

Böheim, René; Stiglbauer, Alfred; Winter-Ebmer, Rudolf

Working Paper

On the Persistence of Job Creation in Old and New Firms

Working Paper, No. 0804

Provided in Cooperation with:

Johannes Kepler University of Linz, Department of Economics

Suggested Citation: Böheim, René; Stiglbauer, Alfred; Winter-Ebmer, Rudolf (2008) : On the Persistence of Job Creation in Old and New Firms, Working Paper, No. 0804, Johannes Kepler University of Linz, Department of Economics, Linz

This Version is available at:

<https://hdl.handle.net/10419/73624>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

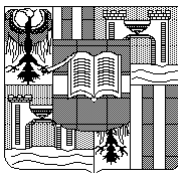
Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



**On the Persistence of Job Creation in Old and
New Firms[‡]**

by

René Böheim ^{*)}
Alfred Stiglbauer
Rudolf Winter-Ebmer

Working Paper No. 0804
March 2008

**Johannes Kepler University of Linz
Department of Economics
Altenberger Strasse 69
A-4040 Linz - Auhof, Austria
www.econ.jku.at**

rene.boeheim@jku.at
phone +43 (0)70 2468 - 8214

On the Persistence of Job Creation in Old and New Firms[‡]

René Böheim^{*}

Alfred Stiglbauer^{**}

Rudolf Winter-Ebmer^{***}

March 2008

Keywords: job creation, new firms, persistence

JEL: J230, J630, E240, E320

[‡] The work was supported by the Körner Fonds and the Austrian Science Funds (FWF grant # P15422-G05). Thanks to seminar participants in Nuremberg, Linz, Vienna, Lisboa and Brussels for valuable comments. René Böheim is also affiliated with IZA, Bonn, Rudolf Winter-Ebmer with IZA and CEPR.

^{*} University of Linz, Austria and WiFo, Vienna, Austria. .

^{**} Oesterreichische Nationalbank, Vienna.

^{***} University of Linz, Austria and Institute for Advanced Studies, Vienna.

Abstract:

We suggest a new method to analyze the success of firm creation by looking at the persistence of new jobs created in old and in new firms. Compared to survival rates of new versus old firms, this measure has the advantage that the sustainability of job creation in different circumstances is investigated. We analyze 21 years of job creation in Austria and find that new jobs last significantly longer in new than in old firms. Moreover, the survival of new jobs depends upon the state of the business cycle at the time of job creation, on the number of jobs created, and, for existing firms, on firm age.

Keywords: job creation, new firms, reallocation, persistence

JEL: J230, J630, E240, E320

1 Introduction

Stimulation of new firm creation is a magic word in today's policy circles. Commentators and policy analysts typically cite the creation of new jobs, the implementation of innovative ideas and – less often — more competitiveness in the industry as advantages. The ultimate employment impact of these new firms is less clear, because the new firms will lead to more competition, possibly crowding out of incumbent firms, which may lead to an aggregate decline in employment. Empirically, it is not clear how the success of these new jobs in new firms should be evaluated.

Davis et al. (1996) compare job creations in large and small U.S. firms and conclude that regression to the mean and measurement error lead to the – exaggerated or wrong —assertion that most job creation is in small firms. They argue that the use of systematically lower employment levels in initial periods may lead to an upward biased estimate of employment growth in these small firms. This result is also relevant for the study of job creation by new firms, because new firms typically start with an employment level below the equilibrium number of workers and will therefore exhibit a more dynamic growth in the number of employees than old firms, which have already attained the optimal number of workers.

Other studies (e.g. Geroski and Mazzucato, 2002) compare the survival rates of new firms to existing ones and find that new firms have a relatively high risk of failure during the first years of their existence. While this is an important result for the survival of new firms, the comparison of failure rates of new and incumbent firms is misleading for the judgment of the creation of jobs. This is because the failure rates of new firms are a combination of several effects, such as financing problems for sunk start-up costs,

learning effects, matching problems between risk-loving entrepreneurs and high-risk projects, and so on. Most importantly, the comparison of the failure rate of a new firm that *created* five new jobs with the failure rate of a firm that *already profitably employed* five workers in the past five years misses the point. The real question is if jobs created by an incumbent firm – which we might call expansion – is more persistent than the creation of the same jobs in a new firm. While the number of start-ups together with the associated job creation as such might bring some turbulence into the market and change competitiveness in the industry, only the persistence of jobs created gives valuable information about the viability of capacity investment, firm setup and expansion.

Boeri and Cramer (1992), Wagner (1994) and Fritsch and Weyh (2006) analyze the employment in startup firms for several cohorts. They find that employment levels in the new firms rise only in the first year(s), but decline significantly thereafter. Fritsch and Weyh (2006, p. 257) comment on these results: “consequently, if the employment development in cohorts of newly founded businesses is so modest, one may question the relevance and justification of policies that try to increase the level of new firm formation in the economy”. This seems to be premature. Looking at a typical cohort of firm startups, one cannot expect continuously rising employment levels, because this would lead to an ever-increasing employment level throughout the whole economy, which is clearly counterfactual. Again, these results suffer from a lack of an appropriate comparison group for the jobs in the new firms.

