Job and worker turnover in German establishments

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Introduction

- A key difference in labour markets between the United States and Europe: how employers adjust employment
- For example, Pries and Rogerson (2005): job turnover in US and Europe is quite similar, but worker turnover is much lower in Europe
- Lower unemployment entry rates and longer unemployment durations; lower hiring and separation rates
- Macroeconomics: debate about the contribution of "ins" and "outs" to the cyclicality of unemployment (Darby et al., 1986; Hall, 2005; Shimer, 2007; Elsby et al., 2009; Smith, 2011; Elsby et al., 2011)
- Microeconomics: contrasting results for firm-level hiring and separation rates between U.S. (Burgess et al., 2001; Davis et al., 2006; Abowd et al., 1999)

What we do

- We examine the relationship between ΔN, H and S in German establisments:
  1. Use a large panel of German establishments over a long period (1993–2008)
  2. Measure of hires and separations from survey: separations can be decomposed into quits and layoffs (an advantage over administrative data)
  3. Simple regression-based approach
  4. How does the relationship vary with characteristics of establishments?
  5. Robustness of results from survey data and from administrative data

What we find

- We provide evidence that the relationship between ΔN and H and S is remarkably similar to that observed in the U.S.
  1. Level of hirings and separations is indeed much lower in Germany than in U.S.
  2. Despite this, separations increase almost one-for-one with job destruction in shrinking establishments, and hires increase almost one-for-one with job growth in growing establishments
  3. The relationship between ΔN and H or S is very stable over time and across different types of establishment
- Our results imply that cross-country differences in the unemployment response to a shock is not due to differences in H and S, but differences in the distribution of ΔN

Concepts

- N_{it} is employment of establishment i in year t
- The *net job flow* of establishment i is ΔN_{it}
- H_{it} and S_{it} are hires and separations
- Net worker flows must equal net job flows ($\Delta N_{it} = H_{it} - S_{it}$)
- Gross worker flows ($H_{it} + S_{it}$) will be greater than net worker/job flows if
  - Workers join and leave a given set of jobs ("churning")
  - The types of available jobs change (e.g. skill upgrading)
- A given ΔN_{it} can be accommodated by changes in hiring, separations, or both ▸ Diagram
- Convert quantities into rates by dividing by average employment over previous two periods e.g. $h_{it} = \frac{H_t}{0.5(N_t + N_{t-1})}$

Existing empirical evidence

- Worker turnover varies enormously between the U.S. and all other countries for which estimates are available ▸ Table
- U.S.: total worker flow rates vary from 75% to 200% of employment per year
- Compare to 22% (Netherlands), 32% (Germany), 59% (France), 55% (Taiwan), 47%–68% (Scandinavia and Finland)
- Support Pries & Rogerson's conclusion that worker flows in the U.S. are 1.5–2.5 times greater in U.S. than in Europe
- Evidence on the relationship between ΔN and H or S is much smaller
- Abowd Corbel and Kramarz (1999): French firms shrink by reducing hiring
- Burgess Lane and Stevens (2001): U.S. firms shrink by increasing separations

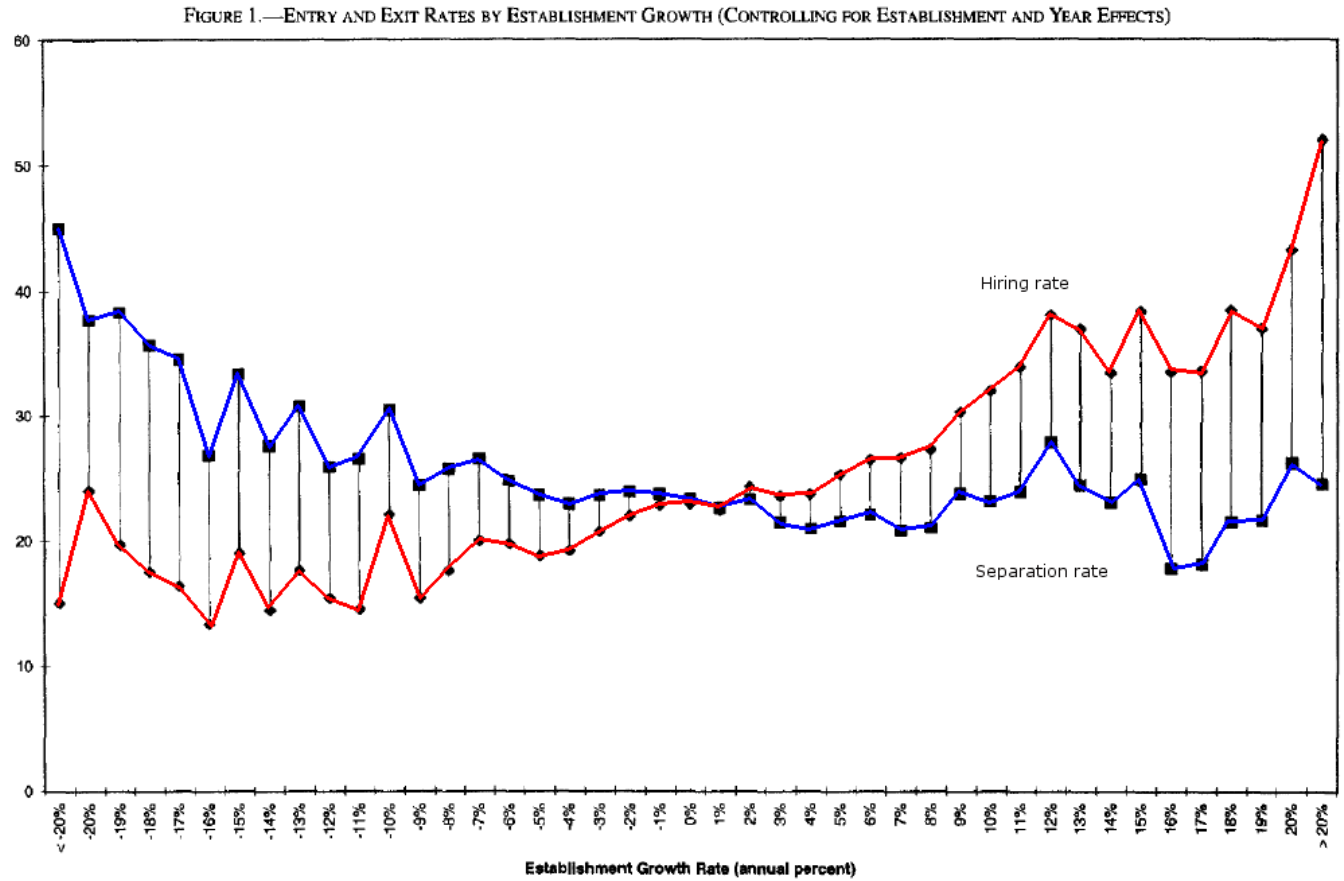


Figure. Modified from Abowd Corbel and Kramarz (1999)

