. These findings suggest that in encouraging private sector job creation, policies targeting firms based on size without taking account of the role of firm age are unlikely to have the desired impact. It also suggests that liberalization of regulations affecting start-up costs could help net employment growth.

There was only weak evidence of countercyclical behavior of job reallocation within individual sector groups. Job destruction was more volatile than job creation in most sectors of the economy. The standard deviation of job destruction relative to the standard deviation of job creation was negatively related to net employment growth. Sectoral and aggregate mean effects exerted considerable influence on the variations in both job creation and job destruction rates. However, idiosyncratic factors also played an important role. Idiosyncratic effects worked against the influence of sectoral and aggregate mean effects in job creation, but reinforced the fluctuations in job destruction associated with aggregate and sectoral effects. As a result, time variation in gross job reallocation was predominantly driven by idiosyncratic effects.

The importance of firm-level heterogeneity in driving job flows is also indicated by the fact that only one fifth of excess job reallocation was accounted for by between-sector shifts. Furthermore, passive

learning about initial conditions explained a small, but significant, fraction of job reallocation in the economy.

The focus of this paper has been on measurement of job flows rather than on policy. A detailed analysis of the effects of specific policies and institutions, including the effects of changes in employment protection legislation and wage-setting mechanisms, is beyond the scope of the paper and is left for future research.

Notes

[1] See Davis and Haltiwanger (1999), Haltiwanger et al. (2003), and OECD (2009a) for a review of the literature and summary of the findings.

[2] Estimates of employment consistent with the measurement framework of national accounts are typically compiled from labor force surveys, business surveys, and micro data sets such as social security statistics and tax registers. Depending on the primary data source, a variety of adjustments are made to the original numbers to satisfy the requirements of the System of National Accounts.

[3] There were several instances of firms shutting down in any given year but resuming operations after a gap of two or more years. In such cases, the resumption of operations was treated as entry of a new firm.

[4] As such, these findings may seem contrary to the findings of Vodopivec (2004). He found a declining trend in both job creation and job destruction rates during 1996–2001, with job creation rates being higher than job destruction rates. However, a likely explanation of the difference in findings is that, unlike in this paper, Vodopivec's measure of job creation and job destruction rates was not based on FTE employment but on head-count employment that included part-time workers.

[5] Following Davis and Haltiwanger (1992), we use net employment growth as a measure of the business cycle. Boeri (1996) notes that there is no evidence of countercyclical movements in job reallocation outside the USA. In all Canada and all the OECD countries in Europe, the correlation coefficient between gross and net job flows is either positive or statistically insignificant. Davis and Haltiwanger (1999, p. 2738) argue that Boeri's results were affected by the limited cyclical variation in his sample. However, Gómez-Salvador et al. (2004) also report that in European countries job reallocation tends to be acyclical or slightly pro-cyclical.

[6] See footnote 13 on page 837 in Davis and Haltiwanger (1992) for the calculation of persistence rates. As Davis and Haltiwanger (1999, p. 2727) point out, the focus in this measure of persistence is on the persistence of the typical newly created or newly destroyed job. This focus is distinct from a focus on the persistence of the typical existing job or the persistence of establishment size.

[7] From a statistical perspective, $\widetilde{SUM}_t^{ST}$ equals the size-weighted average absolute deviation of firm growth rates around the overall and sectoral means.

[8] Davis and Haltiwanger (1992) found that idiosyncratic shocks were the driving force behind the variation in the gross reallocation rate in the United States, while Konings (1995) found that sectoral and aggregate shocks were the main driving force in the United Kingdom.

[9] Konings (1995) found a pro-cyclical pattern in the nature of job turnover in the manufacturing sector in the United Kingdom: in good times jobs were reallocated more within-sector, while in bad times jobs were reallocated more between-sector.