We compare the persistence of job creations between jobs created in new firms and those created in incumbent firms using a large data set covering 21 years of job

creation. The data are matched employer-employee data from Austrian administrative sources, providing not only characteristics at time of job creation, but also a detailed history of the firms. Our results indicate that a typical new job survives considerably longer if created in a new firm, even after controlling for business cycle effects and workplace characteristics.

2 Measuring job creation

The data from the Austrian social security system (“Hauptverband der Österreichischen Sozialversicherungsträger”) cover all employees in the Austrian private sector and all non-tenured public sector workers. Establishments are identified by the employers’ social security number. Due to classification changes for administrative purposes, there is potential measurement error, a problem prevalent in most administrative data. We take particular care to avoid such classification errors (see below). The data cover the period of January 1978 to December 1998.¹

We observe quarterly employment at the following sampling dates, 10 February, 10 May, 10 August, and 10 November. We define a job creation if the number of employed persons in an establishment in any quarter t is greater than in the preceding quarter $t-1$. Of all job creations in the data, we draw a 10 per cent random sample,

¹ For a more extensive discussion of features of the data and data processing see Hofer and Winter-Ebmer (2003) and Stiglbauer et al. (2003).

stratified by quarter, sector, and the age of the establishment.² The sample consists of some 197,000 job creation episodes, which created on average 2.14 jobs per quarter. Of these establishments, 153,019, or about 78 per cent, existed in the previous period, 24,934 (13%) were new establishments and 18,986 (10%) were enterprises non-existent in the previous period, but at some time before. As these are mostly seasonal enterprises closing down for some time or one-man firms, these re-entering firms are excluded from our sample. Data cleaning leave us an estimating sample of approximately 377,000 job creations in about 144,000 old and 24,000 new establishments.

Like others, we formulate our analysis in terms of job flows, i.e. the creation and destruction of employment positions in a firm. This is the appropriate perspective if we aim to measure the success or failure of a new job. Alternatively, one could look at worker flows, which focuses on the persistence of workers in particular firms. This is the preferred perspective if workers worry about job security in particular firms as the analysis of job tenure in new or old firms gives guidance as to where to apply³. An intermediate measure is the persistence of a particular job position, e.g. of a sales manager, in a firm. The duration of the position ends, if, for example, the sales manager is replaced by an accountant, but not if a new person replaces the previous sales

² The age of establishments is calculated from its first observation or, if established before 1972, censored at January 1972. We focus on the private sector and drop all sectors which have a substantial share of tenured civil servants, because a change in employment in these sectors might be due to a change in the legal status of employees. We exclude the following sectors from the analysis: public sector (public administration, social security administration, military), health services, and transport. We also drop establishments in agriculture and forestry, construction, hotels and restaurants because these sectors exhibit strong seasonal variation. Consequently, our estimating sample covers 9 sectors.

³ Schnabel et al (2008) look at this issue.

manager. Lacking information on detailed job descriptions we do not follow this method.

2.1 Classification of establishment entries

There could be “spurious” entries and exits of employers resulting from administrative changes in the establishment identifier, which would add “artificial” labor flows. (For instance, establishments may receive a new identifier when they change address.) To overcome this problem, we use a classification method that was recently applied to comparable Swedish data (Persson, 2004). Using the employees’ identification number, this procedure checks whether a “substantial” part (two thirds) of the workers of a new establishment can be found in another establishment in the previous period. By the relative magnitude of the overlap of workers’ identities, we distinguish new establishments (“births”) from administrative changes of identifiers. If an establishment is recorded as entering, but it appears to be merely caused by a change of the identifier, we treat it as a continuing establishment.

2.2 Job creation and destruction in Austria

Rather restrictive firing restrictions and strong unions at the industry and firm level characterize Austria’s labor market institutions. Such institutions should be of central importance for explaining the allocation and reallocation of labor. Austria is a relatively highly regulated country with respect to job security provision (Emerson, 1988). Accordingly, taking differences in the size and the sectoral composition of firms into account, Austrian job flow rates are substantially lower than in the U. S. (Stiglbauer et al., 2003) and other European countries (Gómez-Salavador et al., 2004).

Table 1 provides summary statistics of our data. The average job creation was small, with about 2.4 jobs per quarter in old and about 1.5 in new establishments. The average net job creation in old establishments was on average about 22 per cent of the previous quarter's number of workers. New establishments appear to start small, about three quarters of establishments started with just one employee. We see that many job creations seem to accommodate minor fluctuations in labor demand as almost two thirds of old establishments created only one new job. Supporting this interpretation is the fact that a significant minority of old establishments (14%) created just one job and had with the new job the same number of workers on their payroll than two quarters before. (About 17% of all old establishments had the same number of workers after the job creation as they had two quarters before.) This could arise from a time lag between an unfilled vacancy at time $t-1$ and the hiring in the sampling quarter t , which could be caused by staff turnover rather than the firm's business strategy. If we erroneously interpret this as a job creation, the persistence of job creation will be biased upwards. We therefore control for such a possibility using an indicator variable in the regressions.