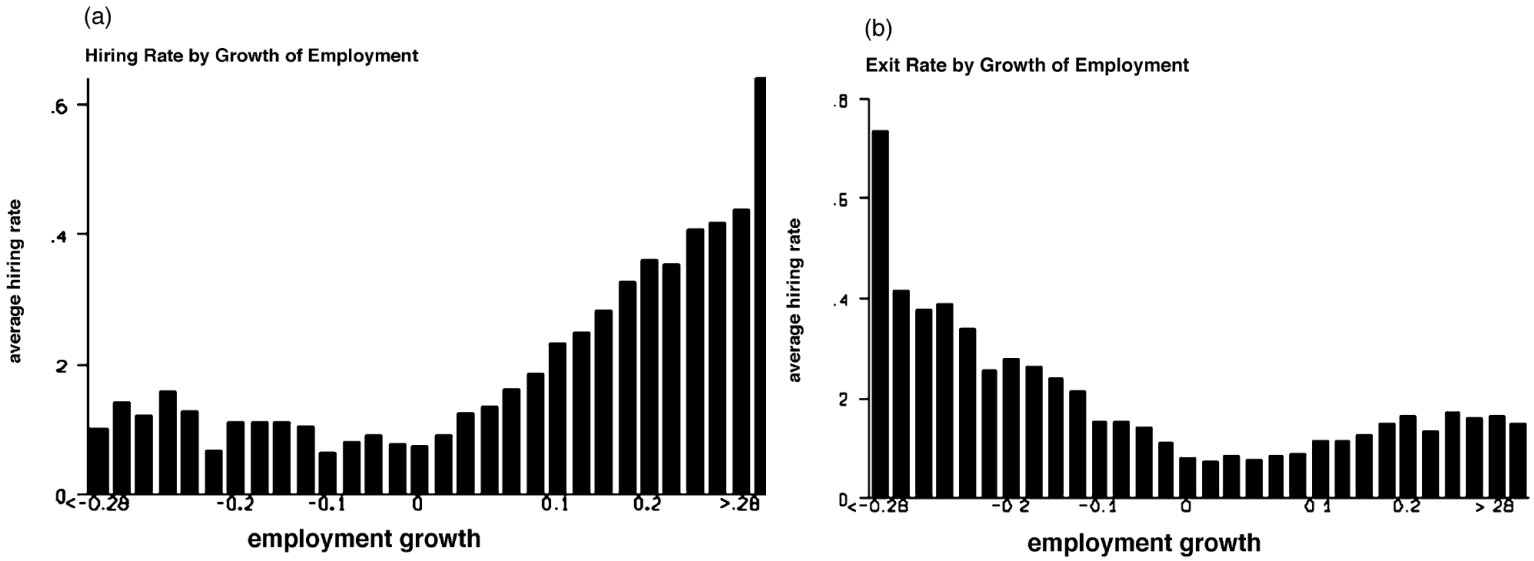


Figure. Modified from Burgess Lane and Stevens (2001)

Data 1: IAB establishment panel survey

- 4,000–10,000 plants in West Germany (since 1993) and 4,000–6,000 plants in East Germany (since 1996)
- Covers all sectors; sample currently covers 1% of plants and 7% of employment in Germany
- Our sample comprises all private-sector plants 1993–2009
- Information on employment, hiring and separations

▸ Questions ▸ Different measures of job flows

Data 2: Social-security data

- Advantages and disadvantages of survey data
- Employment statistics register of the German Federal Office of Labour (*Beschäftigtenstatistik* – BS) covers all workers and trainees registered by the social insurance system
- Establishment identifier which can be used to link to the plant-level data
- The *BS annual measure*: all workers who are employed by the surveyed plants on 30th June
- The *BS spell measure*: all spells of employment in a subsample of plants

▸ Comparison

Table. Average annualised job and worker flow rates by industry, location and size. Weighted by sampling weights and employment.

	Number of obs.	*Number of estab.*	*JC rate*	*JD rate*	*Hiring rate*	*Separation rate*	*Quit rate*	*Layoff rate*	*Layoffs per quit*	*Layoffs per destroyed job*
All establishments in IAB panel	151,766	38,368	20.3	14.8	12.4	10.7	6.2	4.5	0.73	0.58
Primary industries	6,140	1,413	31.5	13.8	12.5	9.9	5.4	4.4	0.82	0.48
Manufacturing	49,942	11,300	11.8	10.2	8.1	8.1	4.6	3.4	0.74	0.56
Construction	17,946	4,415	31.2	23.1	15.5	11.9	5.4	6.5	1.22	0.68
Wholesale and retail trade	26,904	6,876	19.3	16.0	9.9	9.7	5.9	3.7	0.63	0.53
Transport and communication	6,576	1,883	19.7	14.6	14.6	11.7	7.5	4.2	0.57	0.53
Financial and business services	21,460	6,116	23.3	17.3	17.5	14.2	8.1	6.1	0.75	0.68
Other services	22,798	6,365	31.3	22.5	17.6	13.4	8.2	5.1	0.62	0.58
West Germany	92,195	24,691	19.1	14.0	12.0	10.6	6.4	4.2	0.65	0.55
East Germany	59,571	13,677	26.6	19.5	14.9	11.5	5.1	6.4	1.24	0.75
1–10 employees	57,886	15,893	50.5	46.5	13.8	10.9	6.3	4.5	0.72	0.49
11–20 employees	19,080	4,659	30.1	23.5	13.8	10.8	6.4	4.4	0.68	0.53
21–30 employees	13,308	3,141	22.5	17.4	13.2	10.2	6.0	4.2	0.69	0.57
31–50 employees	12,728	3,195	19.6	14.9	14.2	10.9	6.2	4.7	0.77	0.68
51–100 employees	14,244	3,645	15.6	11.9	13.8	11.3	6.3	4.9	0.78	0.68
$>$ 100 employees	34,520	7,835	9.2	8.0	10.0	10.5	6.0	4.4	0.74	0.66
Establishments which match the BS annual data	117,055	31,596	20.0	13.9	12.4	10.6				
BS annual measure	117,055	31,596	12.4	10.9	11.2	11.2				
Establishments which match the BS spell data	14,471	1,133	17.2	12.4	9.9	8.8				
BS spell measure	14,471	1,133	10.9	8.9	10.7	11.1				

The relationship between job and worker flows

▸ Robustness checks

Table. Job and worker turnover rates, weighted by cross-section weights and employment

	Annual job flow rate	Annual hiring rate	Annual sep. rate
Increasing employment $n = 39,270$	0.17 (0.19)	0.25 (0.25)	0.08 (0.14)
Stable employment $n = 69,639$	0 (0.00)	0.06 (0.14)	0.06 (0.14)
Decreasing employment $n = 40,012$	-0.13 (0.16)	0.05 (0.11)	0.18 (0.20)