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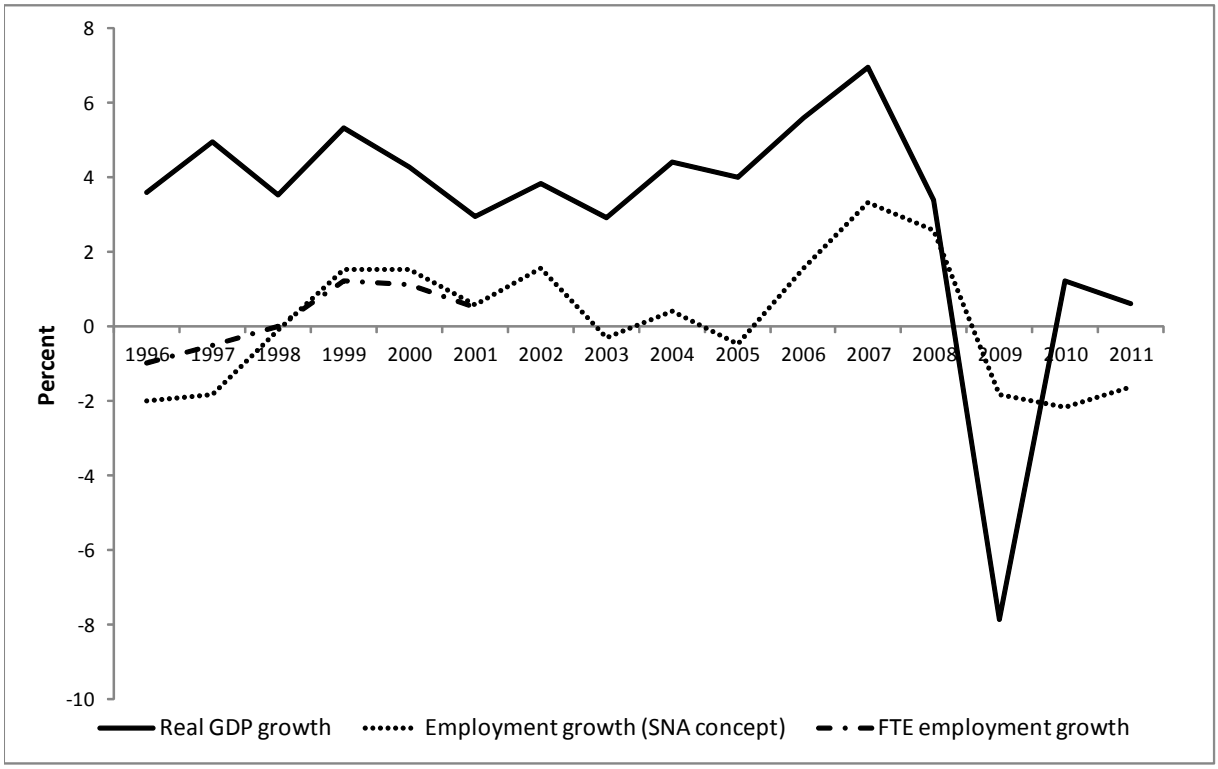
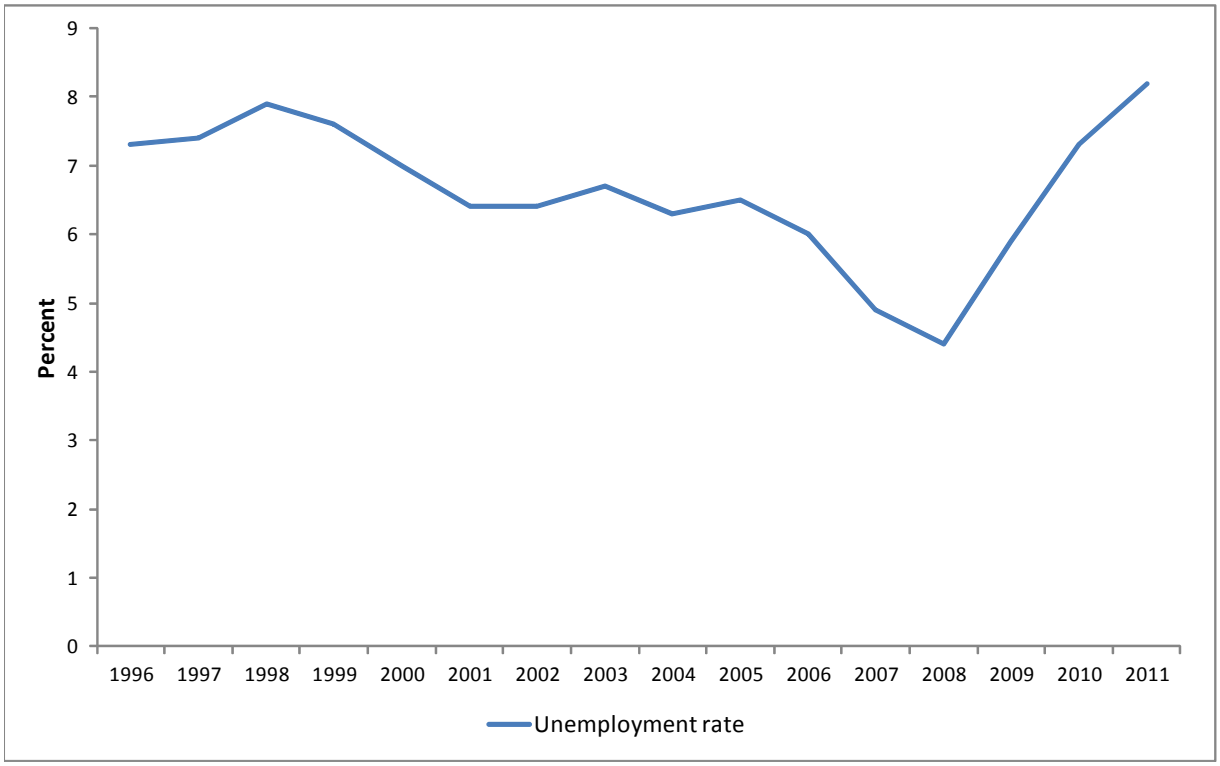
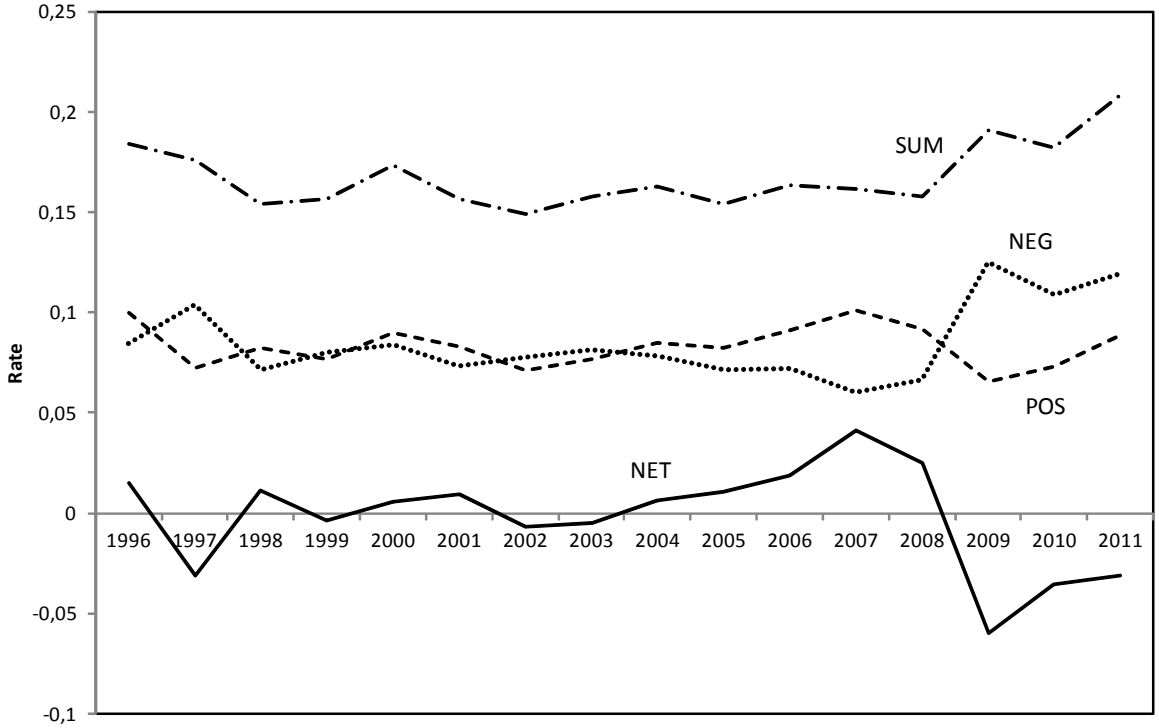
Figure 1. Real GDP growth, Employment growth and Unemployment rate, 1996-2011