Some structural differences between new and old firms can be seen in the hiring process. In old establishments, the majority of new workers were up to 25 years of age (52%) whereas in new firms only a quarter of workers were below 25 years of age. In old firms, 44% of new workers were blue-collar workers, compared to new establishments with only one third blue-collar workers. Some 45% of the new workers in old establishments were women, whereas more than half were female in new establishments. The median daily wage for newcomers was about 430 ATS in old

establishments and about 456 ATS in entering establishments.⁴ We also observe a structural change during the sampling period, about 40% of new establishments are active in the service sector whereas only 21% of the old establishments are in the service sector. This is in accordance with e.g. Geroski (1991) who noted that entry of firms in markets changes not so much the size of the population of firms than the characteristics of the population of firms.

There might be fewer hires than implied by our measure of job creation because workers may be hired to replace other workers who may not have yet left the firm. To test the influence on the persistence of job creation, we calculate the churning rate following Burgess, Lane and Stevens (2000) for each establishment in the quarter of the job creation.⁵ The churning rate was on average 7% of employment at the establishment level.

3 Empirical methods

Descriptive studies of job creation typically use persistence rates to check for the longevity of newly created jobs—how many jobs are still there after n periods? —, but these persistence rates do not lend themselves easily for multivariate analysis. In fact, apart from cross-tabulations of various n -period persistence rates (e.g. Davis et al., 1996

⁴ Daily wages, calculated from the yearly gross earnings divided by the number of employed days (without sick leave payments). There is no information on the number of hours worked.

⁵ Hires and separations are measured by comparing workers' identities between the two consecutive sampling dates.

and Armington and Acs, 2000), there is no detailed analysis of persistence in the job creation literature. To make persistence of job creation tractable, we use a survival time concept. As firms can create several jobs at the same time, we use the *survival time of a typical new job*, which is calculated as the mean duration of all the jobs created at a point in time in an establishment. Alternatively, one might look at the survival of the first job or how long it takes until all job creation is lost, which is equivalent to the death of the new firm.⁶ Note that survival of the last new job is a valid measure to compare the persistence of job creation in new and existing firms but not firm death. Such a comparison mixes the destruction of recently created jobs with the destruction of jobs which have been created some time in the past and which are, because of selection, much more successful.

Figure 1 displays Kaplan-Meier estimates of the survivor functions of jobs created in new and old firms, together with 95% confidence intervals. A survivor function shows the proportion of jobs creation in period 0 which are still active after n quarters. The survivor function for jobs created in new firms is consistently above the one for old firms. The persistence of job creation is considerably higher in new firms; this is the case immediately after job creation, but also up to 80 quarters after job

⁶ In a previous version we presented these two approaches, too, but the results are quite similar to the ones presented in Table 2. The dependent variable in these analyses is the average duration of new jobs, the explanatory variables, where workers' characteristics are concerned are the average values of the new workers.

creation. After five years, about 65 percent of jobs in new firms are lost; about 80 percent created in old firms are lost.⁷

Survival techniques are widely adopted by industrial economists for the survival of new establishments (e. g. Audretsch and Mahmood, 1994, 1995, and Disney, Haskel, and Heden, 2003). To our knowledge, the survival of new jobs was not investigated in this way before. We use a Cox proportional hazard model to estimate the hazard rates of new jobs. The Cox model specifies the hazard function $h(t)$ as:

$$h(t) = h(0) \exp(X'\beta). \quad (1)$$

The hazard rate $h(t)$ is the rate at which a job will cease to exist in period t , given that it existed up to $t-1$. The baseline function $h(0)$ specifies the hazard function when all covariates are set to zero, X is the vector of covariates and β is the vector of coefficients to be estimated. The Cox model does not require any assumptions regarding the baseline hazard, but it belongs to the class of proportional hazard models where the impact of all covariates is assumed to be proportional to the baseline hazard. It allows a flexible estimation of the association of the covariates with the survival chances of the new jobs.

⁷ This figure does not picture average employment in startup firms after creation, because it does not consider the impact of the creation of additional jobs, it only asks how long jobs created in one quarter do survive. Including additional job creations over time would wash out the clear distinction between new and incumbent firms.

4 Results

In Table 2 we present the Cox regressions for old and new firms and the pooled sample of old and new firms. The results are presented as hazard ratios and a hazard ratio greater (less) than 1 signifies a bigger (smaller) hazard and the job is lost sooner (later). From the pooled sample, we see that job creation in old firms is less persistent than in new firms as the hazard ratio for jobs created in new firms is approximately 36% lower than for jobs in old firms. This corresponds with descriptive results from the literature. Cross-tabulations of persistence by age in Davis et al. (1996) and Armington and Acs (2000) indicate higher job creation persistence when jobs are created by new firms or plants.⁸

The regression results for old establishments shows that the more new workers were hired, relative to the number of incumbent workers, the longer the job existed. Moreover, new jobs in old establishments are the shorter, the older the establishment was, an increase in age by one year increases the hazard ratio by more than 2% relative to the baseline.

