Labour Market Dynamics in Germany:
The Role of Job-to-Job Transitions

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Abstract

In this paper, we study the extent of, and the role played by, job-to-job transitions in the German labour market. To do so, we use a subsample of the registry data collected by the German social security system, the IAB employment subsample, for the time period 1975-2001. The latter provides daily information on 2% of the German workforce covered by social security legislation. Using these data, we are able to exactly calculate the number of transitions between the different labour market states, and between different employers over time. We first provide a comprehensive overview of labour market flows in Germany, with respect to both cross-section and time series properties. We then study the cyclical features of these flows. As for separations, we find that they are relatively flat over the cycle, while accessions are markedly procyclical, and that the increased flow into unemployment in a recession is mainly due to unsuccessful on-the-job search, rather than increased match separations. Our findings have important implications both for the way we view recessions and for the role of the labour market as a propagation mechanism for productivity shocks.

JEL codes: *J63, J64, J21, E24*

Keywords: *worker flows, business cycle, job-to-job, employer-to-employer, recession.*

1 Introduction

The quantitative importance of direct job-to-job transitions on the labour market has been recognised for some time. Tobin (1972) was a critique of early search theory on the grounds that it neglected these transitions. However, it has only been much more recently that important empirical and theoretical advances have been made in this field. [1] It has turned out that not only are job-to-job flows important quantitatively, but that they also play a major role for the qualitative features of the labour market, such as its cyclical properties (Shimer, 2005). Furthermore, these flows seem to have an important impact on the evolution of match quality over the cycle (Barlevy, 2002), as well as on the propagating role that the labour market plays for business cycle shocks (Hall, 2004).

There seems to have been a consensus among macroeconomists about the reason for increased unemployment inflows during a recession: a negative productivity shock leads to a burst in match break-ups, which in turn results in previously employed workers becoming unemployed. This conventional wisdom has however been challenged by recent empirical research on the US labour market. Fallick and Fleischman (2004) and Nagypál (2004a) provide direct evidence on job-to-job transitions for the US for the time period 1994-2003. Both papers exploit the "dependent interviewing" techniques introduced in the Current Population Survey (CPS) in 1994. Fallick and Fleischman find that such transitions are large, that they are procyclical, and that they are centered around the recession. Nagypál, on the other hand, finds that, while separations are relatively flat over the business cycle, accessions are much more volatile, and puts this down to a decline in job-to-job transitions during recessions.

These findings have been formalised by Shimer (2005). He shows that in a search model where unemployed workers accept any job and employed workers move to better jobs, the cyclicality of the job-to-job transition rate depends on the nature of the shock. While fluctuations in the separation rate lead to a countercyclical transition rate, fluctuations in the job finding rate lead to a procyclical job-to-job transition rate. Nagypál (2004b) shows that this has important implications for the propagation of shocks. Because workers who have been previously employed are less likely to continue search after moving to a new job, firms prefer hiring them to hiring the unemployed. During booms, a large fraction of job seekers is employed, which raises expected profits. Therefore, firms create more vacancies thus enhancing the effects of a positive productivity shock. Krause and Lubik (2004) also find important propagation effects in a multi-sector model with highly elastic on-the-job search. Workers switch sector in response to a positive productivity shock in another sector. This changes the marginal productivity in the sector that the worker has left, which in turn leads to firms creating vacancies in this sector, and more people

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[1] For a brief summary of the literature, see Pissarides (2000).

moving. The ensuing vacancy chain propagates the initial productivity shock. These studies thus stress the importance of direct job-to-job transitions for the role of the labour market as a propagation mechanism of productivity shocks.

Direct job-to-job transitions also have an important impact on the way we view recessions. The traditional view is the Schumpeterian one which postulates that bad matches are weeded out during recessions. This conclusion ensues, for example, in the standard search and matching model of the labour market as epitomised in Mortensen and Pissarides (1994). There, a negative aggregate shock leads to the destruction of matches featuring low idiosyncratic productivity. This cleansing effect of recessions has however been challenged by Barlevy (2002). He argues that on-the-job search usually leads to better matches, as otherwise workers would not search while employed. If recessions hamper job-to-job transitions, this can result in matches created during recessions being of lower quality. In this case, recessions could exert a sullying, rather than cleansing, effect by worsening the quality of newly created matches.