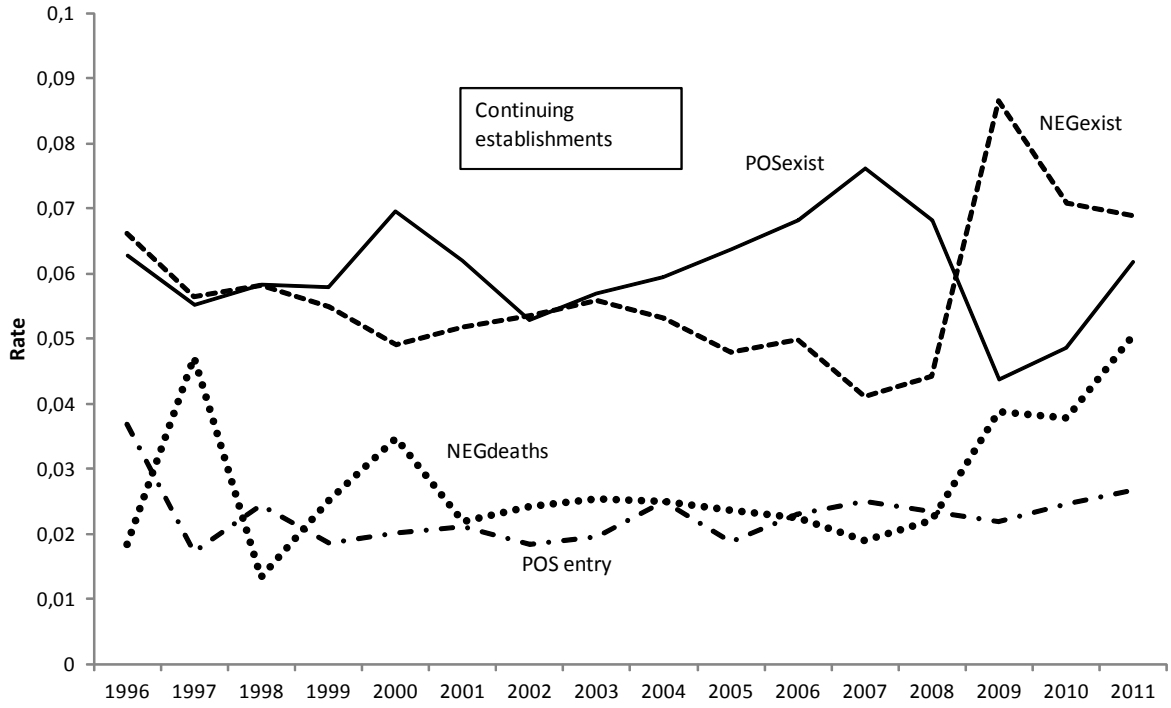
Sources: International Monetary Fund, Institute of Macroecomic Analysis and Development, and Statistical Office of the Republic of Slovenia.

Figure 2. Gross and net job flows (entire economy)



Note: POS = Job creation rate; NEG = Job destruction rate; SUM = Job reallocation rate; NET = Net employment growth rate

Figure 3. Partitioned POS and NEG (entire economy)



Note: POS_{exist}= Job creation rate, continuing firms; POS_{entry} = job creation rate, new entrants;
NEGexist = Job destruction rate, continuing firms; NEGdeaths = Job destruction rate, exiting firms.

Figure 4. Distribution of firm-level job creation and destruction by firm-level employment growth rate