Control variables included in the regressions include some indicators relating to the size and structure of job creation and the structure of the incumbent firm. Does a small (cautious) job creation result in longer lasting jobs than a large (bold) job creation? We include the relative size of an expansion for old firms and the absolute size of new job creations for new firms. For both old and new establishments, large expansion are related to – on average - longer lasting job creations.

⁸ However, the differences these authors find are not as strong as they emerge from our results.

Structural characteristics of the job creation, for example, the demographic composition of the newly hired workers show a statistical association with the survival of the jobs. Jobs in new firms are estimated to be more persistent if new hires are of prime age, female, or white-collar workers. The hazard rate of a typical job in a new firm is 22% higher if the job was filled by a worker younger than 25, in relation to a worker who was between 25 and 50 years of age. It is 7% higher, if the worker was over 50. If the job was filled with a blue-collar worker, the hazard is 22% higher than if it was filled with a white-collar worker. The hazard is 16% lower if the new employee was female, rather than male. The effects are similar for old firms. While the structure of job creation does play a role, the structure of the old before job creation set in, does not seem to matter: neither median wages, size, employment growth or churning rates lead to hazard ratios that are economically significantly different from one.

Note that job creations could be spurious if they were only meant as supplementary or replacement recruitments: In these cases, the size of the work force might fluctuate randomly between quarters without a real firm expansion. Therefore, we control with dummy variables for firms employing only one new worker as well as for those whose employment was the same in period t and in period $t-2$.

Another important concern is the timing of job creation. Intuition suggests that a job creation might be more permanent if started in an expansion, because the firm can profit from better demand conditions at this time. However, low interest rates in a boom will make also investment projects of a more risky type viable, which may result in less persistence. Market entry will increase competition for continuing firms, which may

also lead to shorter job durations. Which effects dominate the survival chances of a job creation remains an empirical issue.

Because we are using time dummy variables in our estimations, we need business cycle indicators that vary both over time and across sectors. We employ two different indicators to gauge the relationship between the survival of an establishment's job creation and the cycle at the time of job creation. Our indicators are the average sectoral and regional unemployment rates over the last 12 months. The business cycle indicators vary over time, between the 9 sectors, and between approximately 100 local districts. Our specification also includes dummy variables for the sectors and the districts as well as seasonal controls.⁹

The state of the business cycle at the time of the job creation shows a strong statistical relationship with the survival chances of the job. If the job was created in a downturn – i.e. the sectoral unemployment rate was high – then the job survives longer, particularly in old establishments, than a job created in an upturn. Increasing the sectoral unemployment rate by 1 percentage point is estimated to lower the hazard rate by 5 percent.¹⁰ However, the regional unemployment rate does not appear to effect the

⁹ We have also experimented with the inclusion of interest rates as business cycle indicators. The results show that the higher the interest rates, the sooner the job creation was lost. This is indicative of the financing structure of Austrian businesses, which is predominantly credit financed (Valderrama, 2002). However, as the interest rates do not vary for establishments, we consider the unemployment rates by sector and region superior. In any case, the results change little.

¹⁰ Pure industry effects cannot be responsible for this result, because we also control for time and sector fixed effects.

survival of newly created jobs. This pattern is robust across specifications, be it the survival of the first job, of a typical job, or the survival of all newly created jobs.

A job survives longer, if the job or the establishment was created in a recession than if it was created in a boom. What might explain such a result? It could be that successful establishments expand at all times – even in recessions – and we might measure the effect of successful establishments only. This is an unlikely explanation, since we control for the expansionary path of the establishments over the last two years and we do not find an association with recent job hires and the survival of the new jobs. The survival may relate to the quality of the expansion, because higher real interest rates in recessions select only the most promising investment opportunities. In addition, the average skill of the unemployed is greater in a recession than in a boom, new hires would have more skills and the project might therefore be more successful.

In Figures 2 and 3 we plot estimated hazard rates (based on the average duration of new jobs) holding all variables at their mean, but for the sectoral and regional unemployment rates. The unemployment rates are set to a high rate, which is two standard deviations above the mean, and to a low rate, which is two standard deviations below the mean. The Figures give the shape of the baseline hazard; we detect an increased hazard for the period following the creation of the job. The hazard peaks after about 7 quarters in existing firms, and after about 9 quarters in new firms. The hazard decreases thereafter. We see that the hazards are consistently greater when unemployment was low at the time of job creation rather than high. These Figures drastically show the superior performance of job creation in new firms: up to five years

after job creation the hazard rate in old firms is consistently above that from new firms: in the first years it is even twice as high.