- The almost linear relationship between job flow rates and worker flow rates suggests the following approach:

$$h_{it} = \beta^h \Delta n_{it} \cdot 1(\Delta n_{it} > 0) + \gamma^h \Delta n_{it} \cdot 1(\Delta n_{it} < 0) + a_i^h + b_t^h + \epsilon_{it}^h \quad (1)$$

$$s_{it} = \beta^s \Delta n_{it} \cdot 1(\Delta n_{it} > 0) + \gamma^s \Delta n_{it} \cdot 1(\Delta n_{it} < 0) + a_i^s + b_t^s + \epsilon_{it}^s \quad (2)$$

- β^h and γ^h measure the responsiveness of hiring to changes in employment; β^s and γ^s measure the responsiveness of separations
- Because $\Delta n = h - s$ it is unnecessary to estimate both: $\beta^h - \beta^s = 1$ and $\gamma^h - \gamma^s = 1$
- This approach allows us to summarise the adjustment process with just two parameters, β^h and γ^s
- How do β^h and γ^s vary across types of establishment and across the business cycle?

Table. Estimates of Equations (1) and (2) with establishment and year fixed-effects. Standard errors in parentheses are clustered at the establishment level. Sample includes observations where job flows are in the range (−0.19,+0.19) which cover 90.1% of the total sample. Job flows and worker flows are measured over the first six months of each calendar year.

	β^h	γ^s	Constant	N	R^2	$\beta^h = -\gamma^s$ p-value
Sample with $-0.19 \leq n_{it} \leq 0.19$	0.964	−0.905	0.034	136,664	0.64	[0.000]
	(0.008)	(0.006)	(0.001)			
All establishments	0.973	−0.963	0.035	151,766	0.86	[0.024]
	(0.004)	(0.002)	(0.001)			
Primary industries	1.014	−0.951	0.031	5,338	0.60	[0.335]
(Agriculture, mining)	(0.050)	(0.037)	(0.005)			
Manufacturing	1.001	−0.905	0.022	46,785	0.65	[0.000]
	(0.009)	(0.008)	0.001)			
Construction	0.922	−0.919	0.048	15,128	0.60	[0.936]
	(0.023)	(0.019)	(0.005)			
Wholesale and retail trade	0.948	−0.912	0.032	24,718	0.57	[0.047]
	(0.016)	(0.013)	(0.003)			
Transport and communication	0.911	−0.835	0.046	5,907	0.64	[0.066]
	(0.037)	(0.032)	(0.009)			
Financial and business services	0.982	−0.932	0.042	18,819	0.76	[0.064]
	(0.023)	(0.020)	(0.004)			
Other services	0.929	−0.867	0.044	19,969	0.61	[0.016]
	(0.022)	(0.020)	(0.007)			
Adjustment equal p-value	[0.042]	[0.001]				

Table. Comparison of estimates from (1) and (2) between establishment survey data and employment register data. All estimates include establishment and year fixed-effects. Standard errors in parentheses are clustered at the establishment level. Sample includes observations where job flows are in the range $(-0.19,+0.19)$. Job flows and worker flows are measured over the first six months of each calendar year.

	β^h	γ^s	Constant	N	R^2	$\beta^h = -\gamma^s$ p-value
Establishments which match the BS annual data	0.948 (0.013)	−0.852 (0.011)	0.064 (0.003)	93,633	0.62	[0.000]
BS annual measure	0.876 (0.009)	−0.805 (0.007)	0.094 (0.002)	96,728	0.74	[0.000]
Establishments which match the BS spell data	0.967 (0.019)	−0.918 (0.014)	0.028 (0.003)	13,500	0.51	[0.019]
BS spell measure	1.093 (0.020)	−0.931 (0.019)	0.041 (0.003)	13,177	0.55	[0.000]

Table. Estimates of Equations (1) and (2), allowing for β^h and γ^s to vary across narrower ranges of employment growth.

	β^h	γ^s
$0 < \lvert n_{it} \rvert \leq 0.05$	0.822	−0.909
	(0.022)	(0.016)
$0.05 < \lvert n_{it} \rvert \leq 0.1$	0.838	−0.972
	(0.015)	(0.012)
$0.1 < \lvert n_{it} \rvert \leq 0.15$	0.891	−0.958
	(0.015)	(0.013)
$0.15 < \lvert n_{it} \rvert \leq 0.19$	0.972	−0.939
	(0.012)	(0.010)
Adjustment equal p-value	[0.000]	[0.029]
N	136,664	
R^2	0.677	

Table. Estimates of Equations (1) and (2) separately by location of establishment.

	β^h	γ^s	Constant	N	R^2	$\beta^h = -\gamma^s$ p-value
West Germany	0.968	−0.889	0.034	84,531	0.6729	[0.000]
	(0.010)	(0.008)	(0.001)			
East Germany	0.961	−0.929	0.038	52,133	0.6111	[0.016]
	(0.012)	(0.010)	(0.011)			
p-value H_0: Adjustment equal	[0.609]	[0.002]				