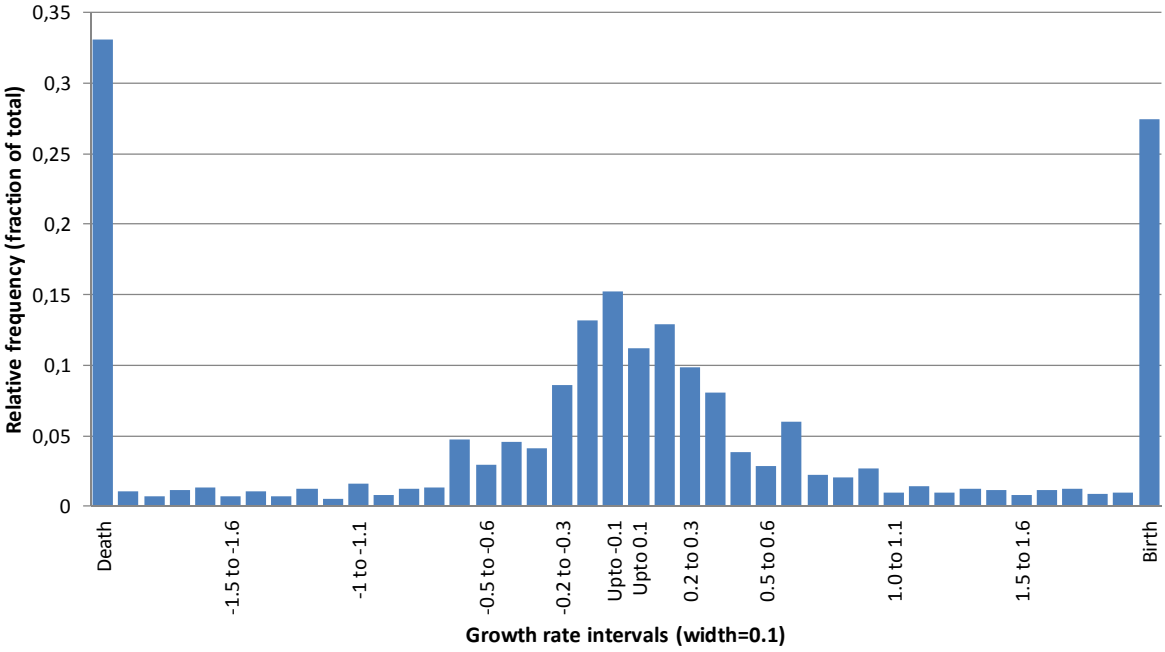


Figure 5. Net employment growth and firm size and firm age

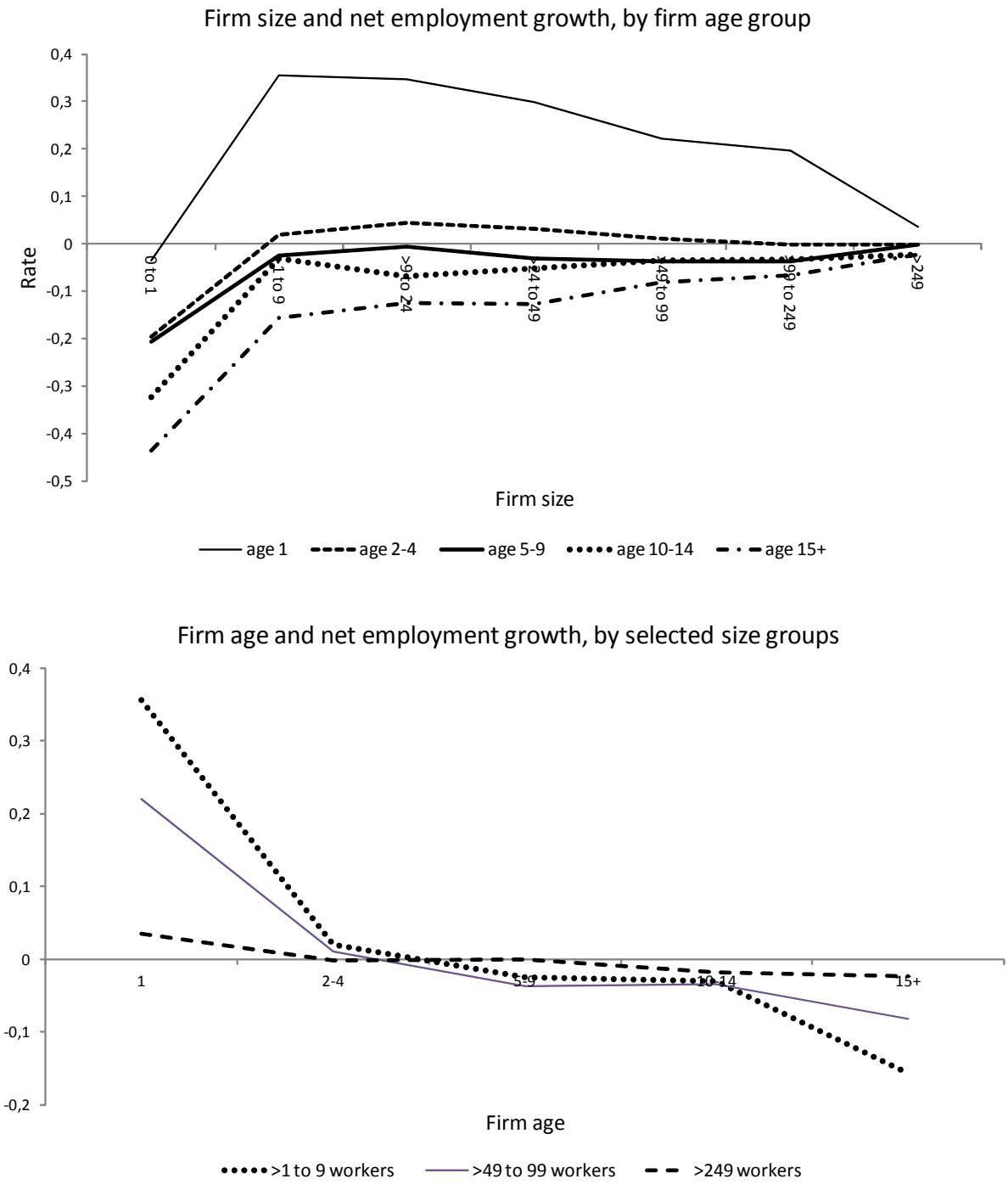
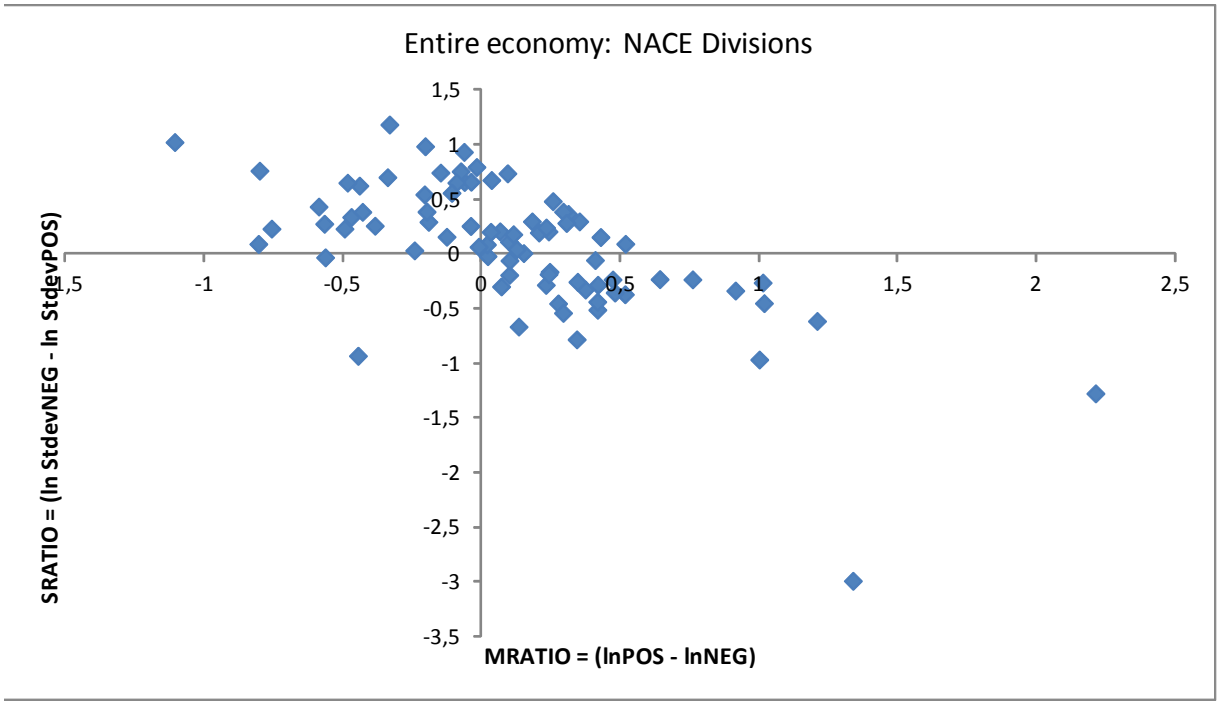
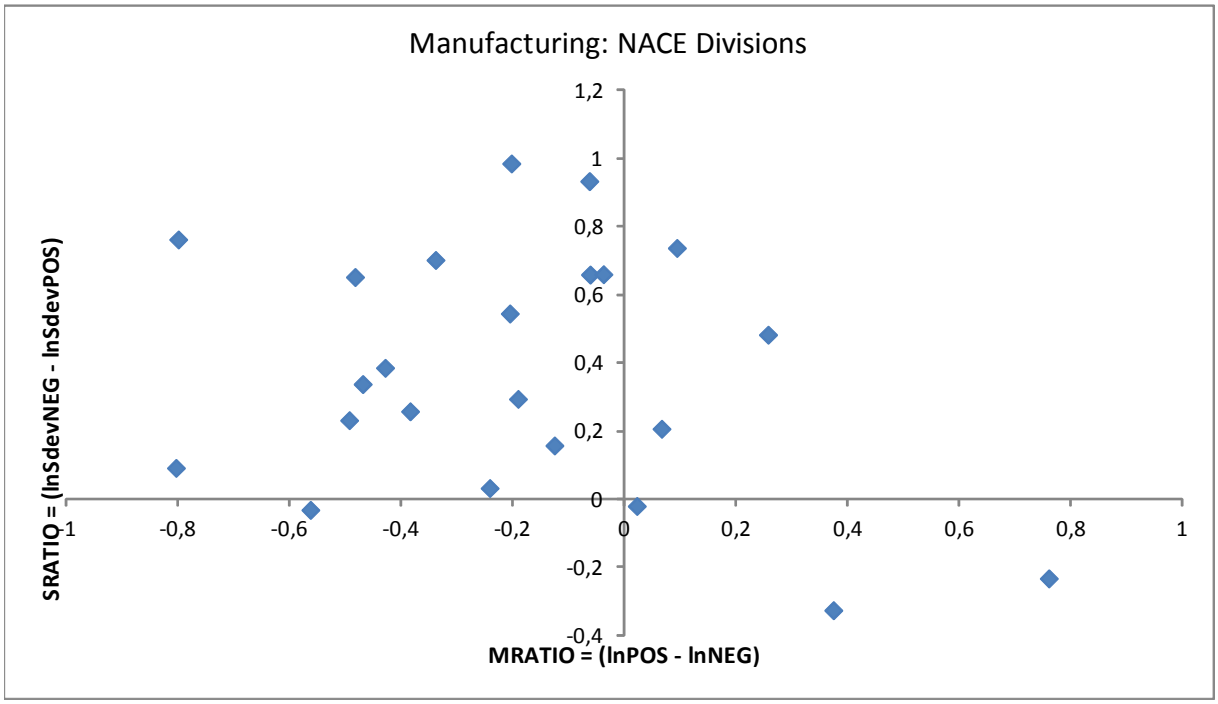