Despite this perceived importance of direct job-to-job transitions, empirical evidence is still relatively scarce in this field. The present article attempts to fill this void for Germany by using registry data provided by the German social security system. This data set allows us to record worker transitions on the labour market, including job-to-job flows, on a daily basis. We are therefore able to exactly quantify worker flows, and to provide a comprehensive analysis of their cross-sectional and time series properties. Furthermore, we can give a detailed picture of the cyclical response of labour market flows. It turns out that we corroborate the findings by Nagypál (2004a) for the US that worker flows into unemployment during a recession are mainly caused by a decline of job-to-job transitions, rather than by a burst in separations. This poses a major challenge to the way macroeconomists tend to view recessions. In general, our findings should be of interest to labour economists and macroeconomists alike.

The plan of the paper is as follows. In the next section, we describe the data set used. In the third section, we give an overview of the relative importance of job-to-job transitions over time. The fourth section is concerned with the cyclical properties of employer-to-employer flows and answers the question whether it is increased job destruction or lower job-to-job transitions which lead to increased flows into unemployment in a recession. The fifth section looks at job creation and analyses the evolution of match quality over the cycle. The final section summarises and concludes the discussion.

2   The data

The data used come from the IAB employment subsample, which covers the period 1975-2001. The data source consists of notifications made by employers to the social security agencies, which include health insurances, statutory pension schemes and unemployment insurance.[2] These notifications are made on the behalf of workers, employees and trainees who pay contributions to the social insurance system. This means that, for example, civil servants and workers in marginal employment are not included. Notifications are made at the beginning and at the end of an employment or unemployment spell. Furthermore, there is an annual report which updates some of the information. The information provided is the following: sex, year of birth, and degree of education/training. Also, information on the occupation, the gross earnings, an establishment number, and the economic sector is available on a daily basis.

The data base covers 2% of all the persons who, between the 1st January 1975 (for Western German employees) or the 1st January 1992 (for Eastern German employees) and the 31st December 2001, worked in an employment covered by social security. Overall, the subsample includes over 1.29 million people, of which 1.1 million people from Western Germany. For 1995, the employment statistics cover nearly 79.4% of the employed persons in Western Germany, and 86.2% of all employed persons in Eastern Germany. As for the unemployed, only those entitled to unemployment benefits are covered. This means that the unemployment stock is about one third lower than the official labour market statistics.[3]

As it is possible to track the employment and unemployment history of every person in the sample, we can use these data in order to construct worker flows for the aggregate economy. We do this on a monthly basis. Three states of the labour market are considered: employment covered by social security, unemployment, and "non-participation". The latter is defined as: not paying social security contributions while employed, and not receiving unemployment benefits. This means that non-participation includes the state "out-of-the-labour-force" as defined in the CPS. However, it can also mean self-employment, civil service, retirement, or marginal employment. Thus, for those ever registered with the social security system, "non-participation" provides an upper bound for "out-of-the-labour force".

We compute the flows between the three mentioned states and within the employment state. It should be noted here that our notion of a job is establishment (not firm) based. This means that a change of establishment within the same firm will also be recorded as a job switch. Our convention for calculating flows between two states is as follows. If the time interval between two records is smaller than 30 days, we count it as a direct transition between the two states recorded.[4] If the gap between two notifications is larger than 30 days, we count this as an intervening spell of non-participation. As for job-to-job flows, records that are from the same person and the same establishment are counted as one single spell as long

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[2]For a complete description of the data set, see Bender, Haas, and Klose (2000).

[3]See Bender et al. (1999).

[4]We did the calculation for smaller intervals as well. This does not change the results significantly.

as the interruptions in notification are not longer than 7 days. As we are interested in consistent time series that go as far back as possible, in the empirical analysis we only include workers from Western Germany. In order to do so, we do not consider observations about employees that at some point have worked in Eastern Germany.

The advantages of the data set are thus as follows: first, it does not suffer from the problems inherent in most panel data sets, e.g. there is no sample attrition, and it follows workers over a long period of time because there is no need for rotation as in the CPS. Given the length of our times series, the evidence here is likely to be more conclusive than the US studies cited above, which observe only one episode of labour market tightening (1994-2000) and loosening (2000-2003). Our data set covers two decades and two full business cycle swings. Second, it offers observations at a very high frequency, which means that every actual transition is observed. Again, this is a distinct advantage over survey data like the CPS, which does not record multiple transitions that take place between two interview dates. There are two disadvantages to the data set. On the one hand, it is representative for the working population covered by social security legislation, and not for the entire working population. On the other hand, it only covers the unemployed who receive unemployment benefits. However, the share of workers covered by social security relative to total employment is large and relatively stable, at around 80 %. Furthermore, the overwhelming majority of job-to-job transitions takes place within the sector covered by social security.[5] Therefore, the data used covers the transitions we are interested in. The special structure of the data set has to be taken into account when interpreting the different flows however, especially the ones going to and from non-participation.