Quits and layoffs

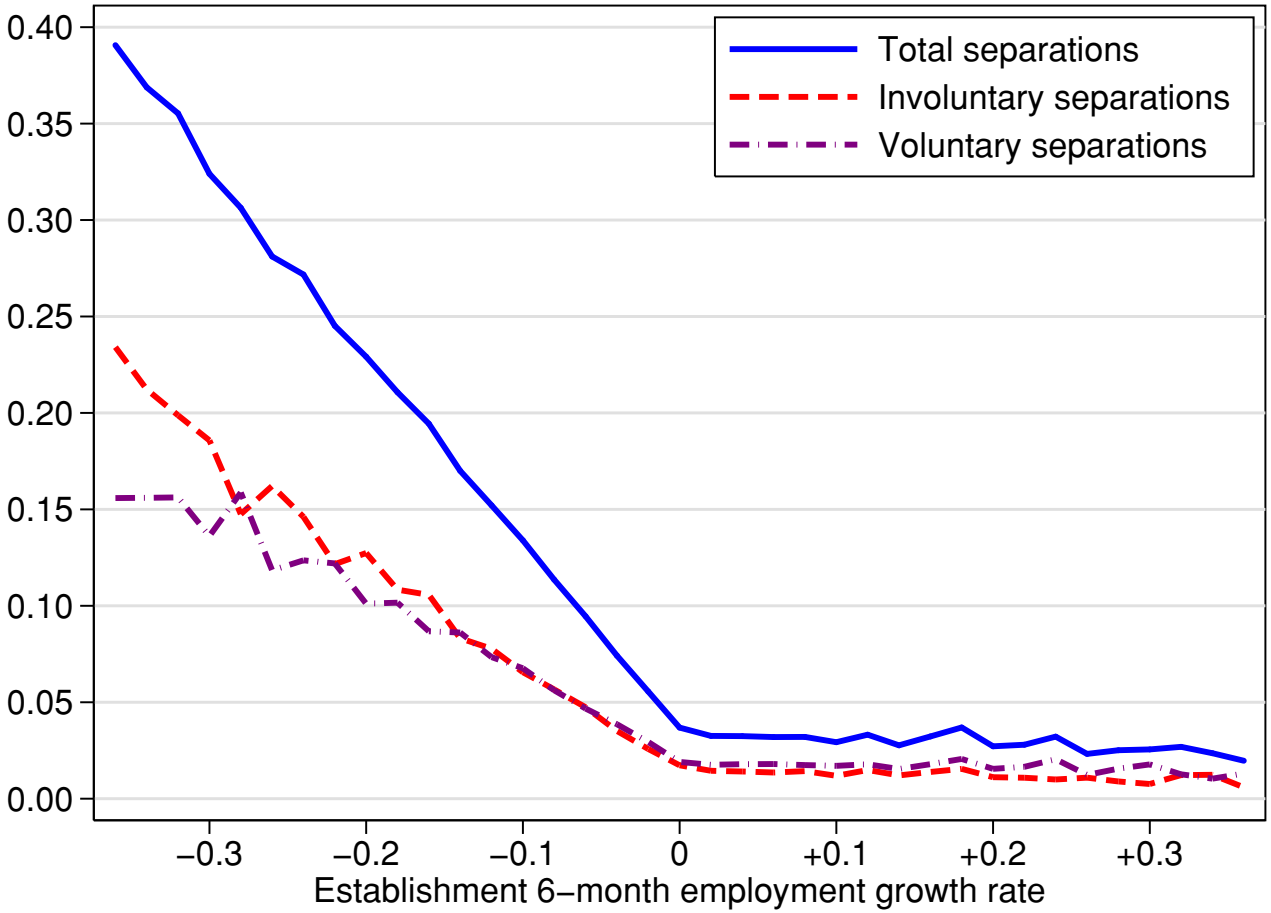


Figure. Relationship between voluntary and involuntary separations and job flows

Table. Estimates of Equation (2) separately by cause of separation. Employer initiated separations are causes 2,3,4 and employee initiated are causes 1,5–10 shown in Appendix A.1.

	γ^s	β^s	Constant	N	R^2
Employer initiated	−0.470	−0.014	0.012	136,664	0.5711
	(0.008)	(0.006)	(0.001)		
Employee initiated	−0.432	−0.022	0.021	136,664	0.5035
	(0.008)	(0.005)	(0.001)		

Variation across establishment characteristics

	Change in β^s	Change in γ^s	Change in Constant
Firm-level bargaining agreement	0.026**	0.036**	−0.001
	(0.012)	(0.016)	(0.001)
Sectoral bargaining agreement	0.020	0.002	−0.002*
	(0.022)	(0.029)	(0.001)
Works council	0.039**	0.013	−0.003***
	(0.011)	(0.015)	(0.001)
Prop. part-time workers > median	0.001	0.067***	0.002***
	(0.011)	(0.015)	(0.001)
Prop. female workers > median	0.026**	0.060***	0.001
	(0.011)	(0.016)	(0.001)
Prop. fixed-term workers > median	−0.006	−0.053***	0.005***
	(0.012)	(0.017)	(0.001)
Prop. freelance workers > median	0.003	−0.002	0.000
	(0.013)	(0.017)	(0.000)
Prop. agency workers > median	0.028*	0.048**	0.000
	(0.017)	(0.024)	(0.001)
Prop. skilled workers > median	−0.030***	−0.024	−0.001*
	(0.011)	(0.015)	(0.001)