To demonstrate the robustness of these results, we have split the pooled sample of establishments into the manufacturing and the service sector and re-estimated the hazard for various sub-samples. These results are tabulated in Table 3, where we list the estimated hazard ratios for the new firm indicator and the associated standard errors. Apart from corrections to the indicator variables for sectors, and in some cases for the regional indicators, these regressions have the same covariates as those tabulated in Table 2. The results confirm the robustness of our main message and show that new jobs in new establishments have a statistically and economically significant longer duration than those in existing establishments. In particular, within old establishments, we restrict the sample to those with at least 5 workers prior to the expansion; to job creations with at least two (five) new jobs; and to job creations where firm size in period t was unequal to the firm's size 2 quarters earlier; and combinations of these conditions. These restrictions should eliminate cases where the measured job creation might be an artifact arising from a temporary adaptation only. The results are by and large the same across all specifications and similar for services and manufacturing establishments. We estimate that a new job's hazard of being terminated is about 35 to 50 percent lower in a new establishment than in an old establishment, all other characteristics held constant.

5 Summary and Conclusions

The dynamics of job creation have received a lot of attention from macro and from labor economists, who have concentrated on the simultaneous creation and destruction of jobs, as well as on the cyclical determinants of job creation. In addition, the discussion in industrial organization has concentrated on firm creation, growth and survival, providing a range of insights and stylized facts on the post-entry performance of firms (e.g. Geroski, 1995). However, no previous study has analyzed the persistence of new jobs in old and new firms. We analyze the persistence of job creation, distinguishing between job creation in existing and in entering establishment, because the creation of employment by supporting the creation of new firms is a prime concern for economic policy, - often supported by government aid.

Jobs created by entering establishments in Austria last considerably longer than new jobs in old establishments, which should support the creation of new firms. These results are robust to many different specification checks. We estimate that jobs which persist over time were predominantly filled by female, white-collar, and prime-age workers at the time of creation, which points to a sustainable match between entrepreneurial spirits and well-educated workers. We also find that a job which had been created together with many other jobs survives longer than if it were the only new job created. If a job was created in a period of adverse macroeconomic conditions, i. e. when unemployment was high, the duration of the job is much longer than if it had been created in a boom.

Our results have clear policy implications and the removal of entry hurdles for new firms is thus a clear priority for economic policy. In case governments dither

between subsidizing new jobs in existing firms or funding start-up programs, the money should best go to new firms: as the data show, they tend to do business in new sectors (and the jobs in the service sectors are amongst the most persistent), using possibly highly educated workers, and create jobs that last on average almost 50 per cent longer than those created in already existing companies.

The importance of structural change is also underpinned by our results. New firms are predominantly entering the market in new sectors of the economy and employ relatively high-skilled workers. In the light of high unemployment rates, one way to lower entry barriers is to generate a pool of high-skilled workers by training and re-training (unemployed) workers.

References:

- Abel, Andrew and J.C. Eberly (1994), The Mix and Scale of Factors with Irreversibility and Fixed Cost of Investment, *Carnegie-Rochester Conference Series on Public Policy* 48, 101-135.
- Armington, Catherine and Zoltan Acs (2000), Differences in job growth and persistence in services and manufacturing, *Discussion Paper 00-04*, Center for Economic Studies, Washington, D.C.
- Audretsch, David and Talat Mahmood (1994), The rate of hazard confronting new firms and plants in US manufacturing, *Review of Industrial Organization* (9), 41-56.
- Audretsch, David and Talat Mahmood (1995), New firm survival: New results using a hazard function, *Review of Economics and Statistics* (77), 97-103.
- Boeri, Tito (1996). Is job turnover countercyclical?, *Journal of Labor Economics* (14), 603-625.
- Boeri, Tito and Lutz Bellmann (1995), Post-entry behaviour and the cycle: Evidence from Germany, *International Journal of Industrial Organization* (13), 483-500.
- Boeri, Tito and Uwe Cramer (1992), Employment Growth, Incumbents and Entrants – Evidence from Germany, *International Journal of Industrial Organization* (10), 545-565.
- Burgess, Simon, Julia Lane and David Stevens (2000), Job Flows, Worker Flows, and Churning, *Journal of Labor Economics* (18), 473-502.
- Caballero, Ricardo and Mohamad Hammour (1994), The cleansing effect of recessions,” *American Economic Review* (84), 1350-1368.
- Caballero Ricardo and Mohamad Hammour (1996), On the timing and efficiency of creative destruction,” *Quarterly Journal of Economics* (111(3)), 805-852.
- Davis, Stephen J. and John C. Haltiwanger (1999), Gross Job Flows. In Ashenfelter, Orly and Card, David (ed.), *Handbook of Labor Economics*, vol. 3B, 2711-2805.