3 Labour market dynamics in Germany: The overall picture

We consider seven different flows: six flows between the three labour market states, and job-to-job flows. In order to be able to abstract from labour force growth, we normalise the flows by the labour force, and thus get normalised flow rates. We depict averages for the time period 1980:1 - 2000:12 for those rates in figure 1. "U" denotes unemployment, "N" non-participation as defined above, and "E" employment. This gives an indication of the magnitude and of the relative importance of the different flows.[6] As one can see, flows between employment and non-participation are most important quantitatively. Very close in order of magnitude are direct job-to-job transitions. Flows between employment and unemployment, on which much of the theoretical search and matching literature focuses, only come third. Finally, flows

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[5] We currently analyse the transitions between social security employment and other employment in a separate research project.

[6] Inflows not equalling outflows for a given state are due to the fact that the stocks are not constant over time.

between unemployment and non-participation are relatively low. These figures are roughly in line with the ones reported in Burda and Wyplosz (1994). The main difference is that we find slightly higher flows between employment and non-participation. This is mainly due to the fact that our third state, non-participation, differs from the usual definition of "out of the labour force" (OLF).

We next use the spell information we have about workers to construct time series for the different flows. The results are depicted in figure 2. It becomes apparent that there is no clear trend in the data.[7] However, some flows seem to be very sensitive to the business cycle. The peaks of the German business cycle are in $80/I$ and $92/I$, and the troughs are in $82/IV$ and $93/IV$. The shaded areas in the graph mark the dates of the beginning (business cycle peak) and the end (business cycle trough) of a recession. As one can see, job-to-job flows are clearly procyclical, as are flows from non-participation to employment. With the exception of the flow from employment to non-participation, which is relatively flat over the business cycle, all the other flows are countercyclical. This is also confirmed by the contemporaneous correlations of these flows with a measure of the business cycle (growth of log GDP), which are presented in table 3. These results are in line with other research (cf. Burda and Wyplosz, 1994). The figures also imply that one third of all new accessions (new employment relationships involving workers who come from either unemployment, non-participation, or another job) are made up of workers who make a direct job-to-job transition. Moreover, the latter transitions account for more than one third of all match separations. The next section analyses separations, accessions, and job-to-job transitions in a more detailed way.

4   Separations and job-to-job flows

We first look at the cross-sectional features of separations and of the flows making up separations, namely the flows from employment to another job (EE flows), to unemployment (EU flows), and to non-participation (EN flows). We report monthly averages of separations and its underlying flows for the time period 1980-2000 and for different worker categories in table 1.[8] The categories considered are age, sex, and the industrial and educational background of a worker. For each of these, separations are computed as share of employment, and the flows are computed as share of employment and of separations, respectively. Several features are worth noting. First, there is a general tendency of separations to decline with age. This can be justified by the accumulation of job-specific human capital on the one hand (cf. Pissarides, 1994), and learning about match quality on the other hand (cf. Jovanovic, 1984). The only exception is the oldest age group, where separations rise again. As this is mainly due to an increase in flows into non-participation, this is clearly linked to retirement decisions. The youngest age

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[7]Unfortunately, the data are not very reliable before 1980, cf. Bender et al. (2000).

[8]The figures for accessions are very similar and are obtainable from the author upon request.

cohort features important inflows into non-participation as well. This is in all likelihood due to workers returning to the education sector. As our research here is not concerned with life-cycle choices linked with education and retirement, we restrict the following analysis to prime-age workers, defined as workers aged between 25 and 55. The sex of a worker also has an impact on the likelihood of separation. A male worker is less likely to separate from his employer in a given month. This is mainly due to the fact that women experience less direct job-to-job movements, but instead transit more often from employment to non-participation. We put this down to the fact that women more often leave the labour market in order to raise children. Working in a specific industrial sector also influences the likelihood of separation. As one can see from the table, separations are highest in the construction sector, with the flows between employment and unemployment being of particular importance. The main reason for this is in all likelihood that workers in this sector are laid off during seasonal downturns, receive unemployment benefits during their spell of unemployment, and are reemployed again thereafter. Unsurprisingly, turnover is particularly low for government employees. Finally, the type of degree a worker holds plays an important role for the kind of separation she is likely to experience. Workers with relatively low skills, namely those without vocational training (with or without high-school degree) are very likely to experience a separation, in which case they face a high probability of becoming unemployed or flowing into non-participation. Workers who have accumulated more specific human capital through, e.g., a vocational training or a degree at a polytechnical university, are more likely to have a new job lined up upon separation. Summarising the above results, it is worth emphasising that worker characteristics play an important role in determining aggregate flows in the economy. Therefore, the composition of the workforce, which potentially varies both over time and over the business cycle, is a factor to be considered.