***, **, * Significantly different from base group at $< 1\%$, $< 5\%$, $< 10\%$.

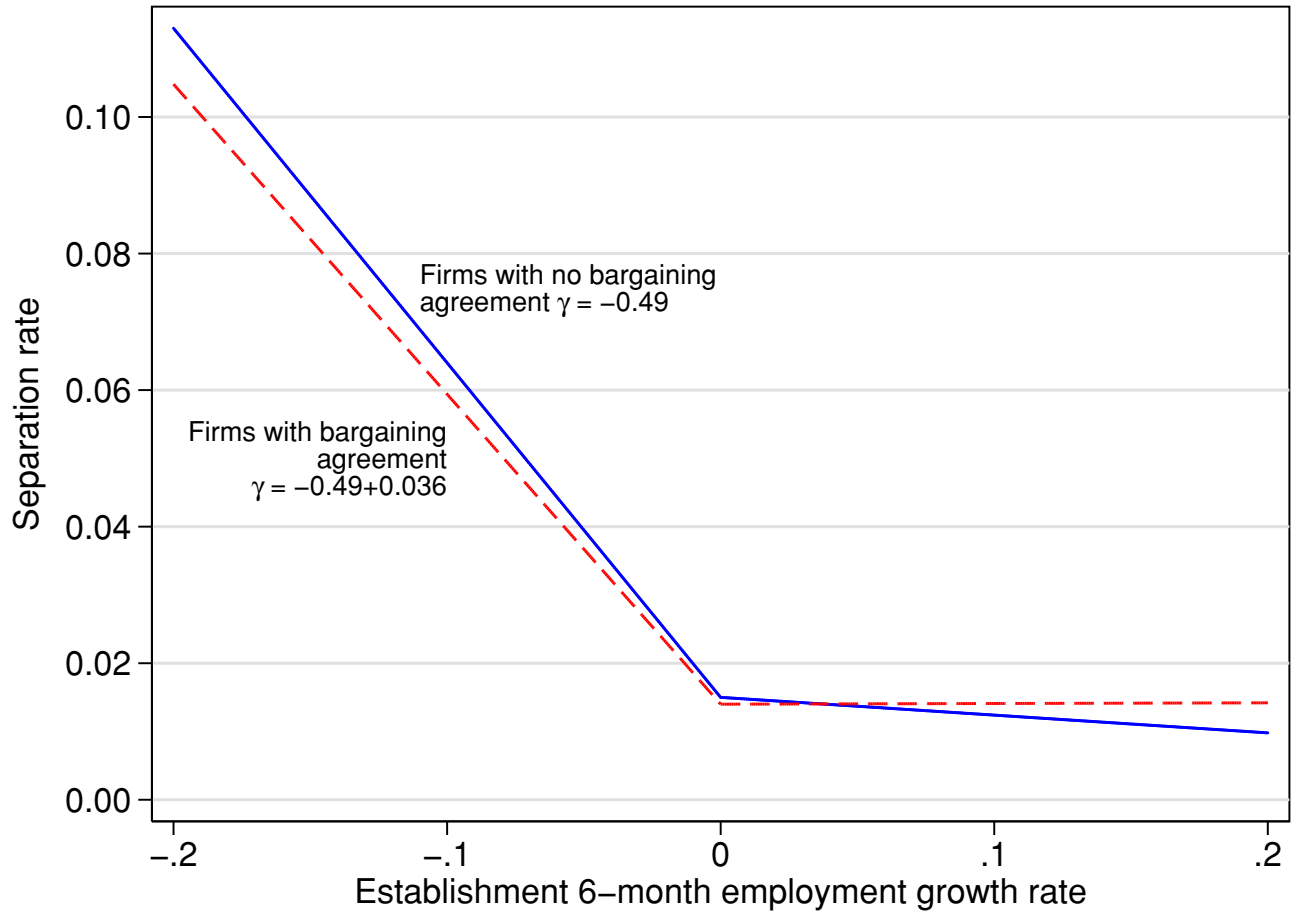
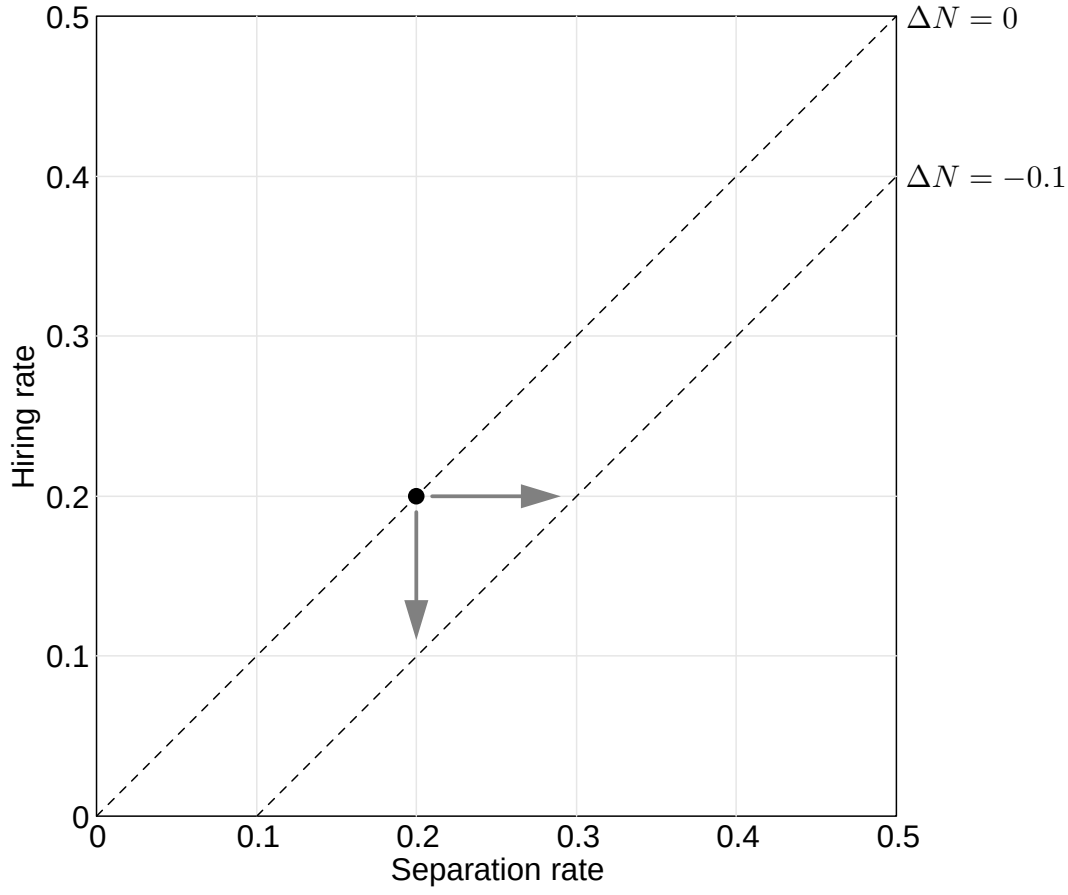


Figure. Establishments with firm-level bargaining agreements have a significantly flatter separation adjustment path, but the effect is quantitatively small

Conclusions and further research

- The relationship between employment growth and worker flows at the establishment level is very similar in German and U.S. establishments
- Establishments which grow increase hirings almost one-for-one; establishments which shrink increase separations almost one-for-one
- Hiring margin is only slightly more important than the separation margin
- Why? Low level of churning
- Quits and layoffs
- The relationship is very stable (across the business cycle, plant location, size, other characteristics)
- Relationship to aggregate changes in unemployment inflows and outflows

Adjustment paths: hiring and firing



Adapted from Burgess et al. (2001)

◂ Return

Existing evidence on job and worker flows

Table. A comparison of hiring and separation rates from the literature. Job creation and job destruction are defined as the sum of positive and negative employment changes as a proportion of average employment between $t-1$ and t.

Study	*Country*	*Sectors*	*Time period*	*Sample*	*Time interval*	*Job creation*	*Job destruction*	*Hiring*	*Separation*
Anderson and Meyer (1994)	US, selected states	All sectors	1978–1984	10-20% sample of social security data; plants employing more than 50 workers	Quarterly			16.1%	17.2%
Hamermesh et al. (1996)	Netherlands	All sectors	1988, 1990	Firm-level survey, 2204 firms	Annual	4.4%	2.6%	11.9%	10.1%
Lane et al. (1996)	US (Maryland)	Manufacturing	1985–1993	100% quarterly social security data	Quarterly	7.5%	8.8%	12.9%	14.2%
Albæk and Sørensen (1998)	Denmark	Manufacturing	1980–1991	All establishments	Annual	12.0%	11.5%	28.5%	28.0%
Abowd et al. (1999)	France	All sectors	1987–1990	Monthly panel data on 2,009 establishments which employ at least 50 workers	Annual	7.6%	6.9%	29.5%	29.7%
Burgess et al. (1999)	US (Maryland)	Manufacturing	1985–1994	Employers with at least 5 employees; spells lasting at least one quarter	Quarterly			19.4%	
Belzil (2000)	Denmark	All sectors	1981–1991	Sample of employees within plants with 5 to 500 primary employees	Annual			68.0%	
Tsou et al. (2001)	Taiwan	All sectors	1987–1997	Establishment survey	Annual	6.0%	9.7%	28.6%	26.3%
Ilmakunnas and Maliranta (2003)	Finland	All sectors	1988–1997	All establishments subject to VAT	Annual	17.2%	10.7%	28.8%	22.2%
Bauer and Bender (2004)	Germany	All sectors	1995–1996	Panel data on 1,378 establishments linked to social security records	Annual	2.5%	7.5%	13.6%	18.6%
Davis et al. (2006)	US	All sectors	2000–2005	Sample of 16,000 establishments (JOLTS)	Quarterly	3.4%	3.1%	9.5%	9.2%
Davis et al. (2006)	US, selected states	All sectors	1993–2003	All establishments (LEHD) linked to social security records	Quarterly	7.6%	5.2%	10.7%	9.2%
Centeno et al. (2009)	Portugal	All sectors	2000–2006	All firms covered by social security system	Annual	13.5%	11.8%	26.1%	24.4%
Gartell et al. (2010)	Sweden	All sectors	1986–2002	All establishments with more than 5 employees linked to social security records	Annual	10.4%	10.2%	23.5%	23.3%

Return

Hiring and separation measures in the IAB panel

1. Did you recruit staff in the first half of <year>?
2. Please indicate the total number of workers recruited.
3. Did you register any staff leaving your establishment/office in the first half of <year>?
4. Please indicate the total number of workers who left your establishment.