- Davis, Stephen J., John C. Haltiwanger and Scott Schuh (1996), *Job Creation and Destruction*, Cambridge (Mass.): MIT Press.
- Davis, Steven J., John Haltiwanger and Scott Schuh (1996), Small Business And Job Creation: Dissecting The Myth And Reassessing The Facts, *Small Business Economics* (8/4), 297-315.
- Disney, Richard, Jonathan Haskel and Ylva Heden (2003), Entry, exit and establishment survival in UK Manufacturing, *The Journal of Industrial Economics* (LI), 91-112.
- Dixit, Avinash K. and Robert S. Pindyck (1994), *Investment under Uncertainty*, Princeton (NJ): Princeton University Press.
- Figura, Andrew (2002), Is reallocation related to the cycle? A look at permanent and temporary job flows, *Working Paper no. 16*, Finance and Economics Discussion Series, The Federal Reserve Board.
- Fritsch, Michael and Antje Weyh (2006), How Large are the Direct Employment Effects of New Businesses? An Empirical Investigation for West Germany, *Small Business Economics* (27), 245-260.
- Geroski, Paul (1991), *Market dynamics and entry*, Blackwell, Oxford.
- Geroski, Paul (1995), What do we know about entry?, *International Journal of Industrial Organization* (13), 421—40.
- Geroski, Paul and Mariana Mazzucato (2002), Learning and the sources of corporate growth, *Industrial and Corporate Change*, (11), 623-644.
- Grambsch, Patricia M. and Terry M. Therneau (1994), Proportional hazards tests and diagnostics based on weighted residuals, *Biometrika* (81), 515-526.
- Gómez-Salvador, Ramón, Julián Messina and Giovanna Vallanti (2004), Gross job flows and institutions in Europe, *Labour Economics* (11), 469-485.
- Hamermesh, Daniel (1989), Labor demand and the structure of adjustment costs, *American Economic Review* (79), 674-689.
- Hofer, Helmut and Rudolf Winter-Ebmer (2003), Longitudinal Data from Social Security Records in Austria, *Schmollers Jahrbuch* (123(4)), 587-591.

- Jovanovic, Boyan (1982), Selection and evolution of industry. *Econometrica* (50(3)), 649-670.
- Letterie, Wilko, Gerard Pfann and Michael Polder (2004), Non-Linear Investment Dynamics and Labour Adjustment, unpublished, University of Maastricht.
- Narazani, Edlira (2005), Interrelationships between Labor and Capital Adjustment Decisions, mimeo, Università di Torino.
- Persson, Helena (2004), The survival and growth of new establishments in Sweden, 1987—1995, *Small Business Economics* (23), 423—40.
- Sakellaris, P. (2001), Patterns of Plant Adjustment, *Journal of Monetary Economics* 51, 425-450.
- Schnabel, C., Kohaut, S. and U. Brixy (2008), Employment Stability of Entrants in Newly Founded Firms: A Matching Approach Using Linked Employer-Employee Data from Germany, IZA WP 3353.
- Stiglbauer, Alfred, Florian Stahl, Rudolf Winter-Ebmer and Josef Zweimüller (2003), Job creation and job destruction in a regulated labor market: The case of Austria, *Empirica* 30, 127-148.
- Valderrama, Maria (2002), Credit channel and investment behavior in Austria: A micro-econometric approach, *working papers* 58, Oesterreichische Nationalbank (Austrian Central Bank), Vienna.
- Wagner, Joachim (1994), The Post-Entry Performance of New Small Firms in German Manufacturing Industries, *Journal of Industrial Economics* (42), 141-154.

Figure 1: Kaplan-Meier estimates of the survival of job creation.