We now want to examine the evolution of separations and accessions over the cycle more closely. We therefore depict separations, accessions, and employer-to-employer flows for the time period 1980-2000 in figure 3 (note that these are now yearly rates). As one can see, separations (defined as EE+EU+EN) are much flatter than accessions (EE+UE+NE). The fact that direct job-to-job transitions decline markedly is an indication that hirings play an important role in this context. Furthermore, the evolution of the three flows is consistent with a shift of job-to-job transitions to employment-to-unemployment transitions in a recession. The evidence therefore points to the hypothesis that recessions go along with a decline in job-to-job transitions, rather than a burst in separations.

Given the cross-sectional features of separations and the underlying worker flows, the above results could however derive from composition effects, for example with respect to industrial structure or age. We therefore follow Nagypál (2004) and decompose the process of becoming unemployed in the following way: denote the labour market state by s, let subscripts i and t denote a person and time period,

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respectively, and let P_{it}^j be the probability of event j happening to person i at time t. Furthermore, let S be the event of a separation, LF the event of staying in the labour force conditional on having been employed, but separated from the employer in the previous period. Finally, let superscript U denote the event of becoming unemployed conditional on having been employed, having separated from the employer, and having stayed in the labour force upon separation. Then the transition from employment to unemployment, EU, can be expressed as follows:[9]

$$P_{it}^{EU} \quad = \quad P_{it}^S P_{it}^{LF} P_{it}^U$$

with

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\begin{aligned}
P_{it}^{EU} &= P(s_{it+1} = U | s_{it} = E) \\
P_{it}^S &= P(\text{separate from period t employer} | s_{it} = E) \\
P_{it}^{LF} &= P(\text{stay in LF} | \text{separate from period t employer}, s_{it} = E) \\
P_{it}^U &= P(s_{it+1} = U | \text{stay in LF, separate from period t employer}, \\
&\qquad s_{it} = E)
\end{aligned}
$$

The above transition probabilities can be estimated using a logit specification:

$$P_{it}^j = [1 + exp(X_{it}\beta_X^j + D_t\beta_t^j)]^{-1}$$

where $j \in \{EU, S, LF, U\}$ and X_{it} includes indicators for age cohorts, industry, sex, marital status, education, part-time employment, and month and year dummies. The ensuing equations are estimated using maximum likelihood. We use the regression results in order to compute expected transition probabilities for every year. We thus get a time series from 1980-2000 for each of the regression outcomes. Table 4 gives some descriptive statistics of the three time series, namely the mean, the variance, and the relative variance, i.e. the variance divided by the mean. For our purpose, the latter statistic is the most important one. It shows that the relative variability of the conditional probability of becoming unemployed is about 50 times larger than the conditional probability of staying in the labour force, and about 19 times larger than the relative variability of the conditional probability of separating from one's employer. This shows two things: first, the business cycle response of movements into and out of the labour force can, to a certain extent, be neglected when analysing the business cycle features of worker flows. Second, the conditional probability of separating is much less variable that the conditional probability of becoming unemployed, which is our main point. The three different time series are depicted in figures 5, 8, and 9.

Figure 5 gives the expected probability of separation conditional on previous employment for every year, where the shaded areas again replicate times of recession. As this is the probability for the entire

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[9]A graphical representation of this decomposition can be found in figure 4 in the appendix.

sample, naturally the results replicate the features of the separations in figure 3. Figures 6 and 7 repeat the same exercise for employees with different education levels and working in different industrial sectors, respectively. This shows that there is no burst in separations, neither for workers characterised by a specific education, nor for workers employed in a certain industrial sector. Thus, the results obtained from the aggregate evidence about separations do not appear to be due to composition effects.

The probability of staying in the labour force, conditional on having separated, is depicted in figure 8. This graph shows that there are more people leaving the labour force just after a recession (in 1983), or during a recession (in 1992) however, the effect is quantitatively small.

Figure 9 depicts the conditional probability of flowing into unemployment. Here, the business cycle influence looks much more important, with the probability hitting lows at the time of business cycle peaks in 1980 and 1992, and hitting highs at the time of business cycle troughs in 1982/3 and 1993. The probability of becoming unemployed upon staying in the labour force jumps by nearly 50% in both recessions. This is a large effect, especially when compared with the business cycle responses of the other probabilities.