Respondents are also asked to distribute the total number of employees who left among the following categories:

1. Resignation on the part of the employee
2. Dismissal on the part of the employer
3. Leaving after termination of the in-company training
4. Expiration of a temporary employment contract
5. Termination of a contract by mutual agreement
6. Transfer to another organization within the establishment
7. Retirement after reaching the stipulated pension age
8. Retirement before reaching the stipulated pensionable age
9. Occupational invalidity/ disability
10. Other

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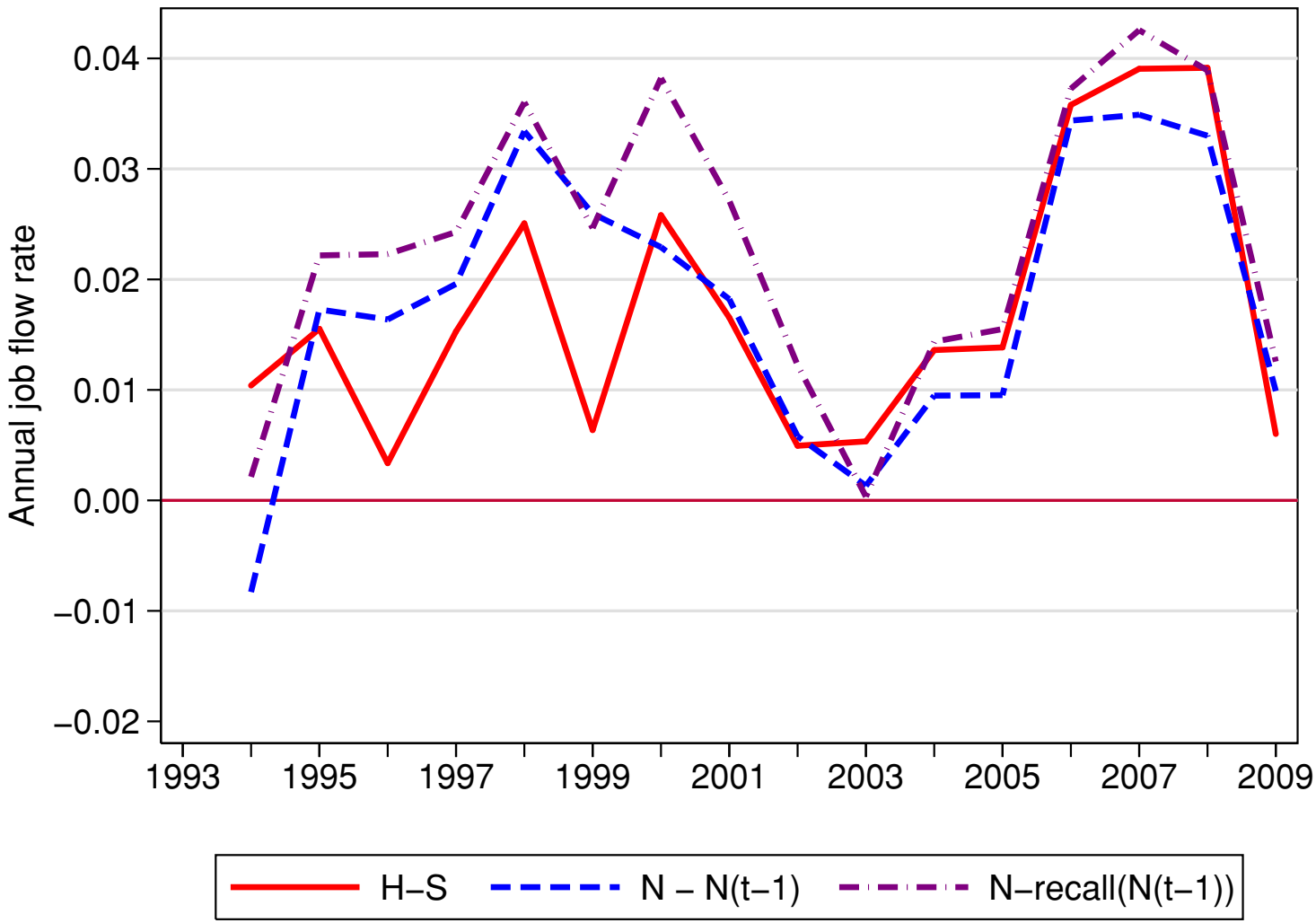
Different measures of job flows