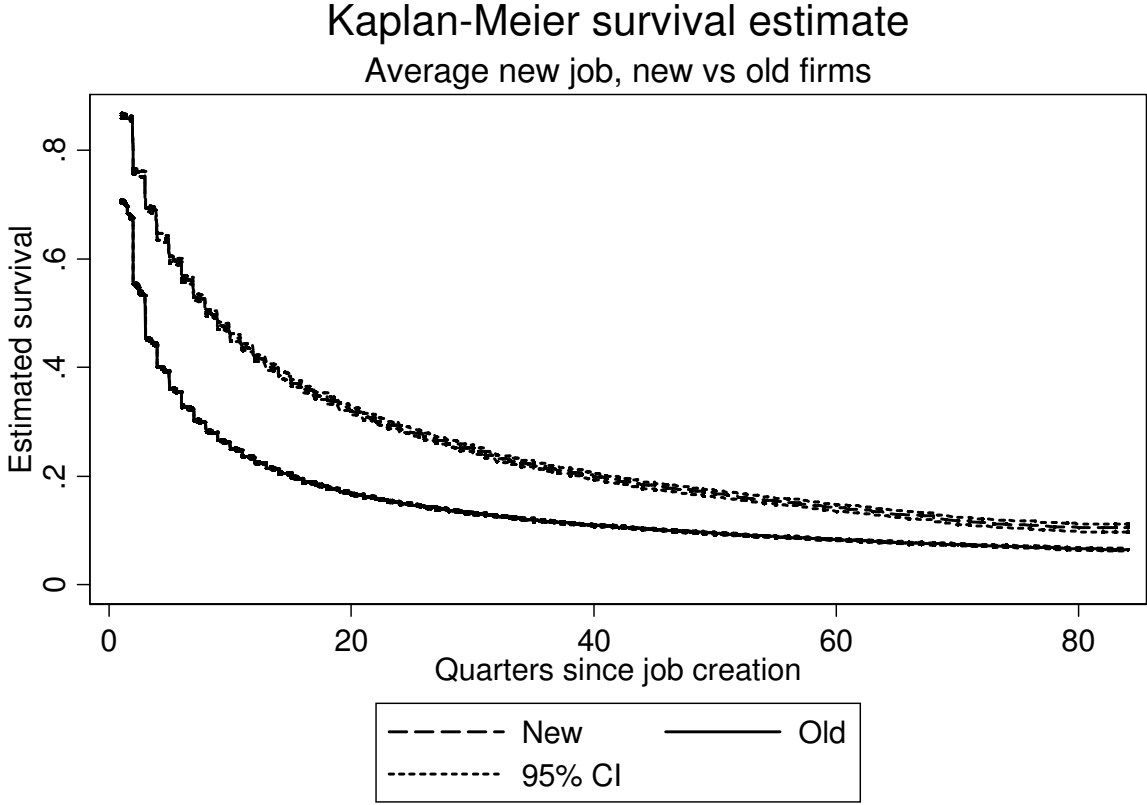
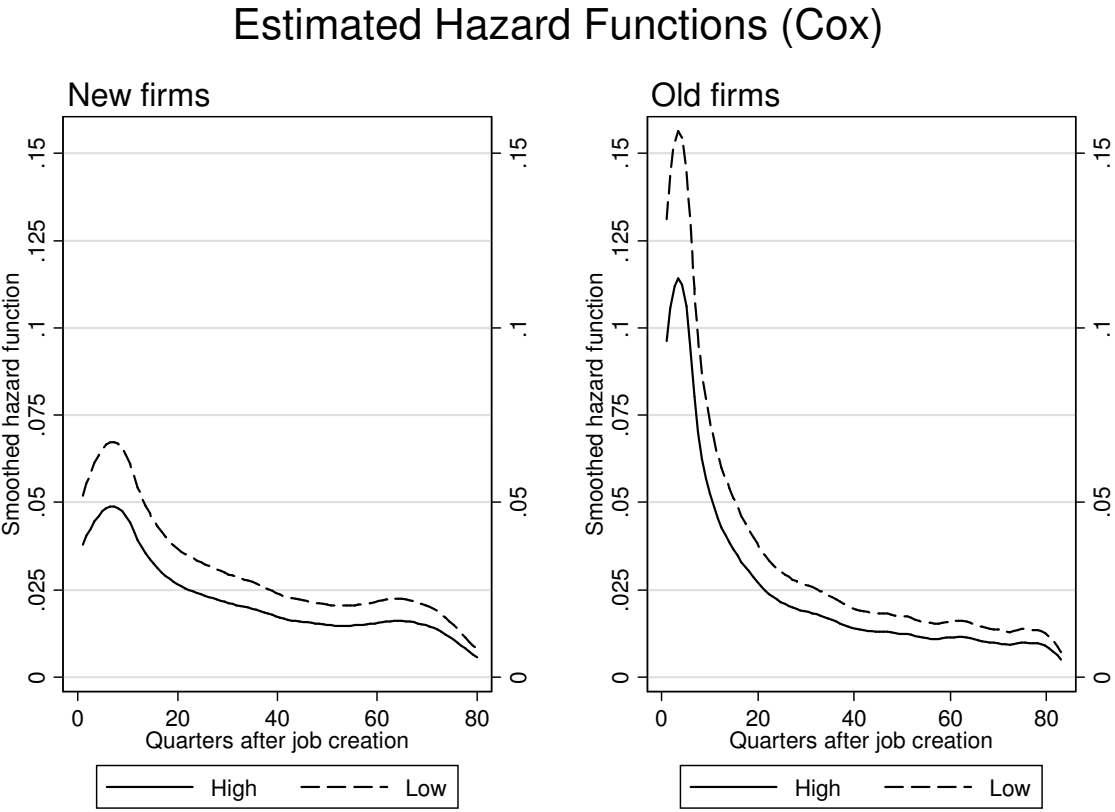


Figure 2: Estimated Hazard functions, old vs. new firms.



Note: High (Low) indicates the hazard rate calculated at the average regional unemployment rate plus (minus) two standard deviations at the time of job creation.

Table 1: Summary statistics.