Taken together, these results give some evidence for the hypothesis that the traditional view of recessions, with more workers getting fired which then leads to higher unemployment, does not apply to the German labour market. If anything, separations are relatively flat over the business cycle, while accessions are procyclical. It seems like the decline in job-to-job transitions in a recession lies at the heart of this evolution.

5   Conclusion

In this paper, we have analysed the cyclical dynamics of the German labour market by looking at worker flows. First, we provided both time-series and cross-sectional evidence on these flows. This showed that the flows between employment and non-participation, as well as job-to-job flows, are most important quantitatively. Furthermore, worker characteristics play an important role for worker flows. In the main part of the paper, we analysed match separations and hirings, and the flows making them up. We found that, in the aggregate, accessions are more volatile over the cycle than separations. While the latter are relatively flat, the former are clearly pro-cyclical. Therefore, hirings seem to play a more important role for labour market dynamics than separations. This issue was further investigated by decomposing the process of becoming unemployed using a method proposed by Nagypál (2004). This showed that separations are relatively flat over the business cycle also for different worker groups. Therefore, the aggregate results do not seem to be caused by composition effects. We concluded that the increased inflow into unemployment in a recession is mainly due to the decline in direct job-to-job transitions, and not to increased match break-ups.

In sum, our results in this paper provide further evidence that recessions do not lead to a burst in separations. In fact, the increase in unemployment during a recession seems to be caused by a reduction in hirings, i.e. match formations. This reduction in hirings goes together with a drop in direct job-to-job transitions. As a consequence, recessions might not play a cleansing role in the labour market. This is a challenge to the conventional wisdom about the link between unemployment and recessions. Our results should therefore be of interest to labour economists and macroeconomists alike.

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A Tables

	As share of employment				As share of separations		
	Sep.	EE flows	EU flows	EN flows	EE flows	EU flows	EN flows
All observations	2.28	0.82	0.63	0.82	36.08	27.81	36.11
By age							
16-19	7.06	1.58	1.40	4.08	22.41	19.79	57.80
20-29	3.48	1.30	0.92	1.26	37.37	26.45	36.18
30-39	2.09	0.88	0.56	0.66	41.83	26.52	31.65
40-49	1.28	0.41	0.45	0.41	41.07	30.82	28.11
50-59	1.51	0.40	0.56	0.56	26.44	36.85	36.71
60-69	2.06	0.35	0.43	1.29	16.79	20.72	62.49
By sex, age 25-55							
Male	1.90	0.83	0.55	0.52	43.64	29.14	27.22
Female	2.02	0.68	0.55	0.79	33.83	27.05	39.12
By industry, age 25-55							
Agr.. Energy. Mining	1.67	0.55	0.63	0.49	33.21	37.51	29.28
Production	1.37	0.58	0.39	0.40	42.53	28.51	28.96
Construction	3.19	0.95	1.50	0.74	29.80	47.10	23.10
Trade. transport	2.35	1.07	0.56	0.72	45.54	23.91	30.55
Services	2.30	0.91	0.53	0.86	39.48	23.24	37.28
State	1.23	0.49	0.35	0.40	39.50	28.10	32.40
By education, age 25-55							
no vt. no Abi	2.18	0.65	0.79	0.74	29.68	36.24	34.08
vt. no Abi	1.73	0.74	0.48	0.51	42.66	28.07	29.27
no vt. Abi	2.67	0.93	0.43	1.31	34.91	15.97	49.11
vt. Abi	2.00	0.99	0.33	0.67	49.62	16.67	33.71
polytec	1.41	0.83	0.22	0.37	58.65	15.32	26.03
university	1.96	0.96	0.27	0.73	48.83	13.90	37.27

Table 1: Separations, cross-sectional properties, monthly averages 1980-2000, in per cent. Notes: *vt* denotes *vocational training*, *Abi Abitur* (high-school degree), and *polytec* and *university* stand for a degree from a technical and a regular university, respectively.

	Absolute figures		Normalised figures		
Flow	Mean	SD	Mean	SD	Mean/SD
EE	131	100	.76	.58	.76
EN	131	53	.76	.31	.40
EU	101	47	.59	.28	.47
UE	85	40	.50	.23	.46
NE	118	64	.69	.38	.55
NU	48	10	.28	.06	.21
UN	53	10	.31	.06	.18

Table 2: Mean and standard deviation of monthly worker flows for the time period 1980-2000. *Notes:* absolute figures in 1000s; normalisation by the labour force; figures for normalised flows in per cent.