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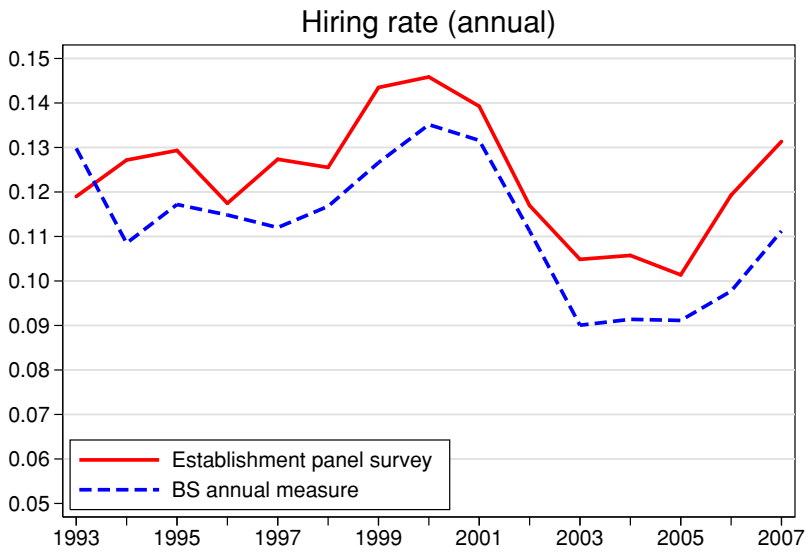
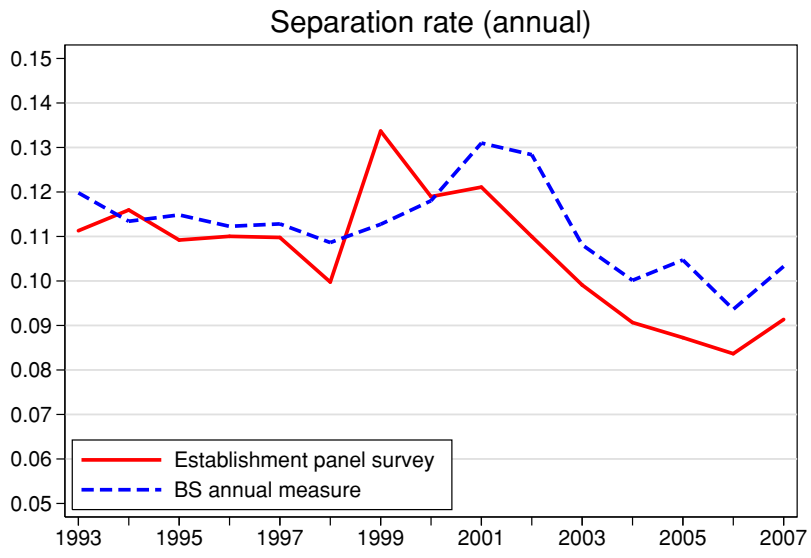
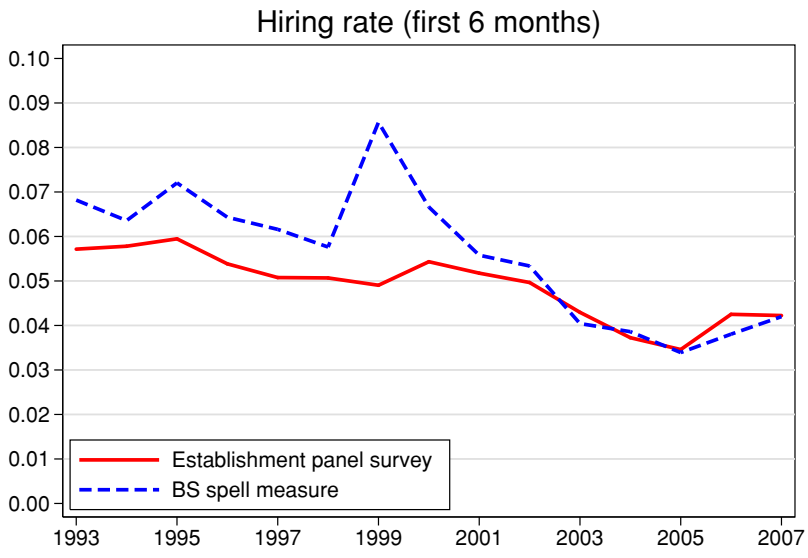
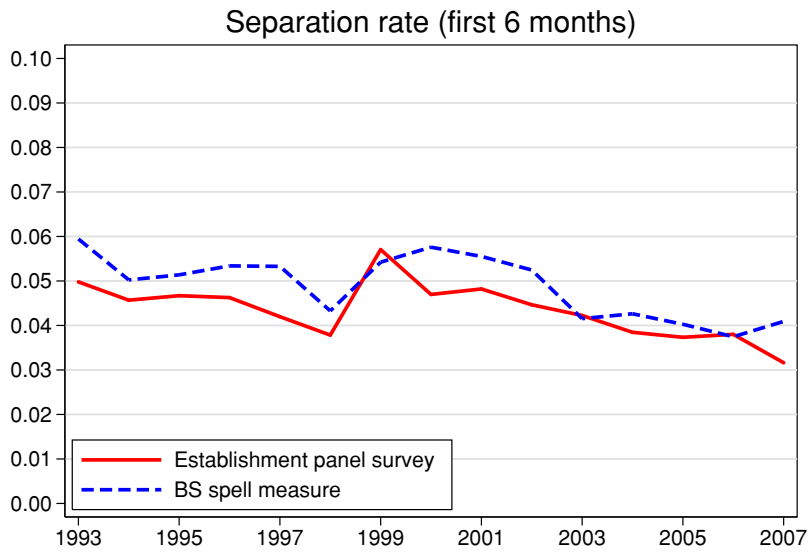
Hirings and separations from survey data and social security statistics (annual measure)



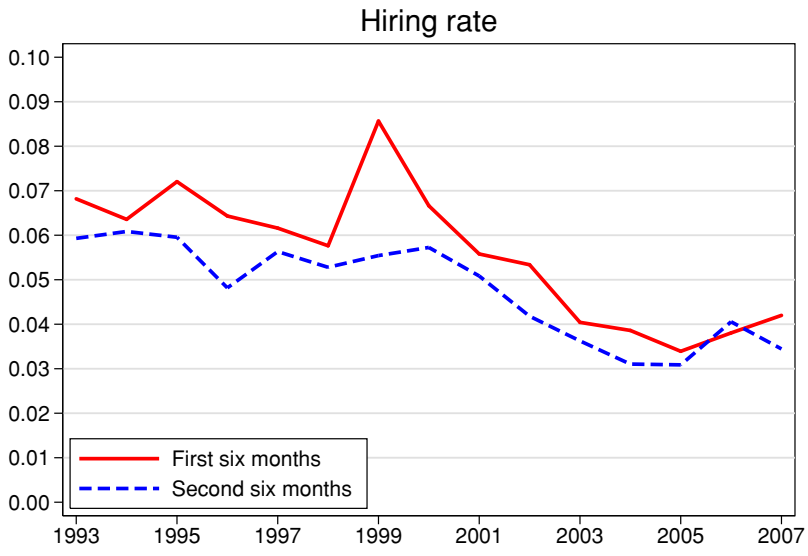


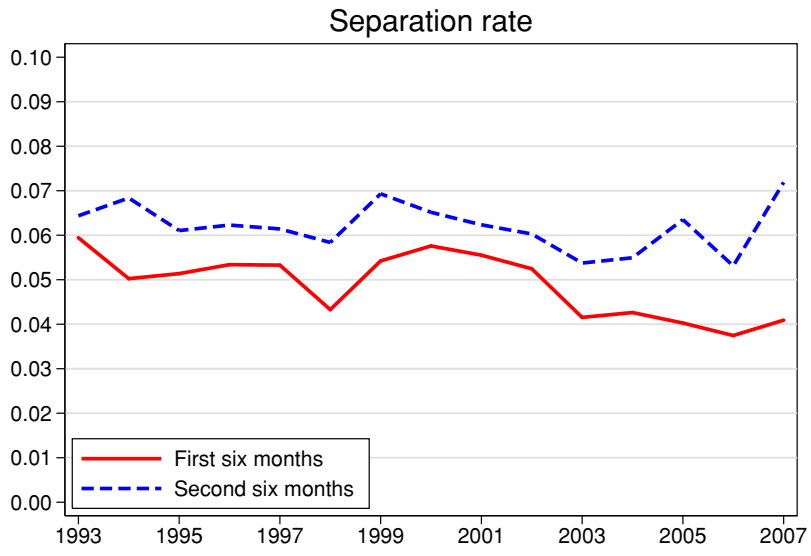
Hirings and separations from survey data and social security statistics (spell measure)