Figure 6. Employment growth and relative gross-flow volatility





Note: SRATIO measures the relative volatility of job destruction and job creation; MRATIO neasures net employment growth.

Table 1. Number of firms and full time equivalent (FTE) employment in the sample, 1996-2011

Year	Firms in current year	Continuing firms	New entrants	Exiting firms	Entry rate of firms	Exit rate of firms	FTE employment of firms in sample	FTE employment of sample / Total employees in economy (SNA measure)	Value added of firms In sample / National account value added
1996	25.031	22.399	2.632	-	0,105	-	447.811	0,608	0,50
1997	25.951	24.083	1.868	948	0,072	0,037	434.060	0,604	0,50
1998	25.452	23.769	1.683	2.182	0,066	0,086	438.974	0,610	0,50
1999	26.263	24.494	1.769	958	0,067	0,036	437.474	0,598	0,50
2000	26.483	24.702	1.781	1.561	0,067	0,059	440.032	0,588	0,50
2001	26.563	24.847	1.716	1.636	0,065	0,062	444.157	0,587	0,51
2002	26.462	24.807	1.655	1.756	0,063	0,066	441.261	0,575	0,51
2003	26.803	24.702	2.101	1.760	0,078	0,066	439.138	0,572	0,51
2004	27.699	25.235	2.464	1.568	0,089	0,057	441.974	0,572	0,52
2005	28.855	26.110	2.745	1.589	0,095	0,055	446.780	0,580	0,52
2006	29.971	27.167	2.804	1.688	0,094	0,056	455.318	0,581	0,52
2007	31.607	28.301	3.306	1.670	0,105	0,053	474.350	0,584	0,52
2008	33.935	30.107	3.828	1.500	0,113	0,044	486.405	0,583	0,52
2009	35.693	32.116	3.577	1.819	0,100	0,051	458.205	0,565	0,50
2010	36.754	33.157	3.597	2.536	0,098	0,069	441.434	0,559	0,51
2011	36.995	33.753	3.242	3.001	0,088	0,081	427.958	0,553	0,50

Note: FTE stands for full-time equivalent. These were self-reported by the firms.

Table 2. Persistence rates for job creation and destruction (economy wide), 1996-2010

Year *(t)*	Fraction of job creation in Year *t* that persists in Year			Fraction of job destruction in Year *t* that persists in Year		
	t+1	*t+2*	*t+3*	*t+1*	*t+2*	*t+3*
1996	0,803	0,794	0,765	0,844	0,767	0,744
1997	0,844	0,776	0,754	0,824	0,764	0,718
1998	0,818	0,762	0,734	0,814	0,753	0,718
1999	0,817	0,743	0,716	0,819	0,745	0,710
2000	0,797	0,734	0,705	0,815	0,770	0,729
2001	0,803	0,733	0,716	0,838	0,769	0,737
2002	0,797	0,747	0,726	0,811	0,747	0,708
2003	0,813	0,757	0,734	0,805	0,731	0,696
2004	0,806	0,763	0,751	0,796	0,728	0,690
2005	0,813	0,779	0,759	0,801	0,716	0,691
2006	0,818	0,772	0,700	0,770	0,707	0,724
2007	0,806	0,690	0,636	0,779	0,761	0,763
2008	0,710	0,626	0,587	0,839	0,810	0,794
2009	0,715	0,634	-	0,856	0,806	-
2010	0,720	-	-	0,843	-	-

Table 3. Fraction of worker reallocation accounted for by job reallocation, 2002-2011

	Joblessness to job transition (employed persons with job tenure of ?12 months who were previously without job as ratio to total employment)[a]	Job to job transition (employed persons who moved from different job in the previous 12 months as ratio to total employment)[a]	Job to joblessness transition (currently jobless persons who held a job 12 months earlier as ratio to total employment)[a]	Total worker reallocation rate	Upper bound on worker reallocation rate required to accommodate job reallocation (=SUM)	Lower bound on worker reallocation rate required to accommodate job reallocation (=max{POS, NEG})	Upper bound ratio of job reallocation rate to worker reallocation rate	Lower bound ratio of job reallocation rate to worker reallocation rate
	(1)	(2)	(3)	(4) = (1) + (2) + (3)	(5)	(6)	(7) = (5) / (4)	(8) = (6) / (4)
2002	0,077	0,075	0,065	0,217	0,149	0,078	0,688	0,360
2003	0,077	0,083	0,064	0,224	0,158	0,081	0,705	0,362
2004	0,071	0,094	0,059	0,224	0,163	0,085	0,726	0,379
2005	0,072	0,109	0,062	0,243	0,154	0,082	0,634	0,338
2006	0,090	0,089	0,062	0,241	0,164	0,091	0,678	0,378
2007	0,087	0,101	0,063	0,251	0,161	0,101	0,643	0,403
2008	0,086	0,109	0,054	0,249	0,158	0,092	0,634	0,370
2009	0,066	0,101	0,075	0,242	0,191	0,125	0,788	0,517
2010	0,070	0,102	0,075	0,246	0,182	0,109	0,740	0,443
2011	0,087	0,104	0,067	0,259	0,208	0,12	0,805	0,464
Simple mean	0,078	0,097	0,065	0,239	0,169	0,096	0,704	0,401

[a] Calculated from Labor Force Survey data. Calculation confined to wage and salaried workers only; i.e., excludes own-account workers and unpaid family workers.