EU	-0.152	UE	-0.223
EN	-0.035	NE	0.071
UN	0.395	NU	0.138
EE	0.120		

Table 3: Business cycle correlations of labour market flows, at monthly frequency, 1980-2000.

	P(S|.)	P(LF|.)	P(U|.)
$\overline{x}$	0.30	0.796	0.213
$var(x)$	0.0002	0.0004	0.0032
$\frac{var(x)}{\overline{x}}$	0.0008	0.0003	0.015

Table 4: Descriptive statistics for the conditional probabilities of separation, P(S|E), of staying in the labour force, P(LF|.), and of becoming unemployed, P(U|.).

B   Figures
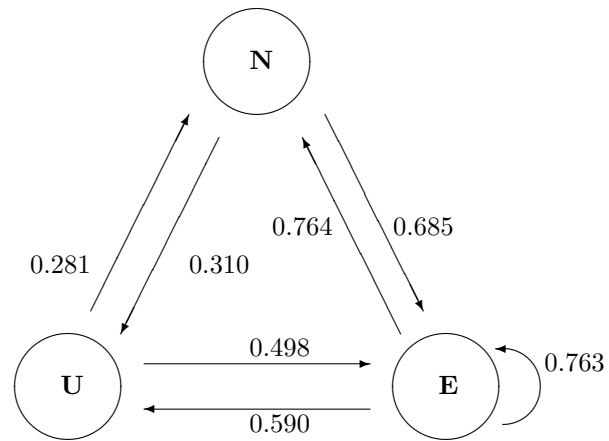
Figure 1: Normalised worker flows in Germany, monthly averages for 1980-2000, in percent.
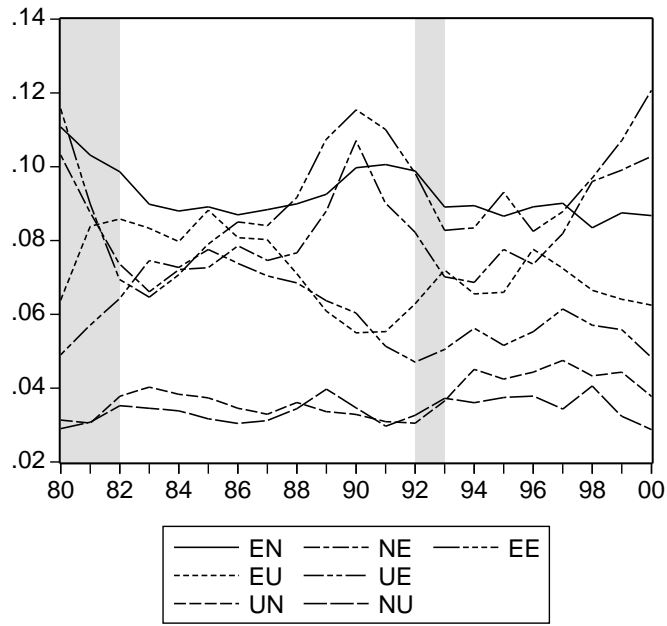
Figure 2: The evolution of worker flows, 1980-2000, monthly rates. Shaded areas are times of recession.
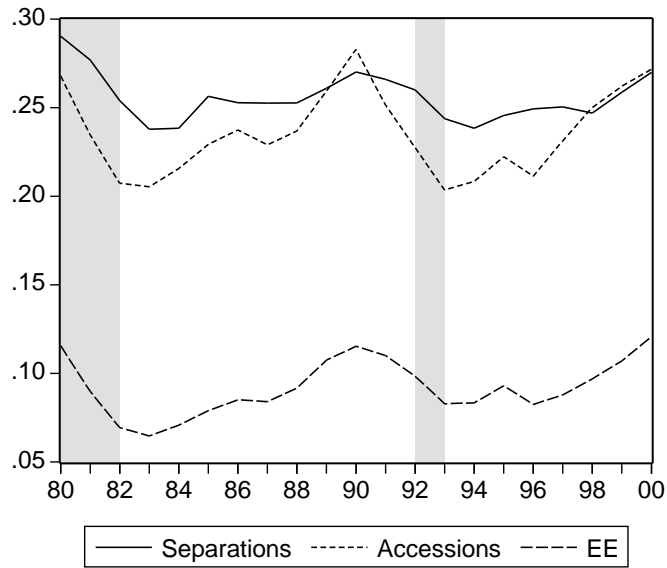