Comparison of first and second six months of the year





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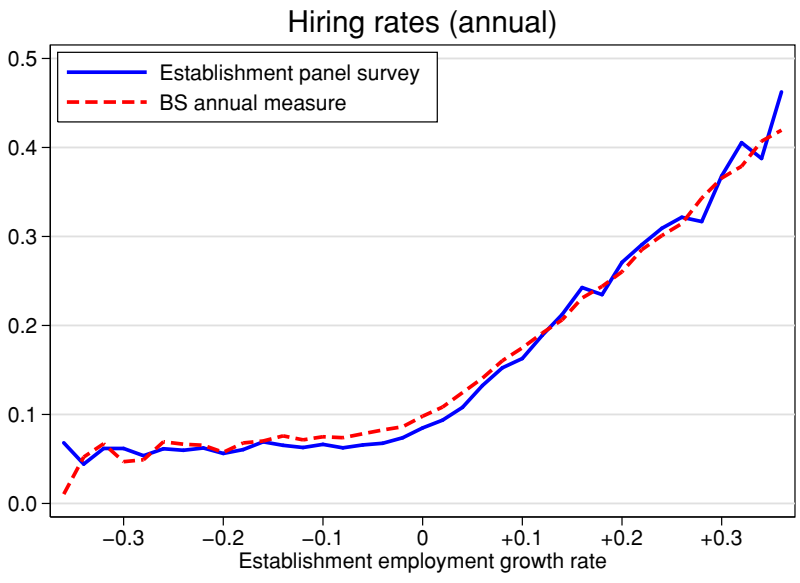
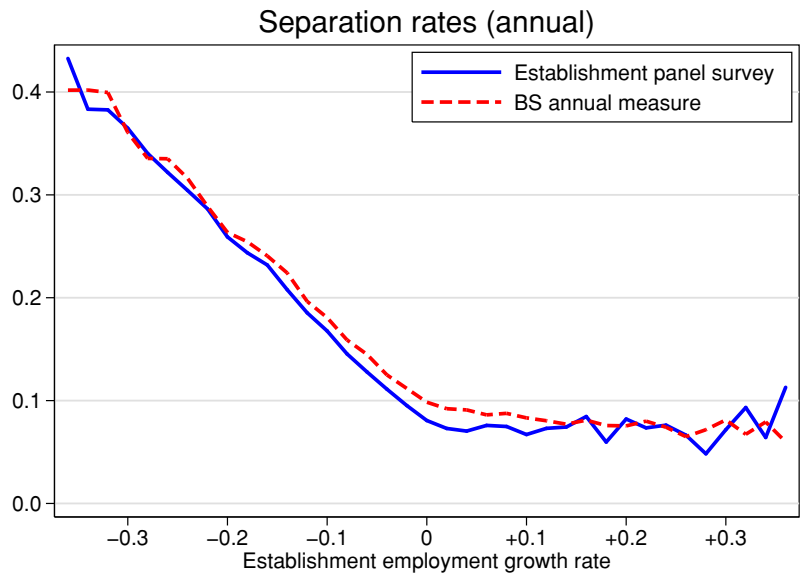
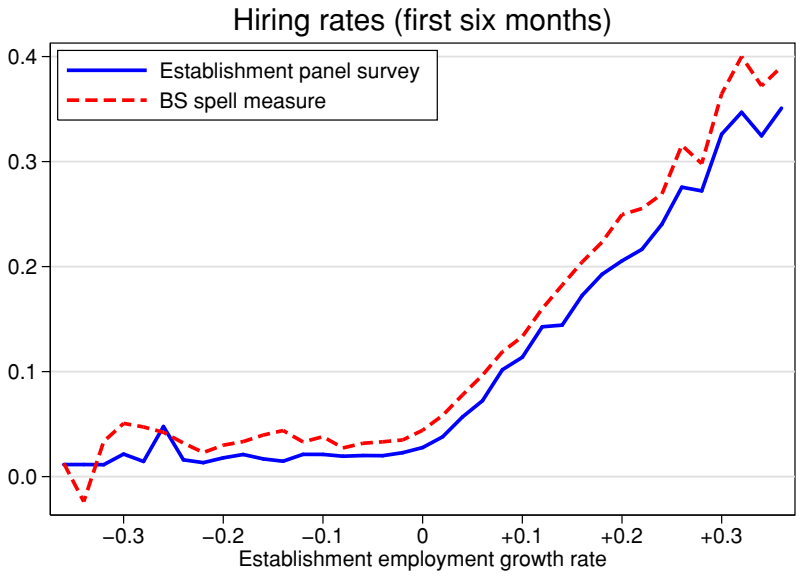
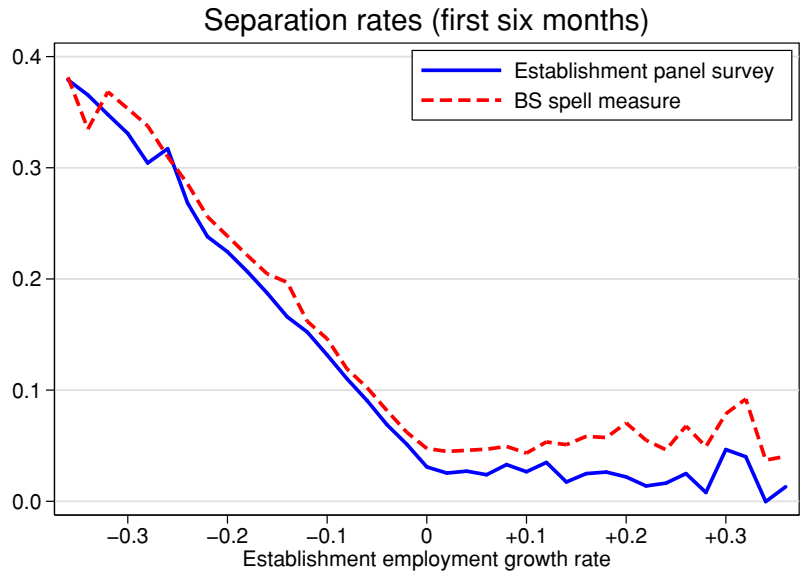
Comparison of adjustment mechanism from survey data and social security statistics (annual measure)





Comparison of adjustment mechanism from survey data and social security statistics (spell measure)





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