Table 4. Cumulative growth in employment in selected sectors

NACE Rev.2 Sections	Cumulative growth in employment (%)			Share in total employment (%)		
	1996–2008	2009–2011	1996–2011	1996	2008	2011
C. Manufacturing	-10,4	-15,7	-24,4	45,6	38,2	36,6
F. Construction	64,5	-31,1	13,3	7,9	11,1	8,7
G. Wholesale and retail trade, repair of motor vehicles and motorcycles	18,2	-7,4	9,5	16,9	17,7	18,7
H. Transportation and storage	32,2	-2,9	28,4	4,8	5,8	6,4
I. Accommodation and food service activities	34,1	-4,0	28,7	2,8	3,3	3,6
J. Information and communication	80,6	-3,8	73,7	2,3	3,6	3,9
K. Financial and insurance activities	-28,6	-19,6	-42,6	3,6	2,5	2,3
M. Professional, scientific and technical activities	41,9	1,3	43,8	4,8	5,8	6,7
N. Administrative and support activities	128,6	-1,0	126,3	2,2	4,3	4,8

Table 5. Net and gross job flow rates by sectors (size-weighted averages, 1996-2011)

NACE Rev. 2 Sections	Job creation rate POS (1)	Job destruction rate NEG (2)	Net employment growth NET (3) = (1) ? (2)	Job reallocation rate SUM (4)=(1) + (2)	Excess job reallocation rate EXCESS (5)=(4) -|(3)|	Pearson correlations: $\rho(NET_t, SUM_t)$ 1996-2003	1996-2008	2004-2011	1996-2011
A. Agriculture, forestry and fishing	0,047	0,097	-0,050	0,144	0,095	0,226	0,109	-0,318	0,081
B. Mining and quarrying	0,056	0,078	-0,022	0,134	0,039	-0,436	-0,446	-0,269	-0,448 *
C. Manufacturing	0,068	0,084	-0,016	0,153	0,130	-0,266	-0,091	-0,667 *	-0,494 *
D. Electricity, gas, steam and airconditioning supply	0,016	0,029	-0,012	0,045	0,029	-0,359	-0,399	0,418	0,201
E. Water supply, sewerage, waste management and remediation actitivies	0,051	0,026	0,025	0,076	0,051	0,419	0,486 *	0,603	0,459 *
F. Construction	0,122	0,112	0,010	0,234	0,172	-0,373	-0,369	-0,487	-0,177
G. Wholesale and retail trade, repair of motor vehicles and motorcycles	0,094	0,089	0,006	0,183	0,167	0,325	0,210	-0,379	0,088
H. Transportation and storage	0,071	0,054	0,017	0,125	0,101	0,182	-0,164	-0,784 **	-0,075
I. Accommodation and food service activities	0,110	0,094	0,016	0,204	0,176	0,706 *	0,409	-0,159	0,231
J. Information and communication	0,094	0,062	0,032	0,156	0,115	-0,606	-0,506 *	0,109	-0,140
K. Financial and insurance activities	0,034	0,068	-0,034	0,102	0,058	-0,695 *	-0,703 ***	-0,733 **	-0,586 **
L. Real estate activities	0,121	0,133	-0,011	0,254	0,205	0,333	0,059	-0,624 *	0,006
M. Professional, scientific and technical activities	0,122	0,099	0,023	0,221	0,195	0,028	-0,170	-0,643 *	-0,104
N. Administrative and support activities	0,130	0,082	0,048	0,212	0,155	0,824	0,626 **	-0,383	0,089
O. Public administration and defence, compulsory social security	0,080	0,072	0,008	0,152	0,036	-0,031	0,021	-0,498	0,032
P. Education	0,119	0,124	-0,005	0,243	0,194	-0,600	-0,540 *	-0,170	-0,485 *
Q. Human health and social work activities	0,137	0,073	0,064	0,211	0,104	-0,428	-0,333	-0,317	-0,321
R. Arts, entertainment and recreation	0,060	0,058	0,002	0,119	0,071	-0,034	-0,274	-0,927 ***	-0,402
S. Other service activities	0,091	0,094	-0,004	0,185	0,152	-0,246	-0,348	-0,636 *	-0,359
All NACE Sections (entire economy)	0,083	0,085	-0,001	0,168	0,148	-0,038	-0,120	-0,811 **	-0,619 **

*** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 1 percent level.

Table 6. Net and gross job flow rates by region (size-weighted averages, 1996-2011)

Region	Job creation rate POS (1)	Job destruction rate NEG (2)	Net employment growth NET (3) = (1) - (2)	Job reallocation rate SUM (4)=(1) + (2)	Excess job reallocation rate EXCESS (5)=(4) -|(3)|
Obalno-kraška	0,097	0,094	0,003	0,191	0,171
Goriška	0,069	0,075	-0,007	0,144	0,123
Gorenjska	0,079	0,089	-0,010	0,168	0,152
Osrednjeslovenska	0,089	0,086	0,003	0,174	0,153
Notranjsko-kraška	0,079	0,083	-0,003	0,162	0,144
Jugovzhodna Slovenija	0,080	0,078	0,002	0,158	0,126
Spodnjeposavska	0,081	0,099	-0,018	0,180	0,144
Zasavska	0,072	0,084	-0,013	0,156	0,111
Savinjska	0,069	0,072	-0,003	0,141	0,119
Koroška	0,082	0,096	-0,014	0,178	0,140
Podravska	0,093	0,086	0,007	0,179	0,149
Pomurska	0,082	0,095	-0,013	0,177	0,148