Figure 3: Separations, accessions, and job-to-job transitions, yearly rates. Shaded areas are times of recession.
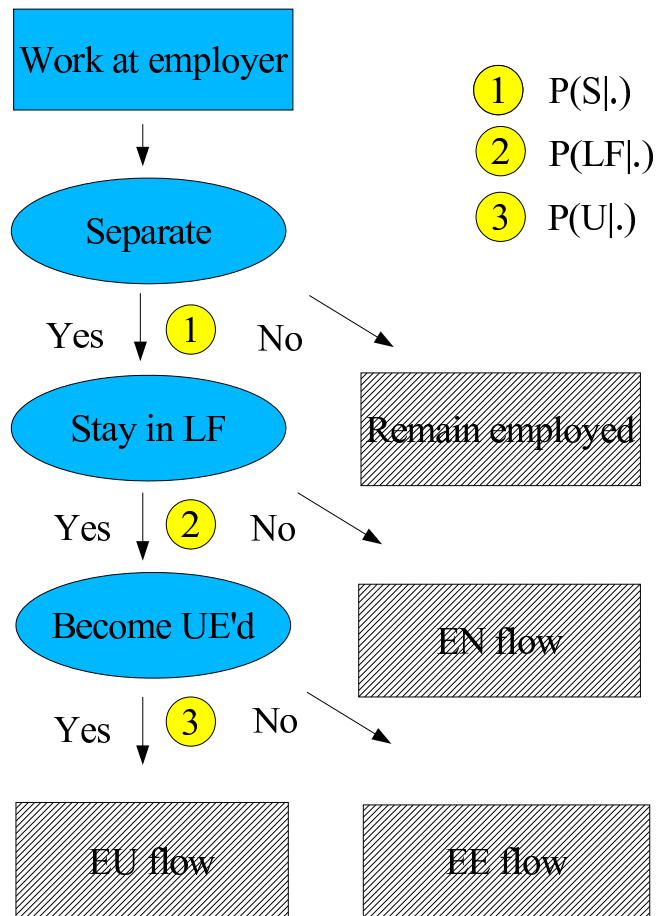
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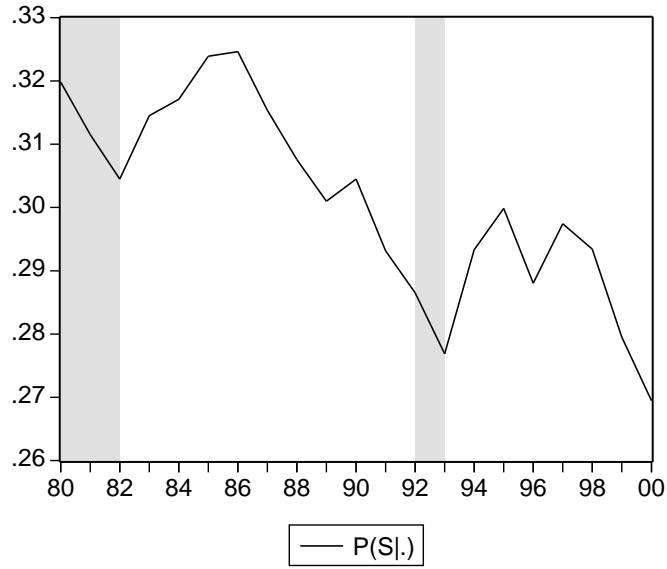Figure 4: The Nagypal (2004) decomposition of becoming unemployed and ensuing worker flows.