	Old Firm		New Firm	
	Mean	Std. Dev.	Mean	Std. Dev.
Absolute job creation	2.359	6.115	1.542	2.308
Employment t	27.161	92.567	1.542	2.308
Employment $t-1$	24.801	89.822	.	.
Job creation, relative to Employment $t-1$ (in %)	21.695	16.842	.	.
Employment growth ($t-4, t-1$)(in %)	-0.500	72.354	.	.
Employment growth ($t-8, t-4$) (in %)	9.359	81.116	.	.
Created only one new job (=1)	0.654	0.476	0.764	0.425
Employment $t-2 =$ Employment t (=1)	0.169	0.375	.	.
Only one new job * [Employment $t-2 =$ Employment t (=1)]	0.143	0.350	.	.
Median wage old workers ^{a)}	565.056	219.467	.	.
Churning (in % of employment)	7.012	14.450	.	.
Characteristics of new hires:				
Median wage new workers ^{a)}	429.341	247.222	455.889	291.953
Workers aged under 25/All new hires (in %)	0.508	0.429	0.251	0.404
Workers aged 25-50/All new hires (in %)	0.444	0.422	0.654	0.443
Workers aged 50+/All new hires (in %)	0.047	0.178	0.094	0.276
Blue collar workers / All new hires (in %)	0.443	0.452	0.327	0.453
Female workers / All new hires (in %)	0.453	0.444	0.562	0.471
Age of firm	10.844	6.958	0	0
Age left-censored in 1972 (=1)	0.484	0.500	.	.
Business cycle indicators:				
Average sectoral unemployment rate last 12 months	4.272	1.632	4.535	1.615
Average regional unemployment rate last 12 months	4.892	2.415	4.862	2.366
Sectors:				
Energy, water	0.010	0.101	0.003	0.056
Food, beverage, tobacco	0.069	0.253	0.015	0.120
Textiles and clothing	0.036	0.186	0.016	0.127
Wood and paper	0.105	0.306	0.039	0.194
Chemical products	0.039	0.194	0.014	0.117
Metal and metalworking	0.107	0.309	0.043	0.203
Wholesale and retail trade	0.399	0.490	0.448	0.497
Banking and insurance	0.028	0.165	0.014	0.119
Other private services	0.208	0.406	0.408	0.491
N	143,952		24,158	

Table 2: Estimated Hazard Ratios of the time until the average new job is lost (Cox-estimation).

	Old firms	New firms	Pooled
New firm dummy			0.6426 (0.009)
Relative job creation (=New/old workers)	0.9968 (0.000)		
Absolute job creation (=Net employment created)		0.9883 (0.006)	0.9940 (0.001)
Churning rate	1.0019 (0.000)		1.0026 (0.000)
Employment $t-1$	0.9999 (0.000)		1.0002 (0.000)
Employment growth ($t-4,t-1$)	0.9999 (0.000)		1.0000 (0.000)
Employment growth ($t-8,t-4$)	0.9999 (0.000)		0.9999 (0.000)
Created only one job (=1)	1.2772 (0.009)	1.5894 (0.037)	1.3080 (0.009)
Employment $t-2=t$ (=1)	1.0674 (0.020)		1.0712 (0.020)
One job * (Employment $t-2=t$)	0.8258 (0.017)		0.8127 (0.017)
Median wage new workers	0.9999 (0.000)	0.9994 (0.000)	0.9999 (0.000)
Median wage old workers	0.9995 (0.000)		0.9996 (0.000)
Fraction of new workers younger than 25 years of age in all new workers	1.0690 (0.008)	1.2212 (0.023)	1.0815 (0.008)
Fraction of new workers older than 50 years of age in all new workers	1.1342 (0.019)	1.0726 (0.029)	1.1090 (0.015)
Fraction of new blue-collar workers in all new workers	1.1443 (0.008)	1.2182 (0.022)	1.1862 (0.008)
Fraction of new female workers in all new workers	0.9782 (0.007)	0.8410 (0.015)	0.9706 (0.007)
Age of workplace (years)	1.0238 (0.002)		1.0278 (0.002)
Age*age/100	0.9436 (0.007)		0.9413 (0.007)
Workplace existed in 1972 (=1)	1.0560 (0.009)		1.0598 (0.009)
Sectoral unemployment rate	0.9487 (0.008)	0.9501 (0.027)	0.9482 (0.008)
Regional unemployment rate	1.0047 (0.004)	1.0048 (0.009)	1.0043 (0.003)
N	143,952	24,158	168,873
Log-likelihood	-1.359,046.4	-166,119.63	-1.582,726.7

Note: Hazard ratios are the exponentiated coefficients of the Cox-regressions. Standard errors in parentheses. Regressions include indicator variables for sectors (9), regions (132), year (21), and seasons (4).

Table 3: Robustness of results, various sub-samples, by sectors.

	Manufacturing	Service
	Hazard Ratio	Hazard Ratio
	(SE)	(SE)
<u>All firms</u>		
New firm dummy	0.5656	0.6754
	(0.013)	(0.006)
<i>N</i>	58592	118563
<u>Old firms with more than 5 employees at <i>t-1</i></u>		
New firm dummy	0.5339	0.6242
	(0.012)	(0.006)
<i>N</i>	41782	74523
<u>More than 1 new job</u>		
New firm dummy	0.4934	0.5491
	(0.020)	(0.012)
<i>N</i>	23700	34301
<u>More than 5 new jobs created</u>		
New firm dummy	0.5684	0.5909
	(0.056)	(0.038)
<i>N</i>	6461	6588
<u>Number of employees at <i>t</i> not equal the number at <i>t-2</i></u>		
New firm dummy	0.4986	0.5555
	(0.021)	(0.012)
<i>N</i>	21782	32217
<u>Old firms with more than 5 employees at <i>t-1</i>, more than 1 job created, and number of employees at <i>t</i> not equal <i>t-2</i></u>		
New firm dummy	0.4898	0.5504
	(0.021)	(0.012)
<i>N</i>	17994	24092

Note: Results from Cox-Regressions of time until the average new job in the establishment is lost. Regression specifications are as in Table 2, pooled sample (apart from adjustments for sectoral and regional indicators, where appropriate).