Table 7. Rates and shares of gross job creation and destruction by firm size

Size	Rates of job creation and destruction[a]								Shares in job flows, employment and number of firms(%)[a]			
	POS	POS_{exist}	POS_{entry}	NEG	NEG_{exist}	NEG_{deaths}	NET	SUM	Average share of size group in POS	Average share of size group in NEG	Share of size group in total average employment	Share of size group in total number of firms
	(1) =(2) + (3)	(2)	(3)	(4) =(5) + (6)	(5)	(6)	(7) =(1) - (4)	(8) =(1) + (4)	(9)	(10)	(11)	(12)
	I. **Entire sample**, Base year firm size (S_{t-1})								I. **Entire sample**, Base year firm size (S_{t-1})			
0 to 1	0,860	0,153	0,707	0,081	0,000	0,080	0,779	0,941	33,4	3,0	4,5	38,4
>1 to 9	0,129	0,129	0	0,114	0,078	0,036	0,015	0,244	17,4	15,4	11,4	45,0
>9 to 24	0,104	0,104	0	0,101	0,071	0,030	0,003	0,206	10,3	10,0	8,4	8,7
>24 to 49	0,088	0,088	0	0,100	0,066	0,033	-0,012	0,188	7,7	8,7	7,5	3,3
>49 to 99	0,070	0,070	0	0,099	0,062	0,038	-0,029	0,169	7,8	10,9	9,3	2,1
>99 to 249	0,042	0,042	0	0,092	0,057	0,035	-0,050	0,134	8,2	17,7	15,7	1,6
>249	0,029	0,029	0	0,067	0,050	0,017	-0,038	0,096	15,3	34,2	43,3	0,9
All sizes	0,083	0,060	0,023	0,085	0,057	0,028	-0,002	0,168	100	100	100	100
	II. **Entire sample**, Average firm size ((S_t + S_{t-1})/2)								II. **Entire sample**, Average firm size ((S_t + S_{t-1})/2)			
0 to 1	0,333	0,081	0,252	0,240	0,066	0,174	0,093	0,573	10,3	7,2	2,6	39,8
>1 to 9	0,159	0,115	0,044	0,114	0,078	0,036	0,045	0,273	21,6	15,4	11,6	43,6
>9 to 24	0,144	0,108	0,036	0,106	0,069	0,037	0,038	0,250	14,3	10,6	8,7	8,6
>24 to 49	0,116	0,090	0,026	0,112	0,065	0,047	0,005	0,228	10,6	9,9	7,7	3,4
>49 to 99	0,092	0,066	0,027	0,105	0,061	0,044	-0,013	0,197	10,6	12,0	9,6	2,1
>99 to 249	0,060	0,048	0,012	0,088	0,056	0,032	-0,028	0,147	11,6	16,8	16,0	1,6
>249	0,040	0,035	0,005	0,054	0,046	0,008	-0,015	0,094	21,0	28,0	43,7	0,9
All sizes	0,083	0,060	0,023	0,085	0,057	0,028	-0,002	0,168	100	100	100	100

[a] All rates and shares are calculated each year and then averaged over the sample period (1996-2011).
POS = Job creation rate; POS_{exist}= Job creation rate, continuing firms; POS_{entry} = job creation rate, new entrants; NEG = Job destruction rate;
NEGexist = Job destruction rate, continuing firms; NEGdeaths = Job destruction rate, exiting firms; NET = Net employment growth rate;
SUM = Job reallocation rate.

Table 8. Net and gross job flow rates by firm age
(size-weighted averages, 1996-2011)

Age	POS	NEG	NEG_{exist}	NEG_{deaths}	NET	SUM	Shares in job flows, employment and number of firms(%)[a]			
	(1)	(2) = (3) + (4)	(3)	(4)	(5) =(1) - (2)	(6) =(1) + (2)	Average share of size group in POS	Average share of size group in NEG	Share of size group in total average employment	Share of size group in total number of firms
1	0,311	0,098	0,046	0,052	0,214	0,409	12,7	2,8	2,8	8,9
2	0,153	0,131	0,063	0,069	0,022	0,284	6,9	4,2	2,8	7,4
3	0,119	0,123	0,067	0,056	-0,004	0,242	5,6	4,1	2,9	7,0
4	0,102	0,112	0,069	0,044	-0,011	0,214	5,6	4,3	3,4	7,1
5	0,091	0,135	0,069	0,066	-0,044	0,226	6,0	6,0	3,9	6,9
6	0,079	0,103	0,060	0,044	-0,025	0,182	6,8	6,3	5,2	7,4
7	0,063	0,090	0,064	0,027	-0,027	0,154	6,0	5,9	5,7	6,9
8	0,062	0,092	0,060	0,031	-0,030	0,154	5,4	5,9	5,3	6,1
9	0,057	0,077	0,056	0,021	-0,020	0,135	4,8	5,0	5,1	5,5
10	0,061	0,086	0,064	0,022	-0,025	0,147	4,8	5,2	4,9	5,0
11-14	0,050	0,075	0,056	0,020	-0,025	0,125	14,4	16,4	17,5	15,7
15+	0,032	0,073	0,053	0,020	-0,041	0,106	20,9	33,9	40,5	16,1
All ages	0,060	0,085	0,057	0,028	-0,025	0,145	100	100	100	100

[a] All rates and shares are calculated each year and then averaged over the sample period (1996-2011).

POS = Job creation rate; NEG = Job destruction rate; NEG_{exist} = Job destruction rate, continuing firms;

NEG_{deaths} = Job destruction rate, exiting firms; NET = Net employment growth rate; SUM = Job reallocation rate.

Table 9. Cyclical behavior of sectoral job reallocation rates: Time series correlations between net employment growth and adjusted job reallocation rate, 1996-2011

	By alternative sectoral classification schemes					
	Total Economy	NACE Section	NACE Division	NACE Section, region	NACE Section, Size	NACE Section, Age
Size-weighted average correlation	-0,550	-0,209	-0,092	-0,038	-0,022	0,038
Average correlation for negative correlations	-0,550	-0,362	-0,364	-0,467	-0,406	-0,554
Average correlation for positive correlations	--	0,221	0,362	0,451	0,357	0,571
(# < 0) / total	1/1	14/19	52/83	117/220	64/129	18/38

	For particular sector types						
			NACE Divisions by				
	Manufacturing	Services	Small[1]	Medium size[1]	Large[1]	Young[2]	Old[2]
Size-weighted average correlation	-0,256	0,030	0,215	-0,130	-0,114	0,588	-0,452
(# < 0) / total	17/23	22/45	12/56	36/57	10/16	1/19	16/19

Note: Each entry summarizes the simple correlations between net job growth and adjusted job reallocation for the indicated classification scheme or sector type. Computed on valid correlations; i.e., where both standard deviations were different from zero.

[1] Small firms are defined as firms with up to 24 workers, medium sized firms are firms with 25 to 249 workers, and large firms are those with 250 or more workers. Size was measured using the average size class methodology.

[2] Young firms are firms up to 9 years in age, and old firms are those that have been in existence for 10 years or more.