Figure 5: Conditional probability of separation. Shaded areas are times of recession.
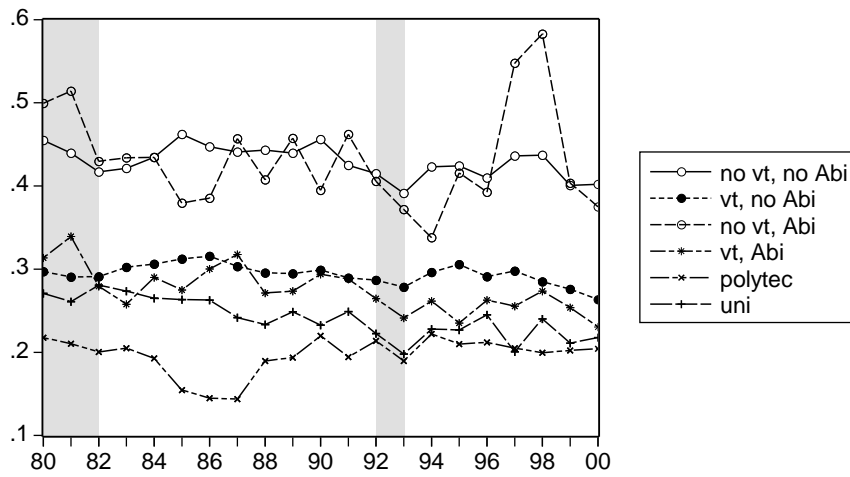
Figure 6: Conditional probability of separation for workers with different education. Shaded areas are times of recession.
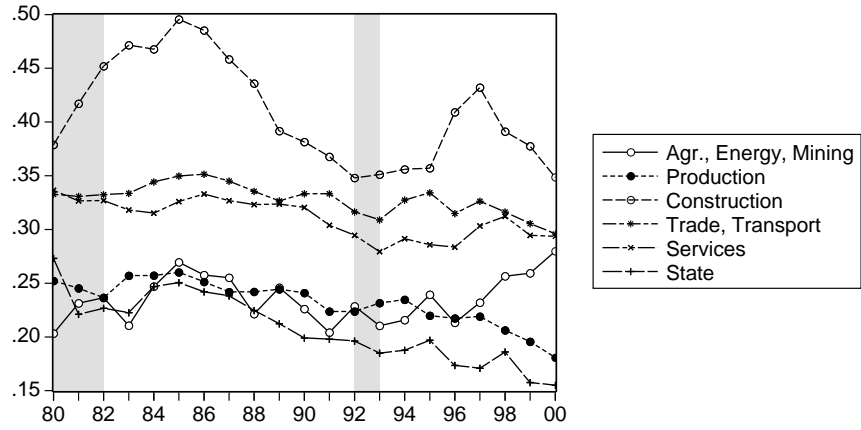
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Figure 7: Conditional probability of separation for workers in different industrial sectors. Shaded areas are times of recession.
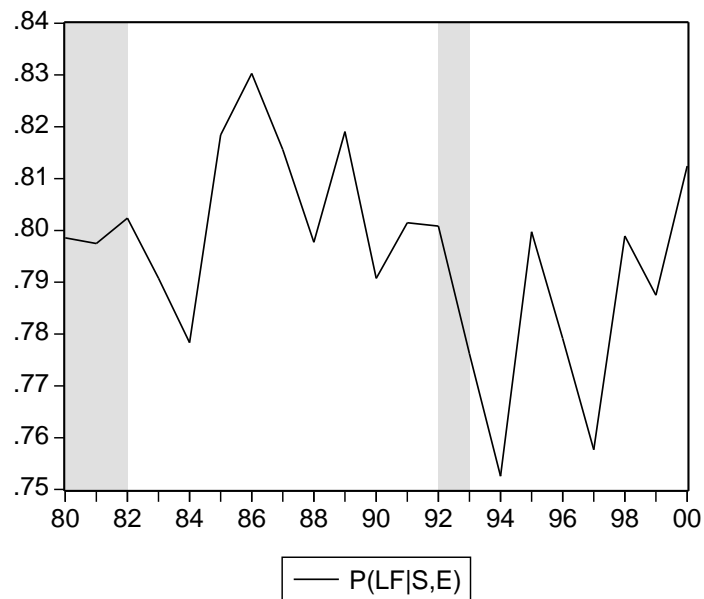

Figure 8: Conditional probability of staying in the labour force.
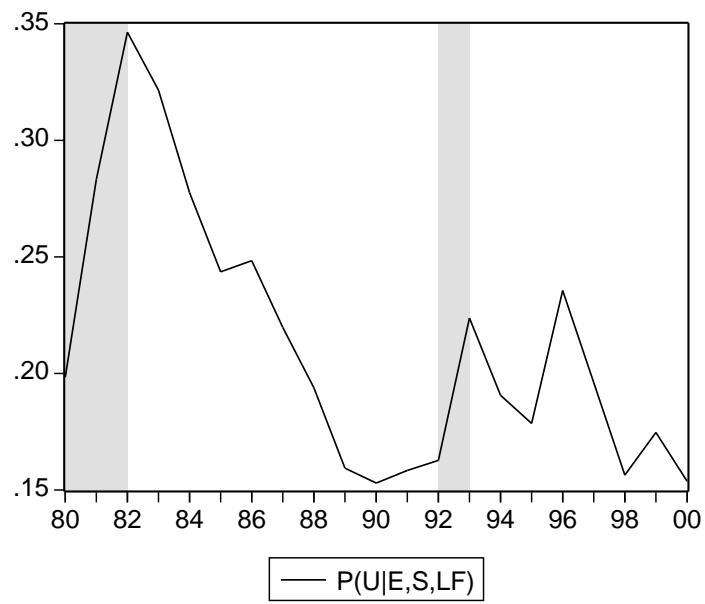
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Figure 9: Conditional probability of unemployment. Shaded areas are times of recession.