Table 10. Regressions on relative volatility of job destruction and job creation

(Dependent variable: Ln (standard deviation of job destruction) – Ln (standard deviation of job creation))

	All sectors	All sectors	All sectors	Manufacturing	Non-manufacturing	Services
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
constant	0,16386 ***	0,13103 **	0,15186 **	0,32084 ***	0,15176 **	0,19545 **
	(0.05154)	(0.06451)	(0.06425)	(0.08365)	(0.06850)	(0.07705)
MRATIO[a]	-0,76286 ***	-0,72956 ***	-0,81826 ***	-0,26260	-0,81812 ***	-0,98718 ***
	(0.09798)	(0.10570)	(0.11326)	(0.20720)	(0.12075)	(0.13187)
mfgdum[a]		0,10214011	0,16897			
		(0.12034)	(0.12303)			
mfgdum*MRATIO[a]			0,55566 *			
			(0.28349)			
R-squared	0,4342	0,4394	0,4660	0,0711	0,4505	0,5658
Adj R squared	0,4270	0,4250	0,4452	0,0268	0,4406	0,5557
F	60,62 ***	30,56 ***	22,39 ***	1,61	45,90 ***	56,04 ***
N	81	81	81	23	58	45

[a] MRATIO is the log difference of the means of job creation and job destruction; mfgdum is dummy variable for manufacturing sector; (mfgdum*MRATIO) is interaction term.

*** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

Table 11. Decomposition of time-series variance of job reallocation, job creation, and job destruction

		Sectoral classification scheme									
		Total economy	NACE Divisions	NACE Sections	Region	Size	Age[1]	Manufacturing, Non-manufacturing	NACE Divisions, Region	NACE Divisions, Size	NACE Divisions, Age[1]
# of sectors		1	83	19	12	7	2	2	220	131	38
A. Fraction of job reallocation (SUM_t) variance accounted for by											
(a) Sectoral and aggregate mean effects	$\mathrm{var}(SUM_t - \widetilde{SUM}_t^{ST})/\mathrm{var}(SUM_t)$	0,013	0,103	0,116	0,148	0,120	0,135	0,138	0,103	0,072	0,123
(b) Idiosyncratic effects	$\mathrm{var}(\widetilde{SUM}_t^{ST})/\mathrm{var}(SUM_t)$	1,028	1,416	1,413	1,563	1,524	1,666	1,529	1,328	1,340	1,546
(c) 2cov(a,b)	$2\mathrm{cov}(\widetilde{SUM}_t^{ST}, SUM_t - \widetilde{SUM}_t^{ST})/\mathrm{var}(SUM_t)$	-0,041	-0,519	-0,530	-0,711	-0,644	-0,800	-0,666	-0,431	-0,412	-0,669
B. Fraction of job creation (POS_t) variance accounted for by											
(a) Sectoral and aggregate mean effects	$\mathrm{var}(POS_t - \widetilde{POS}_t^{ST})/\mathrm{var}(POS_t)$	0,697	1,704	1,938	2,170	2,621	1,978	2,062	1,792	2,043	1,759
(b) Idiosyncratic effects	$\mathrm{var}(\widetilde{POS}_t^{ST})/\mathrm{var}(POS_t)$	0,418	0,768	0,875	1,010	1,158	0,788	0,974	0,738	0,832	0,672
(c) 2cov(a,b)	$2\mathrm{cov}(\widetilde{POS}_t^{ST}, POS_t - \widetilde{POS}_t^{ST})/\mathrm{var}(POS_t)$	-0,115	-1,472	-1,813	-2,180	-2,779	-1,766	-2,035	-1,529	-1,875	-1,431
C. Fraction of job destruction (NEG_t) variance accounted for by											
(a) Sectoral and aggregate mean effects	$\mathrm{var}(NEG_t - \widetilde{NEG}_t^{ST})/\mathrm{var}(NEG_t)$	0,305	0,518	0,581	0,654	0,471	0,377	0,613	0,491	0,377	0,315
(b) Idiosyncratic effects	$\mathrm{var}(\widetilde{NEG}_t^{ST})/\mathrm{var}(NEG_t)$	0,273	0,231	0,191	0,183	0,221	0,329	0,188	0,202	0,240	0,321
(c) 2cov(a,b)	$2\mathrm{cov}(\widetilde{NEG}_t^{ST}, NEG_t - \widetilde{NEG}_t^{ST})/\mathrm{var}(NEG_t)$	0,422	0,251	0,228	0,162	0,308	0,294	0,199	0,307	0,383	0,364

[1] There are two age groups: young plants (0–9 years) and old plants (10+ years).

Table 12 . Fraction of level of job reallocation and fraction of cross-sectoral variation in job reallocation rates due passive learning and selection

Pooled sample data	
1. Fraction of job reallocation due to learning about initial conditions	
assuming n=4	0,210
assuming n=5	0,229
assuming n=6	0,256
NACE Sections	
2. Cross-sectoral standard deviation of job reallocation rates	0,058
3. Fraction of cross-sectoral variance explained by learning about initial conditions, assuming n=4	0,217
4. Fraction of cross-sectoral variance explained by learning about initial conditions, assuming n=5	0,234
5. Fraction of cross-sectoral variance explained by learning about initial conditions, assuming n=6	0,259

Note: Items 3 to 5 report the quantity 1 - (?/V). V is defined as the cross-sectoral variance of job reallocation rates. ? is defined as the cross-sectoral variance of adjusted job reallocation rates. The adjusted sectoral reallocation rate equals the observed rate minus the contribution of learning as estimated from equation (10).

Table 13 . Fraction of excess job reallocation accounted for by employment shifts between sectors

	Entire sample, NACE Sections	Entire sample, NACE Divisions	Manufacturing, NACE Divisions	Services, NACE Divisions
No. of groups	19	96	24	45
1996	0,138	0,294	0,318	0,135
1997	0,061	0,118	0,092	0,132
1998	0,067	0,277	0,324	0,241
1999	0,165	0,218	0,095	0,154
2000	0,063	0,222	0,282	0,129
2001	0,040	0,140	0,197	0,057
2002	0,061	0,181	0,220	0,138
2003	0,091	0,191	0,140	0,116
2004	0,053	0,218	0,235	0,127
2005	0,058	0,150	0,230	0,007
2006	0,032	0,159	0,340	0,043
2007	0,012	0,129	0,272	0,008
2008	0,127	0,197	0,167	0,028
2009	0,039	0,059	0,001	0,086
2010	0,016	0,101	0,114	0,102
2011	0,042	0,156	0,234	0,134
Simple mean	0,067	0,176	0,204	